

***"This is the peer reviewed version of the following article: [Aust J Rural Health, 2017], which has been published in final form at [http://dx.doi.org/10.1111/ajr.12377]. This article may be used for non-commercial purposes in accordance with [Wiley Terms and Conditions for Self-Archiving](#)."***

# **Assessing the impact of vulnerability on perceptions of social cohesion in the context of community resilience to disaster in the Blue Mountains**

## **Authors**

Sarah Redshaw (25% contribution)

Institute of Land Water and Society, Charles Sturt University, Bathurst Australia

Valerie Ingham (25% contribution)

Australian Graduate School of Policing and Security, Charles Sturt University, Bathurst, Australia

Marion McCutcheon (25% contribution)

School of Arts, English and Media, Faculty of Law, Humanities and the Arts, University of Wollongong

John Hicks (Corresponding author) (20% contribution)

School of Accounting and Finance, Charles Sturt University, Bathurst, Australia

Panorama Avenue, Bathurst, NSW, Australia, 2795.

Telephone: 61 2 6338 4234. Email: [jhicks@csu.edu.au](mailto:jhicks@csu.edu.au)

Oliver Burmeister (5% contribution)

School of Computing and Mathematics, Charles Sturt University, Bathurst, Australia.

## **Funding:**

The research was conducted through a partnership between Charles Sturt University, Blue Mountains City Council, Katoomba Neighbourhood Centre Inc., and Springwood Neighbourhood Centre Co-operative Ltd. Each organisation contributed an equal amount of funding to the conduct of the research.

## **Abstract**

### **Objective**

To assess the impact of network communications, community participation and elements of vulnerability on the perception of social cohesiveness in the Blue Mountains Local Government Area (Blue Mountains LGA).

### **Design**

A questionnaire was administered to residents of the Blue Mountains LGA. Econometric analysis of the resulting data was undertaken.

### **Setting**

Blue Mountains Local Government Area, Australia (Blue Mountains LGA)

### **Participants**

1,103 residents of the Blue Mountains LGA responded to the questionnaire.

### **Main outcome measure(s)**

The responses enabled the construction of variables measuring individual perceptions of community cohesiveness, their network communications and community participation. Demographic data and data on the vulnerabilities of individuals was also collected.

### **Results**

The data was utilized in an econometric model which identified that network communications and community participation impacted positively on perceptions of social cohesiveness while vulnerability factors had a negative impact.

### ***Conclusions***

Remedial action to build community cohesiveness and network communications can be expected to have a positive impact on social cohesiveness. In developing strategies to build community cohesiveness and network communication, particular care needs to be taken to ensure the inclusion of those members of society who are regarded as the most vulnerable.

**KEY WORDS:** network communications, community participation, social capital, econometric analysis, vulnerability.

### ***What is already known on this subject?***

- Social Capital is one of a set of adaptive capacities from which community resilience to disaster emerges.
- The extent of network communications and the level of community participation are regarded as important determinants of social capital.

### ***What does this study add?***

- Our results confirm that network connections and community participation have a positive impact on social cohesion in the Blue Mountains LGA.
- Factors that imply vulnerability (e.g. older age groups, living alone and presence of a disability) had a significantly negative impact on perceptions of social cohesion.
- Social cohesion also appears to vary spatially across the Blue Mountains.

## **Introduction**

The Blue Mountains region in New South Wales, Australia, has experienced disaster in the form of bushfires as recently as 2013 and the impact on the most vulnerable members of the community, and the community as a whole as it manages the vulnerable in disaster, requires exploration. There is a growing population of ageing people in the region with a projected increase in the proportion of those over 65 years from the current 15.7 per cent to 22.2 per cent by 2026<sup>1</sup>. Whereas vulnerability is generally described as temporary in the literature, that is not the case for older people, whose vulnerability increases with increasing age<sup>2</sup>.

Social capital has been considered a key aspect of social (or disaster) resilience<sup>3</sup> and Aldrich<sup>4</sup> regards social capital as the most important resource to mobilize after a disaster. The research presented in this paper focuses on two frequently mentioned elements of social capital<sup>5,6</sup> – network communication and community participation – and their impact on perceptions of social cohesion. The aim of the project was to investigate social participation<sup>3</sup>, social support<sup>7</sup> and community connectedness<sup>8</sup> and perceived or cognitive support, trust and sharing to determine differences in support available by age, living alone and disability. This would enable local programs to address issues in supporting the vulnerable as identified by the research, in the belief that the needs of the vulnerable and at risk could be better managed during extended periods of isolation (due to natural disaster) and situations arising from lack of connection to the wider community who may be able to offer support in times of crisis.

It is evident that social involvement, such as being part of social networks<sup>9,10,11</sup> and participation in formal and informal organizations and leisure activities<sup>12,13,14</sup>, is important for health and wellbeing. The converse is also true, that health and wellbeing are negatively impacted by lack of community participation for vulnerable members, particularly older people<sup>15</sup> and those with disabilities<sup>16</sup>.

To summarise, the literature indicates that community resilience is a product of, among other things, the level of social capital of that community. In turn, a number of elements combine to produce a community's social capital and these elements include the extent of network communication and the level of community participation by individual community members. We would expect that a positive correlation with social capital exists between the extent of network communication and the level of community participation and that consequently, both of these elements would be positively correlated with increasing perception of social cohesion of the community. Further, we hypothesize that attitudes towards social cohesion will be negatively impacted by the vulnerability of the individuals who make up the community.

## Method

A quantitative survey consisting of questions divided into five sections was employed to elicit responses from individuals in the Blue Mountains LGA regarding their demographic and health characteristics, in addition to information relating to the three elements of social capital which are the focus of the study – network communication, community participation and social cohesion. The first section was comprised of questions that sought demographic information including postcode, age, indigenous or non-indigenous status, living arrangements and fluency in English. A single question on whether respondents had a chronic illness or disability was used to gauge limitations related to health. The second section was concerned with community participation with questions adapted from social capital surveys developed for the US Social Capital Benchmark Survey<sup>14</sup> and included questions about participation in associations, volunteering, going out and sharing meals with friends. Section three comprised of only one question regarding who was most likely to provide help if needed: neighbor, family or friend. The fourth section asked respondents about their local area connections – how often they see family, friends and neighbors, and others who may be regarded as weak ties – such as people talked to while shopping. Social cohesion questions in the fifth section were concerned with how people felt about their neighborhood and their connection to it, how supported, safe and helped they felt. Here responses were indicated on a five point scale.

The survey data was employed in the econometric estimation of the following model of social cohesion (Appendix A, available from the authors on request, provides a detailed description of the model variables).

$$SCI = b_0 + b_1 NCI + b_2 CPI + b_3 GEN + b_4 AGE + b_5 AGE^2 + b_6 ALONE + b_7 IND + b_8 ENG + b_9 DIS + b_r REG + \epsilon$$

Where:

*SCI* = Social Cohesion Index, a variable which attempts to measure the relative strength of social cohesion in their region for each respondent. It is based on a summated rating scale constructed from selected survey questions.

*NCI* = Network Connection Index, an independent variable attempting to measure the relative importance of network interactions to an individual. We hypothesized that the associated coefficient in equations 1 would be positive on the basis that people who had a larger number of network contacts would perceive social cohesion to be stronger.

*CPI* = Community Participation Index endeavors to measure, for each respondent, the relative importance of participation in community activities. We hypothesized that, in equation 1, the coefficient for this variable would be positive indicating that respondents who had relatively high community participation would have a stronger perception of community cohesion.

*GEN* = Gender dummy variable with 1 for males and 0 for females.

*AGE* = Age measured as the midpoint of the age category self-allocated by respondents. To capture an apparent non-linearity with respect to age an additional variable,  $AGE^2$  is included. As individuals age, they might become more (or less) confident about social cohesion, to increase (or decrease) their participation in the community and to enhance (or reduce) their social networks. However, as people continue to move into older ages, the initial trend may atrophy and eventually reverse.

*LIVE* = Respondents were asked which living arrangements best described their current state. This variable records those who described themselves as living with someone – that is not living alone. Those living with someone were given the value 1 and all others the value of 0. Those living with someone (alone) are expected to be amongst the least (most) vulnerable members of society and therefore the relationship is expected to be positive (negative) in all cases.

*IND* = Respondents were asked to self-identify their indigenous status with those declaring themselves indigenous given a value of 1 and others 0. People of indigenous status are expected to be amongst the most vulnerable members of society and the relationship is therefore expected to be negative in all cases.

*ENG* = Respondents were asked if speaking English was difficult for them. A dummy variable was constructed with those responding in the affirmative given a value of 1 with others 0. As difficulty with English is seen as a factor adversely impacting on a person's ability to operate within an English speaking society it was expected that the relationship would be negative value for all equations.

*DIS* = Disability. A survey question asked 'do you have a chronic illness or disability that limits your everyday activities'. From responses, a disability dummy was constructed which had a value of 1 for those responding yes and zero for others. A disability can be expected to restrict a person's ability to function in society and therefore a negative coefficient is expected in each case.

*NODISU65* = Dummy variable that represents the base case and takes the value 1 for individuals that are under 65 and without a disability.

*DISU65* = Dummy variable that takes the value of 1 for persons under 65 with a disability and 0 for all others. It is expected that individuals with a disability

under the age of 65 would have fewer network contacts, lower community participation and perceive social cohesion to be lower than individuals in the base group.

- DIS65* Dummy variable that takes the value of 1 for persons over 65 with a disability and 0 for all others. Again, it is expected that individuals in this group would score lower on all three indices than those in the base group and, potentially, lower than those in the preceding group.
- NODIS65* Dummy variable that takes the value of 1 for persons over 65 with no disability and 0 for all others. It is expected that individuals in this group would have only slightly lower values on all three indices than those in the base group.
- REG* = Represents a series of dummy variables for postcode regions in the Blue Mountains. The coefficients show outcomes for respondents who have provided us with a given postcode differ from respondents who have not provided a postcode and how those who have provided a postcode differ from each other.
- $\epsilon$  = Is the error term.

## Results

The results of our analysis are reported in Table 1.

**TABLE 1: OLS Results. Dependent Variable: *SCI***

Independent Variables	(1)		(2)	
<i>Constant</i>	0.64***	(0.069)	0.532***	(0.041)
<i>NCI</i>	0.236***	(0.026)	0.233***	(0.025)
<i>CPI</i>	0.131***	(0.02)	0.126***	(0.02)
<i>GEN</i>	-0.037***	(0.01)	-0.038***	(0.01)
<i>AGE</i>	-0.004*	(0.002)	-	
<i>AGE</i> <sup>2</sup>	0.00004*	(0)	-	
<i>LIVE</i>	0.06***	(0.011)	0.062***	(0.011)
<i>IND</i>	-0.033**	(0.015)	-0.036**	(0.015)
<i>ENG</i>	-0.087*	(0.052)	-0.091*	(0.052)
<i>DIS</i>	-0.031**	(0.013)	-	
<i>DISU65</i>	-		-0.037**	(0.016)
<i>DIS65</i>	-		-0.014	(0.022)
<i>NODIS65</i>	-		0	(0.013)
Lapstone/Glenbrook	0.14***	(0.028)	0.142***	(0.028)
Blaxland/Warrimoo	0.08***	(0.023)	0.082***	(0.023)
Faulconbridge	-0.017	(0.03)	-0.014	(0.03)
Winmallee/Yellowrock/Springwood	0.046**	(0.022)	0.044**	(0.022)
Linden/Woodford	0.069**	(0.032)	0.064**	(0.032)
Hazelbrook	-0.008	(0.027)	-0.009	(0.027)
Medlow Bath/Leura/Katoomba	0.034	(0.022)	0.033	(0.022)
Wentworth Falls	0.069**	(0.027)	0.067**	(0.027)
Lawson	0.037	(0.03)	0.033	(0.03)
Bullaburra	0.09**	(0.038)	0.088**	(0.038)

Blackheath/Megalong Valley	0.043 (0.028)	0.039 (0.028)
Mount Victoria/Mount Wilson/Bell	0.036 (0.038)	0.035 (0.038)
Observations	1030	1030
R <sup>2</sup>	0.288	0.286
Adjusted R <sup>2</sup>	0.273	0.271

*Note:* The quantities in parentheses beside the estimates are standard errors.

\*\*\*, \*\* and \* indicate significance at the 1 per cent, 5 per cent and 10 per cent level respectively.

## Discussion

From Table 1 we observe that many of our hypothesised relationships are supported. Network connections and community participation both have a large and highly significant impact on social cohesion (SCI). Being male has a negative impact on SCI. One possible interpretation of this finding is that males are more likely to work outside of the Blue Mountains area or to have business networks that extend beyond the Blue Mountains. If, as a result, much of their social interaction is undertaken away from the region then their perception of local social cohesion may be adversely impacted because they may have had less opportunity to participate locally.

AGE and AGE<sup>2</sup> are significant at the lower end of conventional levels in the first estimation of the model. The results indicate that, initially, as people age, they become less confident in social cohesion but this is moderated as they get older.

Living with someone had a significantly positive impact on the perception of social cohesion (and, therefore, living alone had a negative impact). This finding is in keeping with our expectation that persons living alone are more vulnerable<sup>15,16</sup>. Indigenous status also proved to have a significantly negative impact in the estimated model. At the lower end of significance, difficulty communicating in English also negatively impacted perceptions of social cohesion.

Vulnerability due to disability was clearly an important factor in reducing perceptions of social cohesion. In order to tease out the interacting effect of age and disability, we employed the dummy variables *DISU65*, *DIS65* and *NODIS65* in estimating a second version of the model. The base case was given by persons under 65, with no disability. The interaction variable was of the expected sign for all groups, but only significant for those under the age of 65 with a disability.

Finally, social cohesion appeared significantly higher in half of the postcodes than for the base case. The results suggest that the remaining areas are ones where it might be important to focus on remedial action.

## Conclusion

Over all, the research supports the hypothesis that perceptions of social cohesion are positively associated with both levels of network communication and community participation. This suggests that enhancing both network communication and community participation will result in higher levels of the perception (and by implication the reality) of social cohesion.

Building social cohesion is essential to the development of social capital and community resilience to disaster. However, the results also provide support for the negative impact that vulnerability can have on social capital - whether that vulnerability is an outcome of age, living alone, disability or social impediments arising from race and/or language difficulties. It is also apparent that, in pursuing remedial action, different strategies are needed to raise the social capital of females compared with males and that a focus on specific postcodes within the Blue Mountains is also called for.

## References

- 1 ABS Australian Bureau of Statistics. *Census, Forecast i.d. Blue Mountains* 2011. [Cited 14 April 2015]. Available from URL <http://forecast.id.com.au/blue-mountains/population-age-structure?AgeTypeKey=2>.
- 2 Bernoth M, Dietsch E, Burmeister OK, Schwartz M. Information management in aged care: Cases of confidentiality and elder abuse. *Journal of Business Ethics* 2014; 122: 453-460.
- 3 Norris FH, Stevens SP, Pfefferbaum B, Wyche KF, Pfefferbaum RL. Community resilience as a metaphor, theory, set of capabilities, and strategy for disaster readiness. *American Journal of Community Psychology* 2008; 41: 127-150.
- 4 Aldrich DP. *Building resilience: social capital in post-disaster recovery*. Chicago: University of Chicago Press, 2012.
- 5 Maclean K, Cuthill M, Ross H. Six attributes of social resilience. *Journal of Environment Planning and Management* 2014; 57:144-156.
- 6 Cuthill M, Ross H, Maclean K, Owens K, Witt B, King C. Reporting social outcomes of development: An analysis of diverse approaches. *International Journal of Interdisciplinary Social Science* 2008; 3:145-158.
- 7 Elliott J, Gale CR, Parsons S, Kuh D. (2014). Neighbourhood cohesion and mental wellbeing among older adults: A mixed methods approach. *Social Science & Medicine* 2014; 107: 44-51.
- 8 Cattell V. Poor people, poor places, and poor health: The mediating role of social networks and social capital. *Social Science and Medicine* 2001; 52: 1501-1516.
- 9 Kawachi I, Berkman L F. (2001). Social ties and mental health. *Journal of Urban Health* 2001; 78: 458-467.
- 10 Valente TW. *Social Networks and Health: Models, Methods and Applications*. Oxford: Oxford University Press, 2010.
- 11 Cattell, V. *Poverty, Community and Health: Co-operation and the Good Society*. New York: Palgrave Macmillan, 2011.
- 12 Hawe, P, Shiell A. Social capital and health promotion: a review. *Social Science & Medicine* 2000; 51: 871-885.
- 13 Wakefield SEL, Poland B. Family, friend or foe? Critical reflections on the relevance and role of social capital in health promotion and community development. *Social Science & Medicine* 2005; 60: 2819-2832.
- 14 Abbott, S. Social capital and health: The role of participation. *Social Theory & Health* 2010; 8: 51-65.
- 15 Burmeister OK. What seniors value about online community. *Journal of Community Informatics* 2012; 8. Available from URL <http://ci-journal.net/index.php/ciej/article/view/545>
- 16 Sayers JM, Cleary M, Hunt GE, Burmeister OK. (2017). Service and infrastructure needs to support recovery programmes for Indigenous community mental health consumers. *International Journal of Mental Health Nursing* 2017; 26: 142-150.



- 17 Putnam R. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster, 2000.
- 18 Bowling A, Stafford M. How do objective and subjective assessments of neighbourhood influence social and physical functioning in older age? Findings from a British survey of ageing. *Social Science & Medicine* 2007; 64: 2533–2549.
- 19 Cacioppo, JT, Hawkey LC. Social isolation and health, with an emphasis on underlying mechanisms. *Perspectives in Biology and Medicine* 2003; 46: S39-S52.

## **Appendix A: Development of Construct Variables**

*SCI* = Social Cohesion Index, a variable which attempts to measure the relative strength of social cohesion in their region for each respondent. It is based on a summated rating scale constructed from seven questions employing a five-point scale and asking respondents to what extent they felt:

1. connected to their neighborhood
2. neighbors in their area help each other out
3. their neighborhood is clean and tidy
4. their neighborhood is friendly
5. support with daily activities is available to them
6. safe in their neighborhood, and
7. able to access information on services they need.

Missing responses for any question were allocated the average response across the sample to that question. Internal consistency reliability was tested using the Cronbach's alpha which was estimated at 0.824. Convergent construct validity was tested by calculating the correlation coefficient between responses on each item with the responses on the set of items that make up the rest of the scale. All items recorded a correlation coefficient greater than 0.3 and were therefore retained. To derive the index, the responses to each question were converted to a response on a scale of 0-4 and summed over the seven questions. The sum was then divided through by 7 to give an average of the values from each respondent and this was then divided by 4, transforming the averaged summed scale into a ratio. *SCI* has a mean value of 0.67 and a standard deviation of 0.18, measured over the final sample used in this analysis of 1030 respondents.

*NCI* = Network Connection Index, an independent variable attempting to measure the relative importance of network interactions to an individual. based on the network connection questions in the survey which asked respondents how often they see family members, see friends, attend social gatherings, talk with people in the street and chat with someone while shopping. Response categories for these questions are defined by frequency: daily, weekly, monthly, yearly and never. The number of times each contact is made in one year, gave a value of 365 for daily contact, 52 for weekly, 12 for monthly, one for yearly and zero for never. Dividing the appropriate value for each response by 365 for each question transformed each response, for each question, into a ratio. Testing indicated that internal consistency reliability using the responses to all questions was low (Cronbach's alpha of just 0.483). Dropping responses to 'How often do you see family members', improved internal consistency reliability (Cronbach's alpha rose

to 0.576). Although this was below conventional acceptable levels of reliability (0.7), we pursued development of the index with the responses to the remaining four questions as it was considered that those questions measured a similar concept and that having such a small number of questions may have been impacting on the value of the test statistic. Further, the tests for convergent construct validity were acceptable. *NCI* was derived by summing the ratios for each of the four remaining questions and dividing through by 4. This produced a network connection index with a mean of 0.24 and a standard deviation of 0.21. We hypothesized that the associated coefficient in equations 1 would be positive on the basis that people who had a larger number of network contacts would perceive social cohesion to be stronger.

*CPI* = Community Participation Index endeavors to measure, for each respondent, the relative importance of participation in community activities. The Blue Mountains survey included seven community participation questions each requiring a yes/no dichotomous response:

1. Do you attend local festivals or other community activities?
2. Do you volunteer?
3. Do you go out for entertainment at least once a month?
4. Are you involved in any local associations, clubs, religious or other group?
5. Do you share a meal with friends at least once a month?
6. Do you require assistance with household tasks, such as putting out the bin? (Note that in using this question we inverted the yes/no responses so that the respondents were effectively answering the reverse of this question).
7. Do you provide assistance to people in your neighborhood with household tasks, such as putting bins on the street?

To determine internal consistency reliability we again employed Cronbach's alpha. Using all seven questions it was measured at 0.564. Once again, this is below the critical value of 7 however it is possible that the small number of questions in the index is leading to some understatement of the reliability of the scale. The test for convergent construct validity however, indicated that correlations between responses to the last two questions and the total group were less than 0.3 and so they were dropped (with correlations for all remaining questions being above the appropriate level). *CPI* was therefore constructed as the proportion of yes responses to the first five participation questions. Omitting the last two questions also raised Cronbach's alpha to 0.596. This produced a community participation index with a mean of 0.70 and a standard deviation of 0.27. We hypothesized that, in equation 1, the coefficient for this variable would be positive indicating that respondents who had relatively high community participation would have a stronger perception of community cohesion.