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Social networks and mental health among a farming population

■ **Abstract** *Aims* The study investigated the associations between mental health and measures of community support, social support networks, sense of place, adversity, and perceived problems in a rural Australian population. There was a specific focus on farming communities due to previous qualitative research by the authors indicating distress by farmers in response to drought (Sartore et al. Aust Fam Phys 36(12), 990–993, 2007). *Method* A survey was mailed to adults randomly selected from the Australian Electoral Roll and residing within four local government areas (LGAs) of varying remoteness in rural New South Wales (NSW). Survey measures included: support networks and community attachment; recent stressors (including drought-related stress); and measures of health and related functioning. The Kessler-10 provided an index of current psychological distress. *Results* The sample ($n = 449$; response rate 24%) was predominantly female (58.4%) and 18.9% were farmers or farm workers. Moderate to very high psychological distress was reported for 20.7% of the sample. Half (56.1%) of all respondents, and specifically 71.8% of farmers or farm workers, reported high levels of perceived stress due to drought. Psychological distress was associated with recent adverse life events, increased alcohol use and functional impairment. Hierarchical regression analysis demonstrated an independent effect of the number of stressful life events including drought related stress, perceived social support (community and individual), alcohol use and physical functioning ability on levels of psychological distress. This model accounted for 43% of the variance in current levels of distress. Lower community support had a more marked impact on distress levels for non-farming than farming participants. *Conclusions* This study has highlighted the association between unique rural community characteristics and rural stressors (such as drought) and measures of mental health, suggesting the important mediating role of social factors and community characteristics. The results illustrate the importance of addressing subgroup differences in the role of social capital in mental health.

■ **Key words** social connection – rural mental health – connectedness – community

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Introduction

There are mixed and conflicting findings regarding patterns of mental disorders when broad-based urban/rural comparisons are made [11, 17]. Nevertheless, evidence indicates higher rates of suicide in rural areas than urban regions [7, 18] and poorer outcomes across a number of health domains in rural populations [23]. These data suggest a need for greater attention to the

moderating and mediating factors in the pathways to health outcomes in rural areas.

A group within rural areas directly affected by the financial, social and interpersonal stress of chronic drought conditions is the farming sector [24]. The impact of recent prolonged drought in rural and remote regions of Australia has focused greater attention on the potential mental health needs of people in these areas [9]. The social consequences of drought and other changes in farming can contribute to increased levels on some of the well-established risk factors for adverse mental health outcomes (e.g. family separation, social isolation, socio-economic strain) [24]. Furthermore, Fraser et al. have described the potential adverse effects of declining population numbers on mental health of rural residents, as perhaps occurring through the impact on social networks [11].

The concept of social capital and its relationship to mental health has received substantial interest, encompassing aspects of social networks and community participation [21]. However, social capital research has struggled to reach a consensus about theoretical and empirical definitions for the multidimensional nature of social capital. Rural communities have been identified as having a strong sense of community or social cohesion [12]. Nevertheless, recent Australian research has demonstrated the importance of investigating the role of social networks and connections for differing subgroups in rural communities, rather than assuming a uniform set of interactions between community factors and mental health outcomes [4].

The current study examined associations between aspects of the social environment and mental health outcomes among a rural sample. The main study hypotheses were that, within rural Australian farming communities: (1) greater current levels of psychological distress and drought related stress would be detected in people living and working on farms than non-farmers; and (2) aspects of the social environment would have a significant independent effect on mental health measures in the farming subgroups (psychological distress and alcohol use). It was hypothesised that the severity of drought related stress would vary according to levels of exposure to drought related effects, such that it would be greatest for those living and working in farms who are both exposed to the impact of drought on farming business and finances, less in those who lived on farms but had employment elsewhere, and least in those who lived and worked in rural towns. Hence a gradation of drought impact would be detected across subgroups of rural residents, and a moderating effect detected for community connectedness variables.

Method

The survey was mailed to 2000 adults aged 18 years or older residing in selected local government areas (LGAs) within rural NSW, Australia. The study excluded persons residing in nursing homes, prisons or other non-residential settings and was approved by the University of Newcastle Research Ethics Committee.

■ Sampling method

The stratified sampling strategy was designed to ensure a cross-section of rural and remote communities within two rural health service districts [area health services (AHSs)]. LGAs across both AHSs were grouped according to the Accessibility Remote Index of Australia plus (ARIA) classification as Highly Accessible (HA), Accessible (A), Moderately Accessible (MA) or Remote/Very Remote (R/VR). ARIA plus defines level of remoteness as distance to main service centres, and subsequent access to goods and services and opportunities for social interaction [22]. An LGA was then randomly selected from each of the four ARIA groups, providing a total of four LGAs for the sample. The four LGAs selected for the study had adult populations ranging from 1,428 to 10,517 persons. Across the LGAs, the proportion of the working population employed in the sheep, beef cattle and grain farming industries varied from 7.9 to 41.4% [27].

■ Recruitment of study participants

Adults 18 years and older residing in the selected LGAs were identified on the Australian Federal Electoral Roll. A total of 2000 potential participants were then randomly selected, 500 from each LGA, to optimise the coverage of rural and remote areas and increase the likelihood of accessing farmers. Participants were mailed the survey, an information letter detailing the study, and a flyer providing information on local health services. Two weeks later a second identical mail-out was conducted for participants who had not responded to the initial mail-out.

■ Study measures

Six domains of measures were assessed in the survey and are shown in the model in Fig. 1.

1. *Socio-demographics*: These included: age; gender; education; Aboriginality; marital status; household income; employment status; occupation; and residency on a farm. The farm related variables were: farm resident (FR; lives on farm but does not work on farm); farmer or farm worker (FW; works on farm and may or may not live on farm); and non farm person (NF; does not live or work on farm). The Survey asked if their current home was on a farm and about their main occupational category, which also included farmer or farm worker.

2. *Vulnerability*: The neuroticism subscale of the Eysenck Personality Inventory—Short Form [10] was used. Adverse life events for the past six months were measured by the 11 item List of Threatening Experiences [6]. A list of seven potential "stressors" identified with rural communities, for example, drought and difficulties accessing health care, were compiled from the researchers previous fieldwork [25].

3. *Connectedness*: An individual's sense of connectedness was measured by: (a) community support (including services); (b) sense of place; and (c) social support networks. Perceived community support included social participation, civic participation, sense of belonging to a community, and community infrastructure, and was based on the instrument from the Community Participation Survey: Surf Coast Shire [16].

Sense of place was measured by the ten item 'Place Attachment' subscale of the environmental distress scale (EDS) [15]. The EDS has been used in rural communities undergoing significant environmental change, such as that evidenced from mining and power station activities [8]. The scale has provided evidence of distress associated with negative changes to individual's sense of place, well being and control in these populations. The authors of the scale propose the concept of solastalgia to reflect a yearning or sense of

Fig. 1 Proposed model
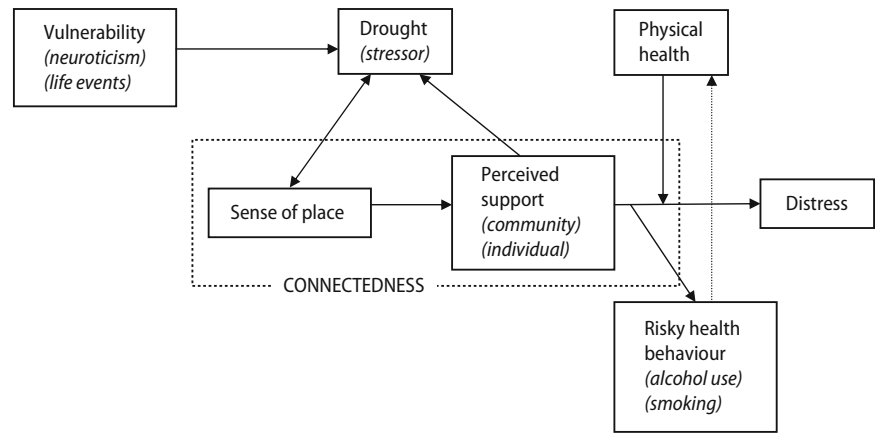
loss for the environment that once existed [1, 8]. The current study utilised the Place Attachment subscale to assess the behavioural and affective components of sense of place.

Social support was defined as the number of available supportive relationships and was measured by six items from the Availability of Attachment subscale of the Interview Schedule of Social Interactions (ISSI)-Short form [14].

4. *Physical health*: Variables in this domain included self reported history of medical conditions and injuries. Physical functioning was assessed by the ten-item Physical Functioning subscale of the Medical Outcomes Study Short Form-36 (SF-36) [29]. Participants were classified on body weight categories according to Heart Foundation guidelines [28] and on physical activity levels during the past week.

5. *Smoking and alcohol use*: Participants were asked to report tobacco use and the Alcohol Use Disorders Identification Test (AUDIT) was used to identify hazardous and harmful alcohol consumption [26].

6. *Psychological distress*: The mental health outcome measure of current psychological distress was the Kessler-10+LM (K10+LM) [2]. The four disability related optional items of the K10 were included in the survey but not in the current analyses.

■ Statistical analyses

Data entry and analysis techniques primarily involved SPSS statistical software (Version 14.0; SPSS, Chicago, IL, USA). Chi-square tests were used to assess univariate associations between categorical variables, while analysis of variance (ANOVA) and hierarchical linear regressions were used to assess associations with the continuous outcome measures. As a partial control for the number of statistical tests conducted, the threshold for statistical significance was set at $P < 0.01$ for all analyses.

Results

The sample of 449 participants was classified into groups of (1) Farmers or farm workers (FW) ($N = 85$, 18.9%), (2) Farm residents (FR) ($N = 111$, 24.7%) and (3) Non Farm persons (NF) ($N = 253$, 56.3%). The response rate for the full sample was 24% and significantly less of the sample was from the R/VR region [$\chi^2_{(3)} = 16.02$, $P < 0.001$]. The percentages of the total sample from each of the four remoteness categories were: 29.4% HA, 25.8% A, 26.5% MA and 18.3% R/VR. For the remoteness categories, there were significant group differences for the farming categories

[$\chi^2_{(6)} = 28.50$, $P < 0.001$] such that there was a greater proportion of (1) FR from the HA region (31.1% compared to 17.1–24.7%); (2) FW from the A region (30.3% compared to 8.5–22.4%); and (3) NF from the R/VR region (74.4% compared to 45.4–56.8%). Compared to the population distributions within the LGAs, respondents were significantly more likely to be female [58.4% vs. 49.4%, $\chi^2_{(1)} = 7.17$, $P < 0.01$] and married [68.4 vs. 52.8%, $\chi^2_{(1)} = 22.85$, $P < 0.001$], and less likely to be unemployed [1.6 vs. 4.7%, $\chi^2_{(1)} = 7.23$, $P < 0.01$].

■ Sample demographics

The average age of the sample was 51.35 years with no significant group differences, as shown in Table 1. There was a significant group difference for gender [$\chi^2_{(2)} = 12.53$, $P < 0.001$] with only 27.1% of FW being female as compared to 74.8% FR and 61.7% NF. While the percentage of married respondents did not differ significantly across groups, NF persons were more likely to live alone (19.4%) compared to FW (8.2%) and FR (5.4%) [$\chi^2_{(2)} = 235.24$, $P < 0.001$]. The majority (84.7%) of the FW group reported currently living on a farm.

Table 1 Demographics for farmers/farm workers, farm residents and non farm related participants

	Farm worker $N = 85$ Percentage (N)	Farm resident $N = 111$ Percentage (N)	Non farm $N = 253$ Percentage (N)
Age in years (mean, SD)	52.64 (13.08)	49.33 (14.67)	51.80 (15.09)
Female	27.1 (23)	74.8 (83)	61.7 (156)
Aboriginal	1.2 (1)	2.7 (3)	4.3 (11)
Married/defacto	81.2 (69)	87.4 (97)	68.4 (173)
Lives alone	8.2 (7)	5.4 (6)	19.4 (49)
No school certificate	38.8 (33)	27.9 (31)	39.1 (99)
Post school qualifications	40.0 (34)	57.7 (64)	46.6 (118)
Employed	98.8 (84)	64.8 (72)	54.2 (137)
Retired	–	10.8 (12)	24.1 (61)
Sick/disabled	–	2.7 (3)	4.0 (10)
Annual household income			
<$40,000	30.7 (26)	25.2 (28)	48.2 (122)
≥$40,000	50.6 (43)	54.0 (60)	38.0 (96)

Table 2 Vulnerability, social support, health behaviours and distress for farming and non farming groups

	Farm workers $N = 85$ Mean (SD)	Farm residents $N = 111$ Mean (SD)	Non farm $N = 253$ Mean (SD)
Vulnerability			
Neuroticism	2.85 (2.96)	2.92 (2.97)	3.32 (2.95)
Life events	0.79 (1.06)	0.68 (1.00)	0.70 (0.97)
Drought stress	3.91 (1.30)	3.83 (1.16)	3.22 (1.33)
Connectedness			
Community support	36.96 (7.99)	36.31 (7.99)	36.65 (8.40)
Sense of place	38.45 (8.99)	36.20 (8.86)	34.27 (9.13)
Social support	4.86 (1.71)	4.79 (1.85)	4.89 (1.69)
Risky health behaviour			
Alcohol use AUDIT total	4.33 (3.38)	3.70 (3.42)	3.94 (4.45)
Percentage of harmful (N)	16.5 (14)	9.0 (10)	13.8 (35)
Percentage of current smoker (N)	8.2 (7)	9.0 (10)	19.8 (50)
Physical health			
Percentage of adequate physical activity (N)	20.0 (17)	25.0 (28)	36.0 (91)
Percentage of overweight/obese (N)	57.6 (49)	52.3 (58)	64.0 (162)
Percentage of heart condition (N)	7.1 (16)		10.7 (27)
Physical functioning	86.03 (21.85)	85.33 (25.90)	77.96 (28.77)
Percentage of injury in last year (N)	17.6 (15)	9.9 (11)	12.6 (32)
Outcome: current distress			
$K10$ total	13.69 (5.52)	13.15 (4.79)	14.44 (6.04)
Percentage $K10 > 15$ (N)	20.0 (17)	12.6 (14)	24.5 (62)

■ Mental health and drought stress

Table 2 provides vulnerability, support, health and distress profiles for the groups. High levels of drought related stress were defined as scores of 4 or 5 on the 5 point Likert scale, resulting in 71.8% of FW, 67.6% of FR and 45.8% of NF showing high drought related stress. However when the FW and FR groups were collapsed, there were significant group differences with the combined farming group reporting significantly higher mean drought related stress scores [$F_{(1, 430)} = 28.10$, $P < 0.001$] and a stronger sense of place [$F_{(1, 436)} = 11.16$, $P < 0.001$] than the NF group. Although there were no significant group differences in the average level of psychological distress as measured by the K10, the likelihood of high levels of distress ($K10 > 15$) was significantly less for FR than FW or NF [$\chi^2_{(2)} = 319.59$, $P < 0.001$]. FW were more likely than FR or NF to engage in harmful levels of alcohol use [$\chi^2_{(2)} = 222.68$, $P < 0.001$] (Table 3).

Physical health measures showed significant group differences for adequate level of routine physical activity [$\chi^2_{(2)} = 814.71$, $P < 0.001$] and having an injury in the past 12 months [$\chi^2_{(2)} = 246.97$, $P < 0.001$]. Both FW and FR were less likely than NF to have

Table 3 Hierarchical linear regressions for prediction of distress ($K10$) and alcohol use (AUDIT)

Predictor	Distress ($K10$) analysis		Alcohol use (AUDIT) analysis	
	Simple correlation	Partial correlation	Simple correlation	Partial correlation
Demographics (step 1)				
Gender	−0.03	−0.03	0.26**	0.28**
Age	−0.15*	−0.15*	−0.26**	−0.28**
Non-farm versus farm workers/residents	0.09	0.09	−0.01	0.03
Farm workers versus farm residents	0.04	0.05	0.05	−0.02
Vulnerability (step 2)				
Neuroticism	0.66**	0.62**	0.15*	0.12
Life events	0.40**	0.30**	0.07	−0.02
Drought stress	0.07	−0.05	0.03	0.06
Connectedness (step 3)				
Community support	−0.33**	−0.14*	−0.12	−0.01
Sense of place	−0.23**	0.02	−0.12	−0.01
Social support	−0.21**	−0.01	−0.02	0.01
Risky health behaviour and physical health (step 4)				
Alcohol use	0.19**	0.15*		
Physical functioning	−0.26**	−0.24**	0.11	0.05
Significant interactions (step 5)				
Non-farm versus farm workers/residents				
Community support	−0.27**	−0.16*		

* $P < 0.01$; **$P < 0.001$

adequate levels of physical activity, while FR were less likely to have had an injury in the past 12 months than FW or NF. For physical functioning overall, there was a trend for both farming groups to have better functioning than the nonfarming group.

There were no significant group differences on the *connectedness* measures of community support, sense of place or social support networks.

■ Predictors of psychological distress

A series of hierarchical linear regressions was conducted (i.e., using a pre-determined hierarchy of steps) which included socio-demographic variables (gender, age) at step 1, together with two orthogonal contrasts (NF compared to FW/FR; and FW compared to FR). The remaining predictor variables were entered according to the groupings shown in Table 2: step 2, vulnerability factors (neuroticism, life events, drought related stress); step 3, connectedness factors (community support, sense of place, social support); step 4, alcohol use (AUDIT score) and physical functioning; and step 5, selected interaction effects. The order of entry of variables was based on the hypothesised chronological sequence of predictors suggested by previous research [3]. The overall model accounted for 58.5% of the variance in $K10$ scores [$F_{(32, 381)} = 16.78$, $P < 0.001$]. Neuroticism was strongly associated with K10 scores, with a partial correlation (pr) of 0.62 ($P < 0.001$), or approximately 38% of the variance, while life events ($pr = 0.30$, $P < 0.001$) and alcohol use ($pr = 0.15$, $P < 0.01$) also showed positive associations with current psychological distress. Age ($pr = -0.15$, $P < 0.01$), community support ($pr = -0.14$, $P < 0.01$) and physical functioning ($pr = -0.24$, $P < 0.001$) showed significant negative associations with K10 scores. There was also a significant interaction effect, NF versus FW/FR by community support ($pr = -0.16$, $P < 0.01$), such that lower community support scores were associated with a 4.0 point rise in average $K10$ scores for non farm people compared to a 1.3 point rise for farm workers and farm residents.

With neuroticism and associated interaction terms excluded from the regression equation (because neuroticism can be viewed as an index of a person's 'typical level of distress'), 42.8% of the variance in K10 scores was still accounted for by the overall model [$F_{(29, 384)} = 9.92$, $P < 0.001$]. Life events ($pr = 0.38$, $P < 0.001$) and alcohol use ($pr = 0.19$, $P < 0.001$) remained as significant positive associations with K10, and age ($pr = -0.15$, $P < 0.01$), community support ($pr = -0.21$, $P < 0.001$) and physical functioning ($pr = -0.34$, $P < 0.001$) had significant negative associations. There were also two significant interactions, NF versus FW/FR by community support ($pr = -0.17$, $P < 0.001$), and NF versus FW/FR by physical functioning ($pr = 0.14$, $P < 0.01$). As in the

previous regression, community support showed a greater influence over $K10$ scores for non farm persons compared to farm workers or residents. Lower physical functioning scores were associated with a 2.6 point rise in average $K10$ scores for non farm persons compared to a 1.9 point rise for farm workers or residents.

The same variables used for predicting $K10$ scores were then entered into regression equations with alcohol use (AUDIT score) as the outcome. Results showed 19.1% of the variance in alcohol scores was accounted for by the overall model [$F_{(29, 396)} = 3.22$, $P < 0.001$]. Gender had a significant positive association with alcohol use ($pr = 0.28$, $P < 0.001$), while age had a significant negative association ($pr = -0.28$, $P < 0.001$); that is, males and younger participants were more likely to report alcohol related problems. There were no significant interactions and similar results were obtained when the model was run with neuroticism excluded.

Discussion

For this rural sample, protective factors for mental health are being older, reporting greater community support and better physical functioning. Although there were no differences between the three groups of farmers/farm workers, farm residents and nonfarm people on the average level of distress as measured by K10, regression analyses showed a differential effect for two predictors of distress. Community support exerted a greater influence on distress for the non farm group compared to the farm workers or residents. Lower community support was associated with a greater increase in distress for people not living or working on a farm, indicating important subgroup differences in the experience of community support variables, and resulting associations with mental health measures.

The regression model predicting distress accounted for more variance in the dependent variable (42.8%) compared to the model predicting alcohol use (19.1%). There were no significant interactions for the farm and non farm groups in the alcohol use regression model. Consistent with other research [30] both gender and age were associated with alcohol use with younger people and men exhibiting higher levels of alcohol use.

In the proposed model (shown in Fig. 1), connectedness was construed as comprising connection to the land and to others, with connection to the land (sense of place) having a mediating effect and connection to others having a moderating effect on drought related stress. It was proposed that sense of place would be strongest for those working and living on the land and this was borne out in the results. The assessment of social capital in rural farming com-

munities, using Araya et al's model of perceived social and built environments, would be incomplete without a measure of an individual's sense of connection to the land. Unlike other components of social capital, this sense of place construct emphasises affective and behavioural commitment to the land rather than social interactions. It is argued that 'place identity' is the process whereby one's sense of identity is formed through positioning and interactions of self in the environment such that place may be construed as a symbolic extension of self [20]. This is evidenced by "My sense of who I am is linked to the environment where I live"—an item from the Place Attachment subscale of the Environmental Distress Scale (EDS) [15]. This study has demonstrated the greater perceived impact of drought among farming people in rural areas, as expected. Nevertheless measures of community connectedness or support failed to demonstrate a protective effect on mental health measures for people in farming as compared with non-farming people. In statistical analysis, sense of place was included among the set of measures of community connectedness and support. It is possible that sense of place increased susceptibility to drought related stress, resulting in greater distress and this positive link diminished the link between collated community support variables and mental health.

What was not predicted was the finding that the community support component of connection to others had a greater impact on distress for non farm persons than farming persons. This would suggest that farming persons have alternate or additional sources of social support and thus do not place such great reliance on community support or that the support that is available does not impact on their distress. An alternative is the self selection hypothesis, that farmers may be intrinsically less reliant on community support and therefore more likely to choose a rather isolated occupation. The isolation of some farming areas may be a catalyst for farmers seeking other forms of support, as there would be limited access to community support resources or activities. Further research is warranted to identify the mechanisms of support that could ameliorate the impact of stressors for farming persons and therefore potentially address the elevated suicide risk for this group. These findings are consistent in general with the findings from other research indicating differences in links between social connectedness and mental health across subgroups within rural communities [4]. Such a body of emerging findings is directly relevant to the task of developing community programs to support rural communities through adversity such as drought, and point to the need to tailor approaches to diversity of rural populations and subgroups.

The strong sense of connection to the land for the farming groups was not surprising and attests to the need to include it when investigating the multidimensional construct of social capital in farming communities. A finer grained analysis could be conducted for this population, if measures included variables such as years spent in farming, drought induced changes in farming practice, prior experience of drought, and perceived community response to the impact of drought on the land. Adding further questions to the study to assess farm residency and farming occupation could have led to a clearer distinction between these two groups and therefore expanded on the role of sense of place for farmers and farm residents. For example, the concept that sense of self becomes integrated with one's environment would be worthy of investigation given that farmers in remote areas could be likely to spend more time interacting with the land than with people. Added to this is the farmers' economic reliance on the land and thus the need to be in tune with the land.

Interestingly in relation to physical health, farmers and farm workers reported a greater rate of injury in the past 12 months than non farm persons. However, physical functioning had a stronger relationship to distress for the nonfarm people compared to farm workers or residents. In fact, poorer physical functioning was associated with higher distress for people not living or working on a farm. It could be speculated that the non farm group may have included persons who had been forced to stop farm work due to a farm related injury and therefore were experiencing distress from loss of job role and financial strain. Unfortunately, the study did not include questions to allow for testing of this proposal.

A limitation of the study was the low response rate and the inherent recruitment bias towards a sample that was more likely to be female, married, and engaged in employment or other duties, compared to the overall adult population in the selected regions. These are well recognized protective factors for mental health and, as has been the case in other comparable studies, it is likely that rates of psychological distress in this sample have underestimated the rates in these communities [19]. However, further research is required with farming groups given that an analysis of GHQ-12 data for non responders in the major NEMESIS study suggested reduced mental health problems in non responders [5]. A study of rural risk for mental health showed different risk profiles for a rural compared to an urban African community and led the authors to suggest that social cohesion was a moderating factor [13]. The role of social capital in the mental health of rural communities is therefore an important factor for further research.

Conclusion

This study of farming communities suggests different ways of thinking about one's self in relation to the

community, where community includes the social and physical environment. The focus of research on the impact of environmental adversity, such as drought on farming communities, has strong potential to elaborate on the multidimensional nature of social capital and further inform the role of 'community' in risk for mental health problems in rural areas.

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