



Perceptions of community responses to the unconventional gas industry: The importance of community agency



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ABSTRACT

When rural communities face major changes whether due to natural disasters, decline of old industries or the development of new ones, some appear to adapt well to the changes while others languish. From an extensive literature review, Brown and Westaway (2011) argue that community resilience, wellbeing, capacity, and capabilities inform agency, which in turn underlies different community responses to change. Further, it needs to be recognised that not everyone within a community is equally affected and groups of residents might perceive the community's response differently. To empirically examine the factors underlying five different perceptions of a community's response to change (resisting, not coping, only just coping, adapting, or transforming) a detailed telephone survey was conducted with 400 residents of the Western Downs region in Queensland, Australia, a rural area experiencing widespread changes in its social profile, economy, and landscape due to the rapid construction of unconventional gas infrastructure such as wells each kilometre, condensers, and pipelines. Most respondents thought the community was either adapting or only just coping with the changes. Two orthogonal factors underlay respondents' perceptions: community functioning and social engagement. Community functioning was by far the stronger factor and key aspects of community agency were reflected in four of community functioning's six dimensions: 1) community resilience actions such as planning and leadership, 2) collective efficacy, 3) community trust, and 4) inclusive decision making processes and citizen voice. High ratings of community functioning were associated with transforming followed by adapting, only just coping, resisting and not coping, in that order. Perceptions of the community's response were not predicted by demographic differences but the social engagement factor suggested that those with stronger social networks were more likely to think the community was not coping whereas those with weak social networks thought it was resisting, perhaps because they obtained their impressions from the Australian media which publicises public resistance to unconventional gas. The results support Brown and Westaway's analysis and also suggest that communities undergoing rapid change need support to be able to work with governments and industry and to facilitate key aspects of community agency.

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1. Introduction

For communities facing significant change, whether from natural disasters, rural decline or large economic developments, concerns for maximizing community outcomes becomes a prime objective of government and community stakeholders alike. How best to ensure communities respond to these changes in a positive

trajectory remains unclear (Morrison, 2014). Researchers and theorists identify the need to support communities through these changes and suggest a range of policies and initiatives often addressing underlying capacities and capabilities. However, some capabilities are more subtle and less tangible making it more difficult to understand and consequently support. Agency is one such capability, which although recognized as fundamental to effectively managing change is much harder to categorize and theorize in relation to communities responding to changes. This paper addresses this issue by reporting on research undertaken in the context of a rural community experiencing major economic development associated with the introduction of an extensive

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unconventional gas industry. The paper unravels community responses to the challenges of the gas industry and identifies key aspects of agency within broad underlying factors that contribute to effective community responses to change. Using survey findings conducted during the construction phase of Australia's largest unconventional gas (referred to as coal seam gas in Australia) project, and a framework of community wellbeing and resilience, we identify key dimensions of community functioning that differentiate between perceptions of not coping through to adapting or transforming into something better. The role of agency is discussed in this context, its underlying aspects identified, and its relationship to other dimensions of community wellbeing and resilience described.

1.1. The context of the research

This study is set in the context of unconventional gas development in the Western Downs region of southern Queensland Australia in 2014, which provides an opportunity to examine a range of community responses to change. Because of the scale of unconventional gas development with approximately 40,000 producing wells with associated pipelines, compression stations, and water treatment plants planned for Queensland by 2040, (Chen and Randall, 2013) unconventional gas activities have brought widespread and rapid change to rural communities in southern Queensland with associated impacts on community resources. The scale and speed of development of the industry with three major companies working in the same region has created challenges for local stakeholders. As Haggerty and McBride (2016) found in Wyoming USA, local government and community have struggled to keep abreast of the changes. For example in the Western Downs, Community Consultative Committees were not able to make concrete recommendations as they were still attempting to understand the industry and its implications well into the construction phase. It also meant that monitoring and regulation of the industry did not keep pace, for example, the Queensland Gasfields' Commission was not inaugurated until two years into the construction phase. The challenges have been compounded by the coincidental amalgamation of local governments which disrupted the existing patterns of community communication and coordination.

Australian media representations of local community responses to unconventional gas development focus on community resistance, often facilitated by political activism (e.g., <http://www.lockthegate.org.au/> and <http://frackmanthemovie.com/>). For those not directly affected by the industry the issue is presented as a conflict between economic drivers versus environmental and health concerns. However, local community responses to unconventional gas vary within affected communities and most accept or tolerate the industry (Walton et al., 2014). Areas of community concern include issues of water quality and farming land, new residents with different values and lifestyles, new local business opportunities and challenges, and new demands on roads, housing, sewerage and other infrastructure (Walton et al., 2013). Despite the absence of the support such as technical and financial assistance and supporting meta-governance, which Haggerty and McBride (2016) recommend, there were numerous diverse community responses which demonstrated its resilience. These actions were varied with each segment of the community aiming for differing, though not necessarily incommensurate, goals (Walton et al., 2013). Faced with a similar challenges, other communities have increased their effectiveness in dealing with social and economic development pressures by formalizing network structures and working to strengthen local capacity (Halseth and Ryser, 2015). However the Western Downs responses lacked integration as there was limited collaboration or coordinated planning (Walton et al., 2013;

Williams & Walton, 2014). This was probably aggravated by the recent changes at the local government level which limited the capacity for regional governance, a factor which has been identified as a key facilitator of effective community response by Morrison (2014), Haggerty and McBride (2016), and Onyx and Leonard (2010). This paper explores how local residents see their communities responding to unconventional gas development in the Western Downs region of Queensland, Australia. More specifically, it identifies factors underlying different perceptions of how their local community is responding, and how these factors relate to community wellbeing, resilience and agency.

1.2. Resilience and wellbeing approaches

In a thorough review of knowledge on resilience and wellbeing across the human development, wellbeing, and disasters literatures, Brown and Westaway (2011) argue for more integrated and human-centred approaches to understanding responses to environmental and other changes. This involves a shift away from understanding resilience and wellbeing as being measured solely by objective indicators such as employment and housing to a much more complex view that includes subjective and socio-relational aspects. They identified three types of responses to stressors (coping, adaptation, and transformation) which they argue interact with community agency, resources, resilience and wellbeing in complex ways. However, from the literature they were unable to explicate those relationships in detail. This paper seeks to explicate those relationships empirically in the context of local communities responding to unconventional gas development.

Further Brown and Westaway (2011) argue that community resistance also needs to be considered. However, they conceptualise resistance as part of transformative change, drawing on Bottrell (2009) notion that resistance-based-resilience “suggests the need for change in positioned perspectives, structured inequalities and the distribution of resources for strengthening resilience”. In contrast, we argue that resistance needs to be included as a fourth type of response in the context of the unconventional gas industry in Australia with some highly active political groups opposing the developments (Walton et al., 2013). Walton et al.'s qualitative research also suggested a fifth response type “not coping” whereby some residents saw their community as being overwhelmed by a “tsunami of change”. Thus these two types of community responses have been added to Brown and Westaway's three response typology, and this present research examines five responses to change: resisting, not coping, coping, adapting, and transforming (see Table 1).

Brown and Westaway (2011) also call for a better understanding of relationships between community wellbeing, resilience, and responses to change. McCrea, Walton, and Leonard (2014) set out a conceptual framework which articulates relationships between community wellbeing and resilience, which are often conflated in the literature. That conceptual framework was subsequently validated in the context of unconventional gas development in the Western Downs region (McCrea et al., 2015). The main thrust of this framework is that future community wellbeing depends on existing levels of community wellbeing plus processes of community resilience in times of change. They also detail a range of community wellbeing and resilience dimensions which can be used in examining relationships between perceived community wellbeing and resilience, as well as between them and perceived community responses to change.

The dimensions underlying community wellbeing are quite developed in the literature, though the dimensions underlying community resilience are less clear. However, Walton et al. (2013) suggest that the most important dimensions in the context of

large scale unconventional gas development are strategic thinking, links within communities, effective use of resources, commitment, and building meaningful relationships. Later work by (McCrea et al., 2015) found that decision making processes and trust were important dimensions underlying community resilience, and suggested that community spirit and cohesion was a dimension underlying both community wellbeing and resilience. These many dimensions underlying community wellbeing and resilience allow for a quantified and nuanced examination of the relationships between them and perceptions of community responses to unconventional gas development.

Because perceptions of community wellbeing are likely to be diverse, reflecting the needs, values, and norms of different community segments, the underlying dimensions also need to be extensive and comprehensive to cater for these differences. This need for broadening the measures to better represent wellbeing is recognised at the individual, community, regional, and national levels (Christakopoulou et al., 2001; Cummins, 1996; Schirmer et al., 2015; Stiglitz et al., 2009) and has been identified in studies of rural wellbeing in relation to mining activities (Hajkowicz et al., 2011). Thus a large set of items were developed and used in this study based on an extensive literature review of community wellbeing and resilience research (e.g., Christakopoulou et al., 2001; Forjaz et al., 2011; Morton and Edwards, 2012; Onyx and Leonard, 2010; Sirgy et al., 2010), including qualitative research in the unconventional gas field (Walton et al., 2013; Williams & Walton, 2014.) and with some items adapted for the unconventional gas and rural context.

1.3. Community agency

Brown and Westaway (2011) emphasise agency in distinguishing between coping, adapting and transformational responses, where agency relates to “cognitive beliefs structures, as well as the structures and circumstances of the environment one is in” (p. 329). While agency is usually defined in terms of an individual's capacity to act deliberately, independently and with a degree of choice (e.g. Lister, 2004), we support Brown and Westaway's call for a more collective view of agency. Agency in the community context can be considered as comprising three broad aspects that interlink to effect an outcome that is of benefit to a local group, segment, or entire community. The first aspect is the capability to think and act in a strategic or forward thinking manner, where such thinking and acting involves planning, leadership, and learning so that outcomes go beyond maintenance of a current situation. This is described as going beyond ‘everyday’ interactions to being more strategic (Brown and Westaway, 2011; Coulthard, 2012). Magis (2010) also described ‘active agency’ as a community's ability to take planned action and identified this as contributing to resilience.

The second aspect of community agency is a social or relational element whereby an entity has the ability or capacity to navigate and negotiate the social landscape to affect change (Coulthard, 2012). At the community scale we believe this embodies notions of inclusiveness, trust, mutual respect, and opportunity for citizens to be heard and involved in decision making through consultation and collaboration. Such negotiations are likely to be easier between community segments or groups with high social capital, that is, where strong, trusting networks already exist (Halpern, 2005; Putnam, 2000). However they can be challenged at times of rapid change such as the introduction of new infrastructure when intensive engagement and dialogue are needed for genuine collaboration (Haggerty and McBride, 2016). Nonetheless, recent research in the UK has emphasised the importance of using a community led, assets based approach which emphasises community assets, capacity building, and opportunities (cf. community

needs) as part of engaging with communities and envisioning local priorities from diverse groups of residents in the context of proposed nuclear power installations (Whitton, Parry, Grundy, Lillycrop and Ross, 2016; Whitton, Parry, Akiyoshi and Lawless, 2015). Similarly Williams and Walton (2014) identified the importance of community visions for engaging communities affected by coal seam gas.

A third aspect is collective efficacy which refers to a group's belief in its ability to effectively work together. It was introduced by Bandura as “a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments” (Bandura, 1997, p. 447). Again the other two aspects of community agency are evident. To have high collective efficacy requires a belief in both the ability to organize and the ability to take strategic action, which may also depend on structures and circumstances. A more social and applied view of collective efficacy moves beyond cognitions in the minds of group members to examine the social relationships, institutions and structures in which those cognitions occur (e.g., Sampson, 2006). Another key insight from research into collective efficacy is that it needs to refer to a specific issue rather than a generalized ‘can do’ attitude (Stajkovic et al. (2009)). The organizing capacity required for community agency is often developed via third-sector organisations run by volunteers addressing specific issues, either as existing community groups, or new groups formed to respond to the change. These groups typically act on behalf of segments within the community such as services, business, and special interest groups. In the context of the Western Downs, Walton et al. (2013) identified a range of organisations that were crucial to community resilience. For example, a landowner group that formed to ensure ‘land, water and health issues were addressed’, or the self-organised, business-oriented, regional development group that operated as a bridging organisation across the region. These organisations largely capitalised on existing networks. In addition, there were examples of recently formed networks with some of the new stakeholders. For example, an unconventional gas company worked with a self-organised community group tackling the increases in drunk and disorderly behaviour with the influx of gas workers and introduced sanctions on their employees, with positive results. This town would be expected to have good collective efficacy about public order but only through working with new stakeholders. Thus in times of change we need to consider collective efficacy across stakeholders rather than limiting it to existing groups as implied in Bandura (1997) definition. Not surprisingly, resident perceptions of how their community is responding to change may also vary depending on their experiences and involvement with different community groups and stakeholders.

1.4. Relating community wellbeing and resilience with agency

There are strong parallels between the McCrea et al. (2014) conceptual framework and Brown and Westaway (2011) theoretical analyses. Both conceptualise community resources or capacities as underlying community resilience, though McCrea et al. (2014) also see them as underlying community wellbeing. The notion of community resources described by McCrea et al. adopts the detailed seven community capitals framework of Flora and Flora (2013) which includes cultural, human, and social capital, and thus has much in common with Brown and Westaway's broader notions of capacity and capabilities. Both focus on social and relational aspects and agency and also see resilience in terms of processes. One point of difference is that McCrea et al. propose that community wellbeing be understood as state at some point in time, whereas Brown and Westaway (2011) see wellbeing as both a process and an outcome.

Table 1
Definitions of each of the five community responses.

Type of response	Definition
Resisting	Trying to fight the change or at least some aspects
Not coping	Feeling a loss of control and unable to find a positive response.
1. Coping	Managing to live with the change
2. Adapting	A positive adjustment to encompass the change
3. Transformation	Changing into something different but better

Although there are strong parallels between Brown and Westaway (2011) and McCrea et al. (2014) theoretical analyses, McCrea et al. (2014) have extended their theorisation by identifying a wide range of dimensions underlying community wellbeing and resilience. The detailed dimensions of community wellbeing and resilience represented in McCrea et al. (2014) allow the three broad aspects of community agency to be related to community wellbeing and resilience. Table 2 shows how community agency can be reflected in dimensions of community wellbeing and resilience.

1.5. The present study

The present research extends qualitative and quantitative findings on community wellbeing and resilience in the Western Downs by using detailed survey data to examine how wellbeing and resilience dimensions relate to different perceptions of community responses to unconventional gas development. Further, the present research empirically examines Brown and Westaway (2011) theoretical conclusions in a number of ways. First it adds *Resisting* and *Not coping* to their three categories of community responses to change so that their relationships to wellbeing and resilience can be examined. Second, it uses a wide range of measures of wellbeing and resilience for a nuanced examination of the relationship of these concepts to perceived community responses. Brown and Westaway (2011) also identify individual and community level resources as important for resilience. These capacities were not ignored. Perceptions of infrastructure such as roads, services, and business or employment opportunities and individual capacities such as income and health were included as measures of wellbeing. With this range of measures, the research can assess how important different dimensions of community resilience and wellbeing are in distinguishing between different types of community responses to change. Third, it considers the central role of community agency, measuring three aspects; strategic actions, negotiating the social landscape, and collective efficacy.

Four research questions were asked in this study to ascertain the ways that community wellbeing and resilience might distinguish among the five community responses in the context of unconventional gas development:

- RQ1 Which dimensions of community wellbeing and resilience best distinguish between the five community responses to change?
- RQ2 How important are different aspects of community agency for distinguishing between five community responses relative to other dimensions of community wellbeing and resilience?
- RQ3 Are there demographic differences in the perceptions of the way the community is responding?
- RQ4 How do residents think community responses could be improved?

2. Method

The research used a telephone survey conducted during

February 2014 to investigate perceptions of community wellbeing, community resilience, and community responses to unconventional gas development. A third party research company was employed to conduct 400 completed computer assisted telephone interviews (CATI) using a database of regional telephone numbers, including mobile numbers, to randomly select participants. All recruitment, selection, and survey procedures were reviewed by the CSIRO Human Ethics Committee and adhere to the guidelines of the National Statement on Ethical Conduct in Human Research (<https://www.nhmrc.gov.au/guidelines-publications/e72>).

2.1. Sample

Participants were selected based on predetermined selection criteria and quotas. These criteria required participants to be 18 years old and reside in the Western Downs region. Three quotas were used to ensure a representative sample was obtained that reflected ABS population statistics for the region (Australian Bureau of Statistics, 2011) on age, gender, and employment (Table 3). In addition, equal quotas were set for the four sub-regions (100 in each) and for those living in towns versus surrounding areas (50:50) to ensure sufficient sample sizes for comparisons between them. This selection was achieved through screening questions embedded within the survey.

The response rate for the survey was 25.6%. To check whether survey participants were more likely to accept or reject unconventional gas activities in the region, interviewers were asked to rate each participant on their interest in the survey from 1 'very uninterested' to 5 'very interested', and this was tested for an association with their attitude toward unconventional gas activities in the region. However, no significant association was found ($r_s = 0.05$; $p = .32$). Further the distribution of age, gender, and employment were close to the census distribution (ABS, 2011), thus the sample was considered representative of residents in the region.

2.2. Procedure

All participants undertook a telephone interview that lasted approximately 25 min. The survey proceeded in five parts. The initial part of the survey included screening questions for the survey and quota selection, informed consent procedures, some demographic questions and a question asking participants which one of six local communities within the Western Downs region they felt most part of. This identified community became the subsequent reference for all questions relating to 'community' throughout the survey. The second part of the survey investigated perceptions of community wellbeing including fifteen different dimensions of wellbeing. The third part of the survey measured perceptions of community actions in response to changes associated with unconventional gas development (community resilience). The fourth part measured participants' attitudes and feelings towards unconventional gas development, including evaluations of how the community was responding, and the final section gathered demographic data. Each participant answered 119 items. At the end of

Table 2
Relating community wellbeing and resilience with community agency.

Type of community resource	Dimensions of community wellbeing and resilience
Capacity or capability	Community Wellbeing: Personal safety, Income sufficiency, Health, Services and facilities, Built environment, Roads, Environmental quality, Environmental management, Employment and business opportunities
Social-relational aspects	Community Wellbeing: Social interaction, Community participation, Community spirit, Community cohesion
Community agency—navigating the social landscape	Community Wellbeing: Decision making and citizen voice, Community trust
Community agency—strategic actions	Community resilience actions
Community agency—collective efficacy	Community resilience: Collective efficacy across stakeholders

the survey participants were offered to enter a draw for a prize of a \$50 gift voucher as gratitude for completing the survey. Twenty-five participants were randomly selected to receive vouchers.

2.3. Measures

Types of community responses. Respondents were asked their perception of how the community was dealing with unconventional gas development – resisting it/not coping/only just coping/adapting to the changes/changing into something different but better (Table 1). This expands on Brown and Westaway's taxonomy of responses by distinguishing between not coping and only just coping, and by adding resisting which is applicable the context of unconventional gas development.

Measures of community wellbeing and community resilience. Fifteen dimensions of community wellbeing and two dimensions of community resilience were used to distinguish between five different types of community responses. These measures are detailed below (Table 4). In addition, an open-ended question was asked about how to better address challenges and opportunities associated with unconventional gas development. This open-ended question asked residents “what would be one improvement you would like to see in the way these groups are handling things?” where “these groups” referred to residents, government, business and resource companies listed in the previous question.

Perceptions of community wellbeing and community resilience were measured using multiple items for each section. The items were based on the model developed by McCrea et al. (2014). In most instances, respondents were asked to respond to a question stem using a scale from 1 to 5 where 1 was the least and 5 was the most. Participants were either asked to indicate how much they agreed with a statement, or how satisfied they were with the issue in question. The agreement scales ranged from 1 = strongly disagree to 5 = strongly agree, and the satisfaction scales ranged from 1 = very dissatisfied to 5 = very satisfied. Separate scales were developed for each dimension by averaging the items relevant to that scale.

Demographic questions. The demographic variables in Table 5 were used to explore differences in perceptions of how the community was responding (types of community responses) across community segments. Sample percentages for each demographic variable are provided in parentheses.

2.4. Analyses

1. A discriminant analysis was used to describe independent dimensions of community wellbeing and resilience associated with the five responses. This enabled the wellbeing and

resilience dimensions to be summarised into underlying factors which distinguished between different types of community responses without assuming an ordinal relationship among them. Correlations between community wellbeing and resilience dimensions and the two underlying factors were used to identify the social, relational, and agentic aspects of these two factors. (RQ1 & RQ2)

2. To test for relationships between the demographic variables and community responses to change (resisting, not coping, only just coping, adapting, and transforming), two-way chi-square analyses were conducted. Categories within some variables were combined to ensure adequate table cell sizes for chi-square analyses. (RQ3)
3. A content analysis was conducted on the open-ended question on suggesting improvements to community responding. (RQ4)

All statistical analyses were undertaken using STATA software version 13. Test results were denoted as significant if the p-value was less than 0.05.

3. Results

Participants' perceptions of how the community was responding to changes from unconventional gas development were mixed, with most participants either viewing their community as adapting to the changes (45.6%) or only just coping (33.9%). A smaller portion of the community felt that their community was not coping (8.5%) and small proportions thought that the community was resisting change or transforming into something different but better (6.1% and 5.9% respectively). Each of the response categories had more than the minimum of 20 responses recommended for discriminant analysis by Hair et al. (1998).

3.1. Relationship of community wellbeing and resilience to perceptions of the way the community is responding (RQ1 and RQ2)

To understand which dimensions of community wellbeing and resilience are important to the way the community is responding (resisting, not coping, only just coping, adapting or transforming), a discriminant analysis was conducted. A discriminant analysis identifies underlying factors¹ which combine dimensions of wellbeing and resilience that best distinguish between the five responses, without assuming an ordinal amongst them.

The discriminant analysis showed that 43.2% of total variation in community wellbeing and resilience is associated with the five community responses, and it revealed two underlying factors that significantly distinguish amongst the community responses. The first factor explained 69% of the between-group variation in community wellbeing and resilience ($F = 3.19, p < .001$) and the second explained another 17% ($F = 1.51, p = .01$).

Table 6 shows the correlations between the dimensions and the

¹ In discriminant analysis these underlying factors are called ‘discriminant functions’.

Table 3

Comparison of the Census and sample demographic distributions for the Western Downs.

Sample demographics	Sample percentages	ABS 2011 population census percentages
Aged 18–34 years	24	27
Aged 35–54 years	42	38
Aged 55 plus	34	35
Male	51	52
Employed	68	65

two underlying factors which can then be used to interpret each factor. By convention, only moderate to high correlations are used to interpret each factor so the focus was on correlations over 0.40. The highest correlations with Factor 1 are some agentic oriented dimensions (community resilience actions and collective efficacy across stakeholders, community trust, decision making and citizen voice), and some of the more process and future oriented dimensions of community wellbeing (employment and business opportunities and environmental management for the future). Given the agentic and process oriented nature of these variables, the first factor was named 'community functioning'. The only correlation above 0.40 on Factor 2 was social interaction so this was named 'Social engagement'. This second factor was also correlated with community participation and collective efficacy but to a lesser extent, suggesting that social interaction, community participation, and collective efficacy are mutually reinforcing.

The means for the community wellbeing and resilience dimensions associated with community functioning were low to moderate (i.e., 2.75 to 3.18 out of 5). The mean for social interaction was higher (3.43), though social engagement was not as effective in distinguishing between community responses to unconventional gas development.

Fig. 1 shows how these two factors distinguish among the five responses. Perceived community functioning was highest for residents that believed that the community was adapting or transforming into something better while those who thought the community was only just coping evaluated community functioning slightly below zero (the mean of the community functioning factor). Perceptions of community functioning were lowest for those who saw the community as not coping with unconventional gas developments. Interestingly, respondents who viewed their community as resisting unconventional gas development did not perceive community functioning as poorly as those who felt the community was not coping.

The social engagement factor was best able to distinguish those who viewed the community as not coping from those who viewed the community as resisting unconventional gas development (i.e. the two groups with lower perceived community functioning). Relatively low levels of social engagement were reported from those respondents who viewed the community as resisting gas development while above average levels of social engagement were associated with perceptions that the community was not coping. The discriminant analysis also showed that social engagement and community functioning are relatively independent factors.

In summary, community functioning best distinguishes between the five community responses, while social engagement distinguishes between perceived community resisting and not coping (RQ1). Social and relational aspects of community wellbeing and resilience were more important in distinguishing between community responses than capacity aspects like income sufficiency, the built environment, roads, and services and facilities (RQ1). The importance of resilience actions (e.g., strategic planning, leadership, and learning) collective efficacy across stakeholders, community trust, decision making and citizen voice, suggest that

the five responses can best be distinguished in terms of agency (RQ2).

3.2. Relationship of the demographic variables to the five responses (RQ3)

Nearly all the demographic variables had no significant association with community responses (i.e., gender, age, year of arrival, sub-regions, location type, employment, farm ownership, home ownership, education, and birthplace). The only significant predictor for community responses was being an unconventional gas worker or employment in the unconventional gas industry ($\chi^2 = 6.9$ $p < .001$). Of the 33 employees in the unconventional gas industry, 24 (72.7%) believed that community was adapting or transforming into something better, and thus they were more positive about the changes than other respondents. By comparison, only 108 of 224 residents (48.2%) working in other industries thought this.

3.3. Suggestions for improved community responses (RQ4)

Overall, the most frequently identified improvement was improved communication (34% of all responses) followed by improvements in community engagement and collaboration amongst the various stakeholders (14% and 10% respectively). Communication could be viewed as a subset of community engagement, as in this data communication was more about getting information out from key stakeholders into the local communities, for example, unconventional gas companies and local government conveying information to the local communities in relation to the latest gas developments, the related impacts, and plans to address them. Improvements in communication encompassed a desire for trust, honesty, transparency, timeliness of information, and suggestions for different modes of communicating.

"More transparency from the groups: they only tell us what they want us to know, if they don't want us to know something, they won't tell us"

"Open and honesty: I want them to be truthful and upfront"

"More input through the local media so that we get to know what's going on, locals are the last to know anything"

In contrast, community engagement occurs when the key stakeholders listen to the local community about their concerns. Suggestions for improvement in community engagement included addressing power inequalities and considering the community's perspective in dealings around unconventional gas development.

"There's an imbalance of power/ needs to be a better power sharing/ think the gas companies hold a lot of power/ they can manipulate the council and the communities come a poor third/ communities don't have the same clout"

Table 4
Measurement of community wellbeing and resilience dimensions.

Measures	No of items	Scale type and reliability ¹	Examples for scale items
Community Wellbeing			
Personal safety	4	Agreement 0.77	safe to be alone at home, walk outside, or leave the car on the side of the road
Income sufficiency	3	Agreement 0.91	household income was enough for household expenses, and the lifestyle they enjoy
Health	6	Satisfaction 0.81	diet and eating habits, exercise habits, physical and mental health
Services and facilities	9	Satisfaction 0.87	With local schools, child care, sports and leisure facilities, food and other shopping, medical and health services, and community support services
Built environment	3	Satisfaction 0.82	with cleanliness in their town, parks and gardens, and the general appearance of their town
Roads	5	Satisfaction 0.83	with the condition, safety and amount of traffic on the roads, both in and around their town
Environmental quality	3	Satisfaction 0.79	with the level of dust, noise, and the overall quality of the general environment in their community
Environmental management	4	Satisfaction 0.85	with quality of underground water for the future; nature reserves for the future; sustainability of local farming land for the future
Decision making and citizen voice	4	Agreement 0.82	council keeps them informed; there are opportunities to be heard; and the unconventional gas companies involved local residents in their decisions
Employment and business opportunities	3	Agreement 0.84	good job opportunities, local businesses had done well out of unconventional gas development
Community spirit	4	Agreement 0.89	people can rely upon one another for help; have friendly relationships; can work together if there is a serious problem
Community cohesion	3	Agreement 0.88	local community was welcoming of newcomers and people of different cultures; and their community includes everyone
Community trust	6	Agreement 0.84	levels of trust in community leaders; people generally around their local area; local Council; unconventional gas companies; and State Government;
Community participation	4	Agreement 0.89	they regularly helped out a local group as a volunteer; attended several community events in the past year; were an active member of a local organisation or club
Social interaction	4	Agreement 0.79	they regularly visited someone's home; went out together socially; spoke or texted on the phone
Community resilience			
Community resilience actions	8	Agreement 0.92	planning for the future, adequate leadership, accessing relevant information, developing key connections within the community, supporting volunteers, persevering
Collective efficacy across stakeholders	2	Agreement 0.83	different groups (residents, government, business and resource companies) could work together to address problems; and take advantage of opportunities in relation to unconventional gas development

Notes: ¹ Reliability = Spearman's *r* for two-item measures and Cronbach's alpha for other measures.

Table 5
Measurement of demographic variables.

Variables	Categories
Age	18 to 34 years (24%); 35–54 years (42%); and 55 + years (34%)
Gender	Male (51%) or female (49%)
Employment	Working (68.2%) or not working (31.8%)
Years living in community	10 years or less (24.3%); 11–20 years (21.8%); more than 20 years (54.0%)
Sub-regions	Dalby, Chinchilla, Miles-Wandoan, or Tara (25% in each)
Location	In-town (49.0%) or out-of-town (51%)
Unconventional gas worker	No (87.3%) or yes, for a coal seam gas company or subcontractor (12.7%). Only asked of working residents (n = 273).
Farm ownership	Yes (37.5%) or no (62.5%)
Home ownership	Yes (76.8%) or no (23.2%)
Education	Less than Year 12 (34.3%); completed Year 12 (senior high school) (17.0%); certificate, diploma, or trade qualification (29.8%); bachelor degree or higher (19.0%)
Birthplace	Australia (91.5%) or born overseas (8.5%)

“Be more inclusive of land holders/ more respect for the land owners' primary business and have some regard for their concerns with their property”

“More consultation with the community/ an open council/ not closed door council/ an open accountable council”

Again, these comments highlight the importance of social-relational and agentic aspects of community wellbeing and resilience. Although improvements in communication, engagement, and collaboration were desired by participants from each of the five responses, suggestions for improved communication and engagement came mainly from those that saw the community as adapting or just coping. Participants who perceived the community as not coping had the highest proportion of very negative comments

about unconventional gas development and they were the least concerned with leadership and planning. Improvements in leadership and planning mainly featured in responses from participants who saw the community as adapting.

4. Discussion

The distribution of perceptions of the five community responses to the changes brought about by the unconventional gas industry revealed that most Western Downs residents thought the community was adapting or just coping. Despite widespread concerns across Australia about declining economies and populations in rural areas, residents in the Western Downs did not see the unconventional gas industry as rescuing their region, with a fairly small proportion believing that the community was embracing the

Table 6

Factors underlying community responses to change and their correlations with dimensions of community wellbeing and resilience.

Dimensions of community wellbeing and resilience	Factor 1: Community functioning	Factor 2: Social engagement	Mean (S.D.)
Community resilience actions	0.77	−0.15	3.16 (0.82)
Collective efficacy across stakeholders	0.65	0.28	3.18 (1.06)
Community trust	0.64	0.13	3.02 (0.81)
Employment and business opportunities	0.63	0.09	3.09 (1.07)
Decision making and citizen voice	0.53	−0.22	2.64 (0.93)
Environmental management for the future	0.43	−0.21	2.75 (0.95)
Income sufficiency	0.34	0.19	3.64 (1.10)
Roads	0.34	−0.07	2.45 (0.92)
Community cohesion	0.33	0.14	3.58 (0.90)
Community spirit	0.32	−0.03	3.89 (0.80)
Environmental quality	0.30	−0.17	3.49 (0.90)
Services and facilities	0.27	0.02	3.32 (0.81)
Health	0.26	−0.07	3.82 (0.73)
Social interaction	0.17	0.48	3.43 (0.99)
Built environment	0.13	0.18	3.52 (0.89)
Personal safety	0.11	0.03	3.91 (0.88)
Community participation	0.03	0.33	3.09 (1.25)

Notes: Correlations over 0.40 are considered important for defining each underlying factor (bolded). The dimensions are ordered by the size of their correlation with Factor 1.

gas industry as an opportunity to change into something better. On the other hand, despite widespread media coverage of opposition to unconventional gas, a similarly small proportion thought the community was resisting the changes. Perhaps the most concerning is the tenth of the local population who thought the community was not coping, that is, that they were overwhelmed by the tsunami of change.

4.1. Underlying determinants of perceptions of the community's response to change

Media reporting would suggest that the underlying theme of unconventional gas development was the conflict between business and employment on one hand and concern for the environment on the other. Certainly these two variables were among the key determinants of perceptions of the community's response to change but they were by no means the strongest predictors and there were five other variables with strong predictive power.

As suggested by Brown and Westaway (2011), the social and relational aspects were more strongly related to perceptions of the community's response to change than were the perceptions of community capacities. A number of dimensions for both underlying factors in the discriminant analysis (community action, collective efficacy across stakeholders, community trust, decision making and citizen voice, social interaction and community participation) reflected social and relational aspects of wellbeing and resilience rather than community or individual capacities. They made up four of the six strongest dimensions of the community functioning factor and the strongest dimension of the social engagement factor. Consistent with McManus et al. (2012) study of farmers, the capacities that were important were employment and business opportunities and to a lesser extent environmental management for the future. However, other capacities, roads, income sufficiency, and environmental quality, made a relatively small contribution. It is also worth noting here that demographics such as home ownership and education which reflect individual capacities were not significant predictors of perceptions of how the community is responding to the changes.

4.2. The importance of community agency

The results also supported Brown and Westaway (2011) conclusion about the importance of agency. Community agency, rather than individual agency, was examined because it was

essential to conceptualise agency at the community level, if not the regional level, to understand responses to a widespread change like unconventional gas production. All three aspects of agency – strategic thinking and action, negotiating the social landscape, and collective efficacy – were important underlying determinants of perceptions of the community's response to change. The strongest contributors to the community functioning factor involved the first aspect of agency, the capability to think and act in a strategic or forward thinking manner (Brown and Westaway, 2011; Coulthard, 2012). Community resilience actions most strongly defined the community functioning factor with the key actions being planning for the future and adequate leadership. Although the focus of these measures is on strategic actions they also contained social-relational elements such as inter-group relationships and support for volunteers. The second aspect of agency, whereby the entity has the capacity to negotiate the social landscape (Coulthard, 2012) was also evident. Key factors were community trust and decision-making and citizen voice. The latter asked for perceptions of how decisions are made, whether the local government kept residents informed, whether there are opportunities to be heard; and whether the unconventional gas companies involved local residents in their decisions. Aspects of the community resilience actions (e.g., accessing relevant information and good intergroup working relationships) are also relevant to negotiating the social landscape. The third aspect of agency was collective efficacy across stakeholders, measuring perceptions of how well residents, government, business and resource companies could work together to address problems or take advantage of opportunities. Collective efficacy was the second strongest contributor to the community functioning factor. The findings suggest that the agency variables could be developed into a reliable and valid measure of community agency reflecting the three different aspects. Future research could use such a measure to compare communities facing a diverse range of changes.

The perceptions of the community's responses to change reflected different ratings on the community agency variables in consistent ways. Those that believed that the community was transforming into something different but better reported the highest levels of community agency which seems reasonable given that transformation would require agency. Adapting was associated with slightly lower ratings of agency. Only just coping was the middle category. At the other end those who thought that the community was not coping gave the lowest ratings on the community agency variables which again makes sense as not coping

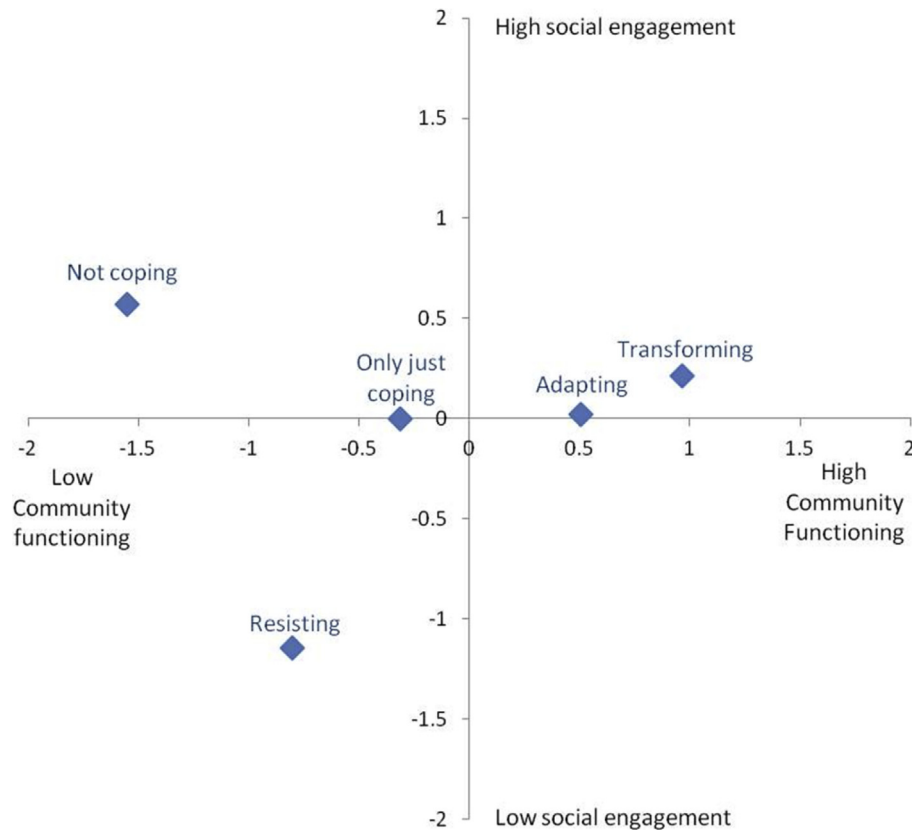


Fig. 1. Types of community responses plotted against perceptions of community functioning and social engagement.

certainly implies a lack of agency. Interestingly those who saw the community as not coping were more socially engaged than average and perhaps obtained more personal stories of the difficulties facing residents. Perceptions that the community was resisting change were associated with the second lowest ratings of agency, which could reflect the nature of the Western Downs as a politically and socially conservative area where resistance is not strong. As this category had the lowest levels of social engagement, perhaps they rely on the media for their information. Future research could investigate whether resisting is associated with higher levels of agency and social engagement at more politically active sites such as Gloucester in the neighbouring state of New South Wales where the local community believes it has driven out the gas companies.

Agency also emerged in the open-ended questions about improving the way residents, government, business, and resource companies are handling things. Better access to information was the dominant theme. Better information about the activities of these key players would address multiple issues: in particular it was seen as a resource to increase community agency and the transparency of unconventional gas companies and government. Further, two-way communication was seen as necessary for effective consultation processes where residents feel their concerns are understood. Thus the findings not only support Brown and Westaway (2011) conclusion on the importance of agency but also extend their position by showing that strategic, social negotiation, and collective efficacy aspects of agency contribute to differential perceptions of community responses.

The results have implications for a community's future actions when faced with major change. In the case of the Western Downs, a number of aspects of agency were viewed as unsatisfactory. Decision making and citizen voice was below the mid-point. Levels of

community trust were also marginal, so strategies to improve citizen involvement in decision-making and trust within the community would be desirable. And even though community resilience actions were perceived more favourably on average, some items were rated poorly (planning for the future, adequate leadership, and accessing relevant information). These all suggest ways in which agency by the community can be increased.

4.3. The five responses as a potential typology of community responses to change

The five categories of community responses to change (transforming, adapting, only just coping, resisting and not coping) appear to form a useful typology of community responses to change. Although there were marked differences in the frequency of the categories, all categories had significant support. The first four emerged from Brown and Westaway (2011) extensive review of three fields of literature and the fifth was added to include the possibility that a community was being overwhelmed by the changes. These five responses accounted for 43% of total variation in the 17 community wellbeing and resilience measures, which is a substantial explanatory power for a single categorical variable. Also, answers to the open-ended question (asking for suggestions to improve the way residents, government, business and resource companies are handling things) revealed differences amongst the five responses. Respondents who saw the community as adapting focussed on improvements in leadership and planning. Respondents who saw the community as only just coping focussed on improved community engagement and those who saw the community as not coping were most likely to express very negative views of the unconventional gas industry. The lack of demographic

differences is also indicative of a useful typology as clearly the responses are not proxies for demographic variables. The exception was that, as might be expected, the small number of respondents working in the unconventional gas industry thought that the community was either adapting or transforming into something better. A slight adjustment might be needed in that the perception of 'only just coping' was associated with less than average community functioning, so there is an argument that a response category of 'just coping' would be average community functioning and probably a better response category. Although, more research is necessary to characterise the response categories and compare them to other potential categorisations, there appears to be value in having a typology of community responses to change rather than entering into debates about definitions of resilience. Any or all the responses, except not coping, could be characterised as resilience (Walton et al., 2013) so it may be more beneficial to investigate resilience empirically by examining the practical outcomes of the community responses in different circumstances.

4.4. Limitations of the research

Clearly a limitation of this study is that it was confined to the Western Downs region and addressed only one type of regional change, unconventional gas development. However, many key dimensions associated with community agency such as issues of collective efficacy, trust, and citizen voice, are likely to apply to almost any community facing change. In contrast, the issues surrounding the capacities are likely to be more variable depending on the location and the type of change the community is dealing with. Clearly natural disasters such as cyclones, floods, or droughts each affect a region's resources differently and have different challenges from those arising from rapid development. Community resistance may not be a useful category in the context of natural disasters, and it would therefore be useful to check the value of the five community responses typology in other situations.

Further, as Brown and Westaway (2011) suggest, issues of scale need to be carefully addressed. If a change is affecting a whole region then there are likely to be responses at individual, group, community, and regional levels but individual responses are less likely to be effective than collective ones. Also concepts such as community agency and collective efficacy imply that there is a defined group, community, or region which is working collectively but in times of rapid change the group members might be difficult to define and identify. Social network analysis would allow empirical assessment of the community structure and clarify when collective responses need to bridge different community segments or external stakeholders.

5. Conclusion

In all, the findings provide empirical support for Brown and Westaway (2011) theoretical conclusions about the importance of social and relational factors for distinguishing community responses and the key role of community agency. These findings also contribute insights into community perceptions of resisting change and the value of addressing the strategic, social negotiation, and collective efficacy aspects of agency, especially when agency needs to be addressed at the communal level. The lack of demographic differences suggests that the region is not segmented on socio-demographic lines in its perceptions of the community responses and assumptions based on these categories should be avoided.

The research makes a first step towards operationalising the theoretical relationships into standardised tools: a measure of community agency and a typology of community responses. These measures could be useful not only for identifying community

responses to unconventional gas in a range of sites but also for examining community responses to a wide range of challenges and opportunities. Further, employing a typology of community responses avoids the problem of debating diverse definitions of resilience (Walton et al., 2013).

The importance of community agency is not a signal that communities can be left to their own devices. As demonstrated in a range of other studies (Haggerty and McBride, 2016; Halseth and Ryser, 2015; Onyx and Leonard, 2010) regional governance and local coordination can be significant facilitators of an effective response. This research suggests that key elements are the opportunities and the skills to work with other stakeholders including more powerful stakeholders such as industry and government. They may also need assistance to develop their resilience actions such as leadership and planning and citizenship activities and to ensure that all members of the community can be part of the response. Trust both within the community and trust in industry and government may not be easily generated when needed to respond to a sudden change. However, it has been identified as a key factor underpinning social capital (Putnam, 2000) and community agency. All stakeholders need to be conscious of the importance and fragility of community trust and nurture it through transparency, reliability, and demonstrating respect for community values. Good regional governance would include the provision of forums where all stakeholders can come together to exchange information, develop trust, facilitate community input into decision-making, and thus to develop and exercise community agency.

However, experiences in the U.S. where there is often no requirement for industry to consult with communities, show that industry rarely engages in consultation and those consultations which do occur are occasions for the industry to spout its contribution rather than occasions to seriously listen to community concerns or actively engage in governance networks (Wilson et al., 2016). Even if community based approaches are embraced by industry, these efforts can be frustrated without an appropriate regional meta-governance arrangements which support community based and participatory approaches in a context of 'strained relationships and limited capacity among key stakeholders' during rapid resource development (Haggerty and McBride, 2016, p. 246).

Thus some legislative requirements for real consultation seem to be necessary and the specification of recognised community consultation methods such as Generic Design Assessment Public Dialogue process (J. Whitton et al., 2016) might be required to make the consultations effective. Further, some resource companies may need to explore the benefits of working with and empowering local communities (Haggerty and McBride, 2016) as oppose to using industry meta-governance arrangements to draw boundaries around corporate social responsibilities (Wilson et al., 2016). Future research could examine the relationships between the legislative requirements, broader meta-governance arrangements, and the nature of stakeholder interactions across sectors for supporting and empowering community-based approaches, generating public trust in energy companies, and fostering enhanced outcomes for both local communities and the unconventional gas industry.

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