



## Wellbeing in the aftermath of floods

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### ABSTRACT

The interactions between flood events, their aftermath, and recovery leading to health and wellbeing outcomes for individuals are complex, and the pathways and mechanisms through which wellbeing is affected are often hidden and remain under-researched. This study analyses the diverse processes that explain changes in wellbeing for those experiencing flooding. It identifies key pathways to wellbeing outcomes that concern perceptions of lack of agency, dislocation from home, and disrupted futures inducing negative impacts, with offsetting positive effects through community networks and interactions. The mixed method study is based on data from repeated qualitative semi-structured interviews (n=60) and a structured survey (n=1000) with individuals that experienced flooding directly during winter 2013/14 in two UK regions. The results show for the first time the diversity and intersection of pathways to wellbeing outcomes in the aftermath of floods. The findings suggest that enhanced public health planning and interventions could focus on the precise practices and mechanisms that intersect to produce anxiety, stress, and their amelioration at individual and community levels.

### 1. Introduction

Flooding represents a major environmental risk for many countries around the world with potentially devastating effects for human lives, health and livelihoods. The frequency and severity of floods are increasing in many global regions due to land development and processes of climate change, which are set to increase the intensity of rainfall (Smith et al., 2014; Watts et al., 2015). In the UK, for example, recent projections for increases in flooding as a result of development processes, land management, and climate change have contributed to heightened concern about the impacts of future flood events (Committee on Climate Change, 2015).

A substantial body of evidence has established that floods have direct health impacts such as the risk of death and injury, disease outbreaks, such as gastroenteritis, and water quality issues (Alderman et al., 2012). But floods are also a deeply traumatic experience for those affected. Multiple studies highlight higher occurrences of mental health issues (such as anxiety, depression and post-traumatic stress disorder) in populations that have experienced flooding (Ahern et al., 2005; Carroll et al., 2009; Stanke et al., 2012; Alderman et al., 2012; Fernandez et al., 2015). Research further documents some of the factors that exacerbate the mental health consequences of flood experience, such as the flood duration, the economic and social consequences of recovery, and the emotional labour involved (Fordham and Ketteridge, 1995; Medd et al., 2015; Tapsell et al.,

2002; Tapsell and Tunstall, 2001, 2008; Whittle et al., 2012). Although the socio-psychological health impacts of floods have long been established, most empirical studies have focused on analysis of single outcomes or particular factors that affect psychological health. Less attention has been given to analysis of how multiple factors and processes combine to contribute to wider wellbeing outcomes.

Wellbeing has formed an increasing focus in the literature concerned with issues of psychological health. As a concept it constitutes a broader category for understanding the healthiness of people, taking into account subjective notions of happiness, as well as physical and psychological components of health. The forms of analysis utilising the concept can be broadly divided into positivist and interpretive approaches. Where the former seeks to operationalize a universal conception of human wellbeing, the latter adopts a relational understanding focusing on the subjective experience of wellbeing in place (White, 2010). Here we adopt a relational approach treating wellbeing as something that is socially and culturally constructed, and rooted in particular times and places (Atkinson et al., 2012). Our focus is thus on investigating wellbeing as emerging through relationality with others, including other people, places and material environments. In this respect we treat wellbeing as something that is actively constituted through the interplay of personal, social, and environmental processes.

The paper develops an in-depth analysis of wellbeing in the aftermath of a major flood event and examines four key social processes that have been shown in the previous literature to have

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relevance for understanding how people experience socio-environmental change. The first concerns how wellbeing impacts develop and manifest over time after being affected by environmental disasters. Here the literature is relatively limited in terms of longitudinal analysis but studies that have been undertaken suggest that psychological health impacts are evident over the long-term (Bailey et al., 2006; Tapsell and Tunstall, 2008; Medd et al., 2015). Research more widely looking at responses to trauma over time indicates that, in general, people improve as time passes (Norris et al., 2009). The second process relates to the role of social networks and social capital as an indicator of social resilience (Adger, 2003). The role of individual and community resilience as a response to various dimensions of flooding has more recently become the focus of policy and research (e.g. Twigger-Ross et al., 2011; Begg et al., 2015), but only with only limited attention given specifically to the community and relational aspects of wellbeing.

The third dimension concerns people's perceptions of agency and processes of institutional response. Public perceptions have been highlighted elsewhere as important in understanding public responses to flooding both more generally (Adger et al., 2013; Butler and Pidgeon, 2011) and specifically with regards to health impacts (Tapsell and Tunstall, 2008). We examine, then, how perceptions of institutional responses and feelings of agency in post-flood contexts influence wellbeing. Finally, we look at the processes by which people make sense of their experiences of flooding, focusing, in particular, on the role of responses to change and perceived futures for wellbeing. This concept has not been the subject of focus in the analysis of disasters and flooding but has been explored in other contexts to explain responses to processes of change and trauma more generally (e.g. Ivinson and Renold, 2013).

Through the paper we advance an analysis of these different social dimensions that have been identified as having a role in explaining wellbeing, and take the field forward by examining the interconnections between them in a context of socio-environmental change. Understanding the connections, associations and contextual issues that underlay public experiences offers an important means for thinking through potential difficulties and opportunities in mitigating the impact of floods on wellbeing.

The empirical data comes from two complementary phases of data collection. The first is a set of in-depth intensive longitudinal repeat interviews conducted with a sample of those directly affected by floods in the winter 2013/14 in the English county of Somerset. The second source is a set of data from a structured survey of two populations affected by the same winter floods: Somerset, England and the town of Boston in Lincolnshire, England. The analysis examines key processes that underlay individual and relational aspects of wellbeing and shows how these intersect to influence how flood impacts are ultimately experienced.

## 2. Floods, health, and wellbeing

Much evidence highlights that the consequences of flood events are not limited to physical health and mortality or communicable diseases. Research points to long-lasting effects on mental health and wellbeing, including stress, anxiety, depression and post-traumatic stress disorder (e.g. see Tapsell and Tunstall, 2008; Ahern et al., 2005). Incidents of common mental health disorders and post-traumatic stress disorder (PTSD) have been shown to be higher in flooded populations than non-flooded groups. Evidence relating to this finding generally comes from large-scale medical and epidemiological research on flood events across the world (e.g. Ahern et al., 2005). However, focussing on mental health through the use of medically defined responses leads many studies to under-emphasise the diversity of mechanisms by which wellbeing more widely is affected.

Though the majority of research concerned with psychological health and wellbeing after floods has focused on quantitative medical scales, several in-depth qualitative studies have advanced explanation

of the processes that influence mental health and wellbeing. For example, Werritty et al. (2007) highlight how flood victims can both fear returning to their homes in case of further flood events, and show concern about not being at home should another flood event occur. Similarly, Tapsell et al. (2002) discuss how people who have been flooded speak about regularly checking river levels and report feelings of anxiety when it rains.

Other studies have highlighted how flood events can alter residents' sense of place in relation to the home, community, and local area (e.g. Tapsell and Tunstall, 2008; Carroll et al., 2009; Sims et al., 2009), with negative implications for health and wellbeing. Sense of place in this context relates to the ways that the once private home becomes less secure and no longer a place of refuge after being invaded by floodwaters (Tunstall and Tapsell, 2008; Harries, 2008; Sims et al., 2009). The violation of home intersects with the breaking of place attachments through the changes to flooded properties and the loss of personal possessions, which give rise to feelings that repaired houses are no longer homes (e.g. Carroll et al., 2009), further negatively impacts the wellbeing of those affected.

In this research, wellbeing is taken to encapsulate mental health issues (such as stress and anxiety) as well as wider dimensions of emotional distress, happiness, and life satisfaction (e.g. MacDonald et al., 2015). We use a conception of wellbeing that includes individual elements as well as relational dimensions of value that give meaning to lived experiences in order to interpret and examine the processes that influence outcomes (Atkinson, 2002). The current analysis goes further than previous studies in seeking to understand the interconnection between the different processes that can be seen to impact wellbeing, including the influence of community and relational dimensions.

Woven through the literature on social dimensions of floods is evidence of the protective nature of different dimensions of social capital, such as strong familial bonds, and the potential for such capital to ameliorate the negative consequences of environmental risks, at both individual and community scales (e.g. Adger, 2003; Aldrich, 2012; Wind and Komproe, 2012; Wickes et al., 2015; Paul et al., 2016). Social capital has increasingly been measured as a set of key components, including trust, reciprocity and mutuality, shared commitment and belonging, and formal and informal social networks. Major concepts are those of *bonding*, which refers to the strength of connections between people who already know one another, and *bridging* and *linking* capital, which denote the value of wider (often weaker) social ties to people or groups in different positions of power (Szreter and Woolcock, 2004). The existence of these components within any given community is held to signify high levels of social capital that manifest as social resources a person or community is able to draw on to meet certain goals.

A positive relationship between individual social capital and wellbeing has been established in previous research (De Silva et al., 2005). In relation to post-disaster recovery specifically, studies highlight the role of strong community relations in promoting wellbeing. Evidence suggests community networks can be strengthened by the event itself, rather than simply representing a pre-existing resource (see Twigger-Ross et al., 2011). The availability of social support, skills and knowledge, which people can draw upon throughout the recovery process, has the potential to reduce the negative impact on wellbeing (Werritty et al., 2007). But social capital is not uni-directional and inclusive. At the community scale, social capital can be exclusionary as much as inclusionary (e.g. Wind and Komproe, 2012). Divisions within a community can also be heightened at times of trauma, perhaps through perceived injustices in the experience of different groups or how certain groups are treated during the recovery phase (see Werritty et al., 2007; Adger et al., 2016).

In this paper we discuss the processes and issues that impact wellbeing in the aftermath of a major flood event. We distinguish four different social dimensions or processes and discuss how these interconnect to influence wellbeing. The analysis highlights how wellbeing

impacts manifest and evolve over time; provides insight into the significance of community relations and the relevance of perceptions of agency; and signals the importance of processes of sense making in the face of ruptured futures for wellbeing. Crucially, it provides insight into the overlapping and intertwined nature of these dimensions in ultimately shaping outcomes. In concluding, the discussion turns to focus on the implications of understanding the multi-dimensionality of wellbeing impacts for public health and wider institutional responses.

### 3. Methods

The winter of 2013/14 in the UK saw extreme levels of high rainfall and high winds over prolonged periods that combined to result in severe flooding across large parts of the country (Huntingford et al., 2014). The county of Somerset in the South-West of England and the town of Boston on the East coast of England were two of the locations that experienced severe flood events.

In Somerset, the flooding affected the Somerset Levels and Moors, a low lying flat area that covers approximately 650 km<sup>2</sup> and includes 250 km<sup>2</sup> of farmland and three towns as well as multiple villages supporting 53,500 residents. Approximately 280 homes and 65 km<sup>2</sup> of land flooded (Environment Agency, 2015), some of which remained under water for upwards of twelve weeks. The recovery period for Somerset was extensive, in some cases lasting in excess of twelve months. In response, major land and river management works were undertaken by government authorities, including river dredging and raising roads. Socio-demographic information shows that the median age in Somerset is 44 years, and in comparison to the general population in England, Somerset has fewer children and adults in the age range 20–29 years, and more adults who are over 65 years old (Somerset Health and Wellbeing Board, 2014). The county is identified as one of the ten most rural counties in the UK, with many dispersed rural populations.

In Boston, a town in a low-lying fenland area much of which is below mean high water spring tide levels, a tidal surge in December 2013 caused the river Haven to overtop flood defences. In total 690 homes and 120 businesses were inundated with water: emergency services had been preparing to evacuate 18,000 residents. Socio-demographic data for the town of Boston shows it has the highest population of non-British EU passport holders outside of London; aside from English, 76 languages are spoken in Boston (Big Local, 2014). The median age in Boston is 42 and based on 2011 census data, the area has seen the greatest increases in numbers of residents in their twenties with the number of those in their sixties remaining the same in comparison to the 2001 census (Lincolnshire Research Observatory, 2012). In terms of ethnicity, 65% of residents describe themselves as White British (Big Local, 2014). In comparison, in the county of Somerset 95% of resident identify as White British.

The research design consisted of a two phases: phase one used an intensive longitudinal design, collecting data through semi-structured qualitative interviews with residents across flood-affected locations in the Somerset Levels and Moors. Data was collected at two distinct time periods, September–October 2014 (six to eight months after the flood waters receded) and April–May 2015 (twelve to fourteen months after flood waters receded). This intensive approach (as opposed to an extensive study conducted across several years) has precedent in qualitative longitudinal studies (see for example Butler et al., 2014) and retains many of the advantages of extensive longitudinal studies, primarily the ability to unpack changes in actions, processes and participant perspectives over time (Saldaña 2003). The temporal period post flood has been highlighted in other longitudinal analyses as a time during which much change occurs (e.g. Medd et al., 2015). As such, the focus of the research on the 18-month period following the floods gave a degree of insight important for advancing understanding of response processes and impacts on wellbeing; though it is acknowledged that changes will have occurred outside the time limits of the

**Table 1**

Summary of methods and data from two phases of data collection on wellbeing impacts of floods.

	Phase One	Phase Two
Location	Somerset Levels and Moors, Somerset	Somerset Levels and Moors, Somerset; Boston, Lincolnshire
Methodology	Intensive longitudinal qualitative interviews	Telephone Survey
Time Period	First round: September/October 2014 Second round: April–May 2015	July 2015
Cohort Size	First round: 35  Second round: 25 Total: 60	Somerset: n=500  Boston: n=500

study. Socio-demographic data collected from the qualitative interview participants shows that gender was approximately even across the sample. Two thirds of the sample were aged 64 or over with just over half of participants being retired, and most owned or privately rented their homes (see Butler et al., 2016).

Phase two, conducted in July 2015, was a quantitative telephone survey to examine issues and perceptions across a wider population within Somerset and across Boston, Lincolnshire (see Table 1). Whilst the survey was only conducted once, the retrospective design enabled data to be gathered about participants' current and historic wellbeing. Despite the dependence upon respondents' recollections in retrospective surveys (Buck et al., 1995), flood events are typically infrequent and highly memorable occurrences, meaning they have key attributes of issues that can be successfully examined using retrospective survey design. Just over half the survey respondents were female (51%) and the most common age was the 45–54 range, accounting for 22% of respondents. Retirees made up 30% of the sample, with 60% in some form of employment, and most respondents own or privately rent their homes (87%) (see Butler et al., 2016).

#### 3.1. In-depth intensive longitudinal data on wellbeing: Somerset Levels and Moors

Recruitment of participants was initiated through the delivery of information packs to a random selection of households across differently affected villages within the Somerset Levels and Moors. Participants were self-selected: they expressed interest after initial information dissemination by contacting the research team. In order to fully capture the range of experiences resulting from the winter flood events, recruitment continued until we had participants who had experienced a range of flooding impacts, for example directly flooded (i.e. with water entering their homes, land or business) and those who had been indirectly affected (e.g. having difficulties getting to work), in line with similar previous studies (see Adger et al., 2013). The interviews explored people's views on their communities; their experiences of the flood and the time afterwards; their perceptions of the response including both formal services and community responses; their wellbeing and feelings about the flood event; and their expectations for the future. The recordings were transcribed and the data made anonymous such that the participants identity could not be identified from the transcripts. The transcripts were thematically coded using Computer Aided Qualitative Data Analysis Software (Nvivo10) and the analytic approach was grounded in the interpretive tradition where themes are created from the data. In the following, participants are differentiated using participant numbers. In interviews with two adults (e.g. husband and wife) the suffixes a and b are used.

### 3.2. Survey of flooded and flood-affected individuals: Somerset and Boston

The sample for the telephone survey (n=1000) was evenly split between Boston (n=500) and Somerset (n=500), and focused on subsections of the two areas that had been flooded during 2013/14. The survey was administered through a market research company who used landline and mobile telephone numbers to call individuals in the survey area and invite them to take part. A quota approach to sampling was utilised to ensure a broadly representative sample in terms of age and gender. The survey remained active until the quotas in each area had been filled. The survey was 20 min in length and collected data on: participants' flood experiences; perceptions on the cause of the floods; the impacts of the floods on their wellbeing in the present day and at three historic time points; perceptions of levels of social capital in their community (adapted from Poortinga, 2012); attitudes towards the role of the community and governing institutions during the floods (adapted from Adger et al., 2013); and standard demographic variables. The data was analysed in SPSS 23 using a combination of parametric and non-parametric approaches.

## 4. Results and discussion: wellbeing in the aftermath of floods

The data offers evidence of a strong impact on wellbeing as a result of the 2013/14 flood events. In the following, we discuss the findings structured around four different dimensions of the issues that impact on wellbeing in post flood contexts. While it is widely reported that there are negative impacts on wellbeing from experiencing flooding, we suggest that there are diverse experiences creating shocks and discontinuities that disturb linear trajectories from initial impact to recovery, and intersect to produce outcomes.

### 4.1. Wellbeing impacts over time

This first dimension concerns the role of time in influencing or mitigating the impacts of flood events on wellbeing. Both the qualitative and quantitative findings highlight clear impacts on wellbeing at the time of the flooding and in the early stages of recovery. Such effects on wellbeing were pervasive, irrespective of the type of experience a person had; i.e. from homes or land being inundated, to individuals who had longer journeys to work. Interview participants outlined the diversity of phenomena that caused anxiety:

*"I couldn't do anything, It was like you were in limbo, you couldn't concentrate and I've never been that stressed, when people say that they're depressed and they don't know, what they're doing or anything, it was just like that, you were walking about in a bit of a daze"* (Participant 6, flooded on land)

Participant 13a: Our **sleep patterns** are absolutely **up the creek. Stress.** Absolutely.

Participant 13a: You **lay awake at night** thinking, "What's going to happen?" (Flooded in home)

*"...there were days, like if was down at Exeter, if it was already flooded and I was driving off to Exeter and it was pouring with rain, you kind of think "should I be doing this?", "will I be able to get back?" and "will my son be able to get back from school?", it... makes you a bit anxious"* (Participant 1, travel difficulties)

In the quantitative phase of the research, participants were asked about their wellbeing at different time points. This gave us an opportunity to better understand the trajectories of longer-term impacts on wellbeing. The findings show that both those that were

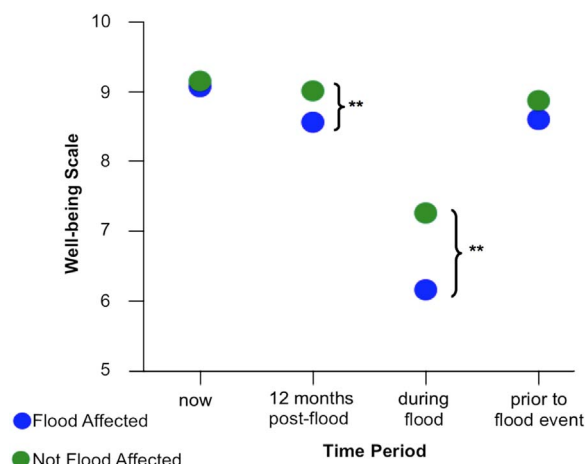


Fig. 1. Scatter plot showing mean wellbeing scores of survey respondents split by exposure to flood impacts at four time periods: before the floods; during the floods, 12 months post-flood and present day.

affected in some way by the floods and those that were not affected but whose communities were affected, report significantly higher wellbeing scores 12 months post-flood, when compared to scores during the flood (see Fig. 1 – Flood Affected:  $t(472)=-22.264$ ,  $p < .001$ ; Not Flood Affected:  $t(257)=-12.136$ ,  $p < .001$ ).

Within the whole sample, significant differences were seen between wellbeing at two time points: during the floods ( $F(1, 493.095)=33.7755$ ,  $p < .001$ ) and 12 months post-flood ( $F(1,528.687)=9.652$ ,  $p < .001$ ). Respondents were given a definition of wellbeing based on that used by the Centre for Disease Control (2013), and asked to rate their wellbeing on a scale of 0 (low) to 10 (high). For the analysis, respondents were split by flood exposure, those who were in some way affected by the floods ('Flood Affected') and those who were not affected but whose community experienced impacts from the floods ('Not Flood Affected').

This quantitative analysis of wellbeing over time thus gives us an indication of how people perceived their wellbeing at different time points, suggesting improvements from the time at which the flood happened compared to one year later. The intensive longitudinal aspect of the qualitative interviews, however, allowed for insight into how people's wellbeing altered over time in ways better attuned to relational understandings of wellbeing. They indicate that though there was an increased feeling of safety and reassurance with time since the floods, this combined with more persistent negative changes in how people felt about home and the area more widely.

*"I found it [the flooding] hugely threatening and oppressive but also hugely dominating because everybody around here is going round with their shoulders hunched, in the Spring when it finally stopped, you just got a sense of people slowly, slowly kind of dropping their shoulders."* (Interview One, Participant 16a, flooded on land)

*"It's certainly helped [the dry winter of 2014/5] and the fact that they've done the work has helped. But I would say that my confidence in this place was never as rosy as [my husband's] from the beginning really but ... I suppose you have to accept where you are and I don't know, we'll see how we go."* (Interview Two, Participant 16a, flooded on land)

This highlights how it is the interaction between different social and material developments that occur over time, such as a relatively dry winter in 2014/15, significant land and river management work, and the recovery of other community members, that ultimately affect people's sense of wellbeing. This means that increased feelings of security and improved levels of wellbeing over time were, for some, highly qualified. For some participants the impacts had not lessened

but intensified as social resources (both personal and community) became exhausted. There remained issues such as the need to re-establish emotional connections to the home, and stress and anxiety from the renovation and rebuilding work that was undertaken in houses that were flooded and in the wider area. A clear finding from past studies concerns how living at home when recovery works are taking place contributes to stress and anxiety long after the flood event (e.g. Whittle et al., 2010; Tapsell and Tunstall, 2001, 2008). The research here also highlights longer-term wellbeing impacts relating to what have been termed ‘secondary stressors’. Participants discussed issues such as “constant noise” and stress over long periods after the flooding: “you flood and you deal with it but the worst part is when you dry out and the builders come in, it’s so stressful” [Participant 23, flooded in home]. Our data, however, further suggests negative effects from participants not being in their own homes whilst works were being carried out, as this exacerbated the loss of ‘home’ further:

“...it’s **so horrible**, I can’t tell you. It just is **vile** compared to my own home, it’s just horrible. **Really horrible**.” (Participant 20, flooded in home)

Overall, rather than a one-way progressive recovery that we might have assumed from the quantitative analysis, we find a non-linear set of impacts on wellbeing, resonating with observations about the nature of flood recovery more broadly as undulating over time (see Medd et al., 2015). Though the evidence shows that wellbeing is most negatively affected through the period during which the flood is happening, impacts do not diminish in a straightforward manner over time. Rather, they improve and decline with the emergence of different processes of flood action and recovery. Such developments see an intertwining of personal and wider social and material dimensions, such as changes to familial relationships as a result of the floods or the completion of flood management works and political processes, like the reinstatement (or not) of insurance for high-risk households. Such dimensions can operate to both negatively or positively influence a person’s wellbeing at any given point in time following a flood event. This non-linearity and the importance of factors beyond the flood itself (such as political decision-making) in the nature of wellbeing impacts, is important to understand both for the design of research, and policy or public health responses.

#### 4.2. Social resilience, networks and community

The second dimension focuses on the significance of networks and relationships between people in the communities for wellbeing. Both the qualitative and the quantitative data show an important role for community relations and forms of social capital in mitigating the detrimental consequences to wellbeing from flood events. For example, in the survey 84% of those affected by the floods said that they agreed with the statement “The community spirit made it easier to cope with the flooding”, and 87% said that they agreed with the statement “The local community provided support that was not available from the authorities”.

The qualitative analysis highlighted multiple elements of community cohesion that were important for wellbeing. For example, community support spanning more formal mechanisms (e.g. donations from local businesses, volunteering, support centres) through to informal ones (e.g. dinner with neighbours, cups of tea), as described by interview participants:

“I almost had to keep a **diary of social engagements** because people were saying “lunch?”, “No, I’m going to lunch”, “supper?”, “er, oh lovely, I can do Thursday”, which was **wonderful** and they’d say “Bring your washing” and these people just up the road, so people you knew, you got to know much, much better and a **fantastic kindness** shown by people, **it really was lovely**”. (Participant 23, flooded in home)

The data demonstrate diverse collective responses to flood events in bringing people together as networks are created afresh and new bonds form, bolstering the sense of community. The role of floods in supporting and stimulating community acceptance was a theme that ran through the qualitative findings, where participants often cited the community spirit as the single positive from the experience of the floods:

“In some respects you could even say **the floods** have been a **positive thing**, in **building community** feel and communication and stuff.” (Participant 26, flooded in home)

“a bit of a **Blitz spirit** thing, which can be quite bonding to a community, to face a common threat and to be ... the experience of **neighbours helping one another** is a good thing. There’s an **awful lot of goodwill** was generated.” (Participant 16b, flooded on land)

“There were **good bits** which sounds awful in times of flooding but the **community coherence stuff** was **just phenomenal**, it really brought you, it re-engaged your **faith in humanity** actually” (Participant 21, village flooded)

As time moved on, the need for and the existence of community support decreased. As the flood waters receded, individuals also retreated in order to concentrate on their own recovery: “During the floods they were good buddies because they had a shared problem, but once that had gone then they’ll be moving apart again” (Participant 26). As this begins to occur, the role of community support changes subtly, with it concentrated within specific opportunities, for example communities celebrated particular milestones, such as flood protection works being completed, or used special occasions to bring people together:

“We had a New Year’s Eve party, we have had them in the past, we had one this year, **they sold all the tickets so they printed some more** and then they sold all those as well and it was **heaving and that is really unusual, really unusual** but for some reason, people said, “Let’s go out and party”, so we did and I’m sorry to say **I pogo-ed with the best of them!**” (Participant 20, flooded in home)

The strong role for community relations in wellbeing was further emphasised through findings relating to evacuation. The survey data showed that the wellbeing of those who were evacuated was significantly lower than those who remained in their homes, both during the floods (Evacuated: mean wellbeing=4.56; Not Evacuated: mean wellbeing=6.84) and 12 months post flood (Evacuated: mean wellbeing=8.04; Not Evacuated: mean wellbeing=8.95; during floods:  $t(53.55)=-5.292$ ,  $p < .001$ ; 12 months post flood:  $t(52.990)=-2.582$ ,  $p < .01$ ). From our qualitative analysis we suggest that this negative difference in wellbeing is in part due to the challenges evacuation creates for maintaining community relations.

For those who were evacuated, the importance of community networks was made visible through the efforts of community members to maintain contact and connections whilst geographically dispersed. For example, a ‘Keep In Touch’ scheme was developed in one heavily evacuated community, which reflected the desire for the community to be able to draw upon support from each other. Further efforts to reunite communities after evacuation were also evident and highlighted as important in enabling people meet and talk about their experiences. The outcome was a commonly perceived increase in social networks, typified by respondents highlighting community cohesion:

“... when we came back, **we at least knew everyone**, pretty much everyone and of course using the church as a focal point for the groups, **whether you were a religious person or not, you met a lot of people** from [the village].” (Participant 27a, flooded in home)

Other forms of community support from networks beyond geogra-

phical communities also had important implications for wellbeing. For example, virtual forms of connection facilitated through social media enhanced bridging and linking capital and brought high numbers of volunteers from across the country to help in the processes of recovery. For the most part, the actions of the volunteers were gratefully received and the data suggests positive impacts for wellbeing. For instance, participants spoke about being emotionally touched by the kindness and generosity of the volunteers:

*“suddenly sort of touches you really and then you see people’s responses and then later in the day, they say “thanks very much, we’ve done this and that”, ...from moving horses to moving furniture, to sandbagging.... it was local so you felt very touched by it.”* (Participant 1, travel difficulties)

However, the implications of volunteer support for wellbeing were not entirely straight forward owing in the main to the un-coordinated nature of volunteer responses. The unpredictable nature of the arrival and numbers of volunteers put pressure on local state agencies to manage them effectively. The data suggests that inadequate management contributed to volunteers’ actions being perceived as inappropriate by both flood victims and agencies, and to examples of volunteer actions detrimentally affecting residents’ wellbeing.

The range of informal community led actions that occurred during and after the floods emphasises the importance of both existing forms of social capital in these areas and the potential for these networks to be enhanced in times of crisis. Such a result suggests that the state of a community before a disaster situation is only partially indicative of how they will respond in the context of a disaster (Aldrich, 2012). While the findings here strongly suggest the importance of community support for mitigating wellbeing impacts, a difficult challenge remains in understanding how community cohesion and capital can be explicitly enabled to ameliorate effects on wellbeing across different contexts.

### 4.3. Agency, power, and perceptions

This dimension concerns how perceptions of agency and processes of institutional response intersect with the other dimensions to affect wellbeing. To begin with, the quantitative data analysis identified four key variables that, in combination, best predicted wellbeing 12 months post flood. In essence, survey respondents who indicated high wellbeing during the flood, who perceived feelings of belonging in their community and felt the community pulled together, who experienced a straightforward recovery process, and who believed that authorities had done all that was possible to help the public, tended to have higher wellbeing scores 12 month post flooding (Table 2).

The quantitative analysis thus highlights how the perceptions of institutional responses combined with other factors to influence wellbeing. The qualitative analysis revealed how a sense of powerlessness pervaded many participants’ descriptions of the flood events and the recovery process. A lack of agency was perceived in relation to the causes of the floods, the responses of different authorities to the floods, and the recovery process. It also extended beyond those who were directly affected by the floods. Residents who were not directly affected reported feeling that they were unable to do more than *“providing a warm dinner in a warm house”* (Participant 18). This lack of agency and sense of powerlessness was overwhelmingly cited by participants as a source of stress and anxiety. One illustration of this was related to the institutional response, with authorities perceived as not be adequately dealing with the emergency:

*“But it was medieval, it was a medieval experience and we were living in medieval conditions and nobody really, no sort of government officials or anything like that appeared for yonks”* (Participant 19, flooded in home)

Beyond perceptions about the lack of response impacting wellbeing we found evidence relating to the importance of *how* responses were

**Table 2**  
Stepwise multiple regression analysis, independent variable is wellbeing 12 months post flood.

	b	SE b	β
<b>Step 1</b>			
Constant	6.76	.26	
Wellbeing during flood event	.31	.04	.40***
<b>Step 2</b>			
Constant	7.63	.33	
Wellbeing during flood event	.30	.04	.39***
Community Acceptance scale	-.44	.11	-.20***
<b>Step 3</b>			
Constant	7.06	.37	
Wellbeing during flood event	.28	.04	.37***
Community Acceptance scale	-.40	.11	-.18***
The recovery was more stressful than the flooding itself	.22	.07	.16***
<b>Step 4</b>			
Constant	7.55	.44	
Wellbeing during flood event	.26	.04	.35***
Community Acceptance scale	-.39	.11	-.18***
The recovery was more stressful than the flooding itself	.21	.07	.15***
The authorities did all that they could to help the public after the flood.	-.13	.07	-.10*

Model four explains 23% of the variance in wellbeing 12 months post flood.  $R^2=.16$  for Step 1 ( $p < 0.001$ ),  $R^2=.23$  for Step 4 ( $p < 0.001$ ).  $\Delta R^2=.04$  for Step 2 1 ( $p < 0.001$ ),  $\Delta R^2=.02$  for Step 3 ( $p < 0.001$ ). \* $p < 0.05$ . \*\*\* $p < 0.001$ .

enacted for influencing feelings of agency or powerlessness. For example, responses that made use of existing community social resources such as ‘village agents’ (which act as support workers within rural settings in the UK) were central to mediating between institutions and communities and delivering key forms of response to support wellbeing and recovery. Gaps in the communications between governing institutions and citizens became visibly problematic in the post-disaster context. Yet, social resources within communities can form a bridge between professionalised governance organisations and communities, fulfilling an important (potentially necessary) role in complex societies where meaningful forms of connection are increasingly difficult to maintain.

While some institutional responses were crucial in facilitating agency and supporting wellbeing, others impinged on the sense of power communities had developed in the early stages of response. One of the benefits of community-led responses is the speed with they can be implemented, free from the bureaucracy of more formal institutional responses. However, once the emergency response procedures are mobilised there is potential for the two to be in conflict. For example, decisions made by authorities about the safety of community-instigated transport arrangements put extra strain on the relationship between the authorities and the local residents.

*“For three weeks, the kids were being transported on the back of... tractors and it was a pretty makeshift affair. Of course, as soon as you get officialdom involved after 3 ½ weeks, “health and safety, you can’t put the kids on the back of the tractor” and for 3 ½ weeks they haven’t fallen in. I think for the community, people thought “oh boy, give us a break”* (Participant18, village flooded).

Ultimately, in this instance, the local people and the authorities created an effective solution to the transportation issues that was acceptable to both parties. However, the process would have been less contentious had it started by engaging with the community led activities that were already in place. This indicates an important need for institutional responses to be attuned to community scale responses

as different scales of action intersect with one another. This is another example of how institutional responses can contribute to the emergence of either negative or positive wellbeing impact, and is suggestive, then, of the role of multiple factors beyond the flood event itself in influencing wellbeing over time. Moreover these findings are indicative of the uneven nature of flood impacts as different issues, from perceptions of the institutional response to trust and community relations, influence participants' experience.

#### 4.4. Sense-making, ruptured futures, and wellbeing

The fourth and final dimension is concerned with the ways in which people make sense of flood events: partly contingent on their own personal social-psychological resources, but also mediated through institutional activities and provisioning. Our focus is on how people respond to change and the ruptures to their lives and expectations for their futures that are created by the flood. This dimension underpins and offers explanatory power with regards to the longer-term wellbeing impacts from flooding.

The analysis suggests that people's conceptions of the future can be important to their wellbeing, for example being able to see a future that is not dominated by the impacts from flooding. This is illustrated in the way that people talked about the challenges they experienced in terms of anxiety and wellbeing as being related to an in/ability to 'look forwards'; highlighted in this participant's discussion of a therapeutic programme they undertook to help them recover psychologically from floods.

*"I was looking forward at my one year, three years and five years and it's full of things like my husband retiring and me thinking about retiring and going on that world cruise – we're not going on a world cruise – but doing the garden or taking up hobbies and all that kind of thing and I can see forward and the flooding just wasn't in there."* (Participant 20, flooded in home)

In this instance being able to move beyond thinking about flooding as something anticipated or associated with uncertainty about the future was central to the recovery of wellbeing following the floods. In other instances, participants expressed negative impacts on their wellbeing arising from concerns about whether the flood management work (both completed and planned) would be sufficient in the face of an increased threat of future flooding with climate change: *"Is it all about climate change and sea levels and stuff? Maybe it is? So maybe I do need to move to higher ground..."* [Participant 26, flooded in home].

The ability to overcome a sense of rupture to futures and look forward without anxiety was also linked to wider political and economic issues, such as the drop in house prices or abilities to get insurance, and to sell homes or pass them on as a legacy for their children. In this regard, some participants reflected that counselling could not help to overcome some of these material and socio-economic factors that contribute to wellbeing impacts. This highlights an important intersection between socio-economic impacts and the more intangible factors, like perceptions of futures, which play an important role in wellbeing.

In the processes through which participants made sense of the flooding we find some evidence for the different strategies employed and reveal another aspect of response processes that help to mitigate wellbeing impacts. Where participants talked about the experience of getting through the floods in terms of it being a challenge to be overcome, they also signalled emotional gratification and moments of happiness derived from overcoming incremental obstacles and celebrating those successes.

*"...he lent me a pump and somebody else lent me a pump and we started to sort of beat it back and hold it and Ursula [pseudo-*

*nym] kept, she was swooshing from inside, she said "we're winning, we're winning" and we were winning!"* (Participant 23, flooded in home)

*"You become a bit like a caveman, getting great satisfaction in finding some nuts somewhere, if you can get someone to come and help you find that table to put the fridge on and get an extension, actually the sense of satisfaction was immense. Or when the water went away a bit and you could get cardboard on the floor, the joy of getting cardboard on the floor to walk on, you thought "We're really getting sorted now".* (Participant 19, flooded in home)

This form of response was also evident later in the processes of recovering from the floods. For example, one participant spoke of rediscovering family crockery and redirecting their way of thinking about treasured items (after they had been threatened by the flood) as a positive outcome for them.

*"the box had fallen apart, and I thought that's it, the whole dinner service is gone and I was heartbroken. But we took it out very carefully and we washed it and we sterilised it, it had been in that box for 15 years and I can't remember the last time I'd eaten a meal off it. So last Mother's Day, we actually sat down with our son and had our Mothering Sunday lunch off it and it is now in the cupboard in the kitchen and we use it and that is something good that came out of the floods."* (Participant 20, flooded in home)

Amidst stories of loss, stress and sadness, then, we also find narratives that highlight the personal resources that people use to make sense of the flood event and to recover from the impacts it has on their wellbeing. These quite personal dimensions of response intertwine with the processes of institutional action to influence feelings of agency and powerlessness, with implications for wellbeing as discussed in the previous section.

## 5. Discussion and conclusions

In this study we have developed an in-depth analysis of four key social dimensions that explain, contribute to, and affect wellbeing following a major flood event. These concern temporal dynamics and the passage of time; social capital and the relevance of relational networks; perceptions of agency and self-efficacy; and capacities for sense-making and coping with changed futures.

Overall our findings show how wellbeing follows a non-linear trajectory through the recovery process after an initial negative peak, rather than proceeding in a straight-forward linear fashion back to higher levels of wellbeing as more time passes. Importantly, the research indicates that a perceived lack of agency has negative consequences for wellbeing outcomes, whilst community connections and networked relationships have positive effects. Further, the data demonstrates the importance of existing social capital but also indicates that flood events can provide the opportunity for new networks to form. Negative wellbeing outcomes are associated with the perception of ruptured futures and continued insecurity caused by concerns about future flood events as well as other material and socio-economic consequences that follow from floods, such as loss of economic value in homes. Taken together, these findings highlight the diverse processes and the interactions that give rise to wellbeing outcomes after flood events. The findings presented here advance the current understanding of the wellbeing impacts of flood events. Though the negative mental health outcomes after flooding are well established (e.g. Paranjothy et al., 2011; Tapsell and Tunstall, 2008), this study makes a distinctive contribution by offering insights into the key social dimensions that explain *why* and *how* wellbeing is affected, the processes through which this occurs, and the intersection between them.

Flooding is often an intensely distressing and traumatic experience; supportive communities and physical flood resilience measures can only ever partially ameliorate the emotional distress experienced when flood water force people to leave their homes for extended periods of time, or disrupts lives in other ways. However, this research offers insights into how community and institutional responses can work together to lessen the feelings of distress and isolation, and promote wellbeing and resilience in communities that are subject to flood risk. In this respect there are three key insights from this research relevant for public health and policy responses.

First, the analysis confirms that the impacts on wellbeing from a major flood event are likely to be exhibited over long temporal periods, potentially years not months. Hence interventions to improve wellbeing or overcome the medical implications of the negative impacts on wellbeing will be required, perhaps at low levels, but over a sustained period. Our research highlights the relevance of social support workers within communities in delivering this kind of on-going intervention, and as important for facilitating feelings of agency in contexts where authorities and governing agencies can often feel distant. This study has presented data from Somerset and Boston where flooding is an on-going risk: residents live with a combination of continued exposure to the threat of repeat events and an increasing likelihood of experiencing floods. While this study did not explicitly conduct analysis of multiple events, the non-linear nature of the wellbeing responses we have documented for a single event suggests that in areas where residents live with flood risk and repeat floods, the effects are likely to be cumulative. This means that any one flood event should not be treated in isolation from previous events, signalling the importance of institutional memory for ensuring responses attuned to the needs and perspectives of those affected.

Secondly, some public policy and emergency responses to floods themselves can have inadvertent negative consequences on wellbeing. The detrimental impacts on wellbeing resulting from the evacuation of residents from their homes was highlighted in this study, and has also been shown in other major disaster events, such as in the response to Hurricane Katrina (Sastry and VanLandingham, 2009). This research highlights that a potentially important factor affecting this, is the fracturing of community relationships that occurs as a result of evacuation, as well as the loss of home. Whilst some institutional responses are non-negotiable in the midst of flood emergencies, it is possible to be cognisant of the potential for detrimental consequences and to put in place measures that help to ameliorate negative outcomes, such as helping to ensure routes for maintaining community connection and cohesion in evacuated communities.

A third public policy implication of the findings concerns the importance of community in offsetting the negative impacts of wellbeing on the individual. The results suggest that sensitivity to existing community connections should underpin all aspects of the emergency response and recovery processes. Further, that community led initiatives are central to proactive resilience building, making communities both more aware of flood risks, as well as engaging their knowledge in the design of sustainable solutions for water management (Lane et al., 2013). Hence communities are likely to be central to the prevention of, as well as recovery from, floods.

Overall, we conclude that it is important to be attentive to the interconnections between different factors underlying wellbeing impacts, as the research highlights that they cannot be fully understood in isolation. For example, the negative impact of evacuation on resident's wellbeing stemmed from a combination of a sense of powerlessness, a lack of community support, the long term stress of being away from home and having to re-build homes, as well as continued concerns about future flood risk. It is only by understanding that ways that these different social dimensions interact in affecting and constituting wellbeing that interventions can counteract the detrimental impacts on wellbeing from floods and other environmental hazards.

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