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Well-being, life satisfaction and capabilities of flood disaster victims☆

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ABSTRACT

The individual well-being of flood disaster victims is examined making use of two concepts: life satisfaction and perceived capabilities in life. These concepts are compared in two samples: a representative sample of Flemish respondents and a specific sample of people that have been the victim of a pluvial flood. Well-being as life satisfaction is found not to be related to past or expected future flooding, whereas well-being as capabilities in life is negatively related to both past and expected future flooding.

1. Introduction

Natural events and disasters can lead to very different kinds of damage. Typically, damage types are classified into direct vs indirect and tangible vs intangible effects (Jonkman et al., 2008). Indirect damage occurs as the result of direct damage and has a different time frame and/or space dimension; that is, it occurs after the event has passed and/or outside the disaster area (Smith and Ward, 1998). Tangible damage can easily be monetized, while putting a monetary value on intangible damage (not traded on the market) is more difficult (Smith and Ward, 1998). Examples of intangible, direct damage are fatalities and injuries, moral damage and inconvenience such as transportation problems or environmental losses. Intangible, indirect types of damage include psychological or (mental) health problems and political, societal or environmental consequences (Jonkman et al., 2008). Neglecting indirect, intangible effects is problematic (see among others Parker et al., 2007; Messner and Meyer, 2006; Murphy and Gardoni, 2006) as it strongly and wrongly decreases the estimated benefits when protection and investment decisions are made.

This paper investigates an intangible, indirect effect of one specific kind of natural disaster, namely, flooding. Most of the research on flood damage focuses on fluvial floods caused by a river overflowing (for Flanders, see Kellens et al., 2013) and uses "depth–damage" functions to measure short-term direct and tangible damage. We analyze the well-being of victims of pluvial floods, which are floods caused by extreme rainfall events that cannot be processed by existing urban drainage systems. This flood type may be less spectacular than fluvial floods, but is more common in urbanized areas.

There are very few studies on risk assessment which use individuals' well-being as the outcome variable. Most of the research addressing intangible and indirect effects concentrates on mental health as outcome variable (for a warning about the effect of climate change on mental health, see Berry et al., 2010). In the field of epidemiology, many scholars have demonstrated important mortality and health effects both shortly and long after floods took place (for an overview, see, e.g., Ahern et al., 2005; for an application of the effect of floods on mental health in Brisbane, see Alderman et al., 2013). Already in 1970, a famous study by Bennet (1970) showed more psychological problems for victims of the flooding in Bristol during the 12 months after the flood compared to a control group, in addition to increased deaths and hospital referrals. In many later studies, comparable effects were found on anxiety, depressions, and posttraumatic stress (Adeola, 2009; Bourque et al., 2006; Liu et al., 2006; Tapsell and Tunstall, 2008; Tobin and Ollenburger, 1996). These negative psychological effects have been shown to linger for years after a flood event (Hajat et al., 2003; Tapsell and Tunstall, 2008). Reacher et al. (2004) discovered that victims of floods suffer more than other people from diseases and other physical issues such as gastrointestinal problems or earache, which clearly cannot be explained directly by the flood itself. This research on the mental health effects of disasters can be complementary to studies which take individual well-being as the outcome variable. The main difference is that (mental) health effects can be more directly linked to the event while effects on well-being are much more indirect and therefore less clearly attributable to the flood event.

For this study, we consider subjective well-being, making use of self-reported information, and we compare two indicators: a traditional

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satisfaction-with-life indicator (as in Diener, 2000; Blanchflower and Oswald, 2004, 2008; Dolan et al., 2008; Stiglitz et al., 2009; Helliwell et al., 2012) and a "perceived capabilities" indicator (Van Ootegem and Verhofstadt, 2012 and forthcoming). Capabilities are defined as the options or opportunities individuals have in life, which is essential to evaluate individual well-being (Alkire, 2005; Fleurbaey, 2006; Gasper, 2007; Kuklys, 2005; Robeyns, 2006; Schokkaert, 2009; Sen, 1985; 1993). The capabilities framework is theoretically and ethically appealing, but implementation is a real challenge. Not only do researchers need a lot of data, but they also have to make choices in order to first define and measure the different dimensions of an individual's set of capabilities and then aggregate these dimensions to obtain a composite index. This is particularly challenging as part of an individual's capabilities is – by definition – not observable. As far as we know, only one study applied the capability approach to the impact of natural disasters: Gardoni and Murphy's (2010) Disaster Impact Index (DII). The DII was illustrated for four disasters: earthquakes in Japan, Pakistan and the United States, and hurricane Katrina. However, from a theoretical point of view, a capabilities approach should focus on people (individuals or households), not countries. Therefore, we opted to directly ask people to evaluate their opportunities or capabilities (Van Ootegem and Verhofstadt, forthcoming). Proceeding as such, we sacrificed some of the objectivity of the concept of capabilities in order to have one composite indicator at the level of individuals. The dimensions or weights are then chosen by the people themselves, not the researchers.

The flood events selected for this study took place at various moments for various people, but individual well-being was measured for one specific year (2013). Consequently, it is possible that some time has passed and other events have occurred in between the flood event and the measurement of well-being in 2013. Similar to the literature on the impact of unemployment on well-being (e.g., Clark et al., 2010; Carr et al., 2011; Lange, 2013), we hypothesized that (past) flooding "scars" because it "scares" (terminology introduced by Knabe and Rätzel, 2011). It is then the fear of more (future) flooding that influences people's well-being rather than having experienced a flood as such. The specific relation between a prior experience of a natural disaster and subsequent behaviour and quality of life was studied in detail for the Katrina catastrophe in Adeola (2009). O'Donnell et al. (2014) stated that life evaluation questions such as on life satisfaction "capture a reflective assessment of how one's life is going" and "are the result of a cognitive evaluation on the part of the subject rather than a description of current emotional state" (p. 28). In contrast, the capabilities concept has – by definition – a more forward-looking perspective as it reflects opportunities in life and "respects the individual's ability to pursue and realise the goals that he or she values" (Stiglitz et al., 2009, p. 152). This distinction was also confirmed by the analysis in Van Ootegem and Verhofstadt (forthcoming): answering the satisfaction question is a more backward-looking reflection, thinking about capabilities and opportunities refers to a more forward-looking exercise. Therefore, the difference between past and (fear for) future flooding may be relevant when comparing satisfaction and capabilities.

In the next section, we explain the data collection methodology and compare the well-being of flood victims with that of non-victims using information on satisfaction and perceived capabilities. Section three examines the determinants (multivariate) of the well-being of flood victims and non-victims, and section four concludes.

2. Comparing flood victims with non-victims

We compared data from two sources. First, in 2013, a survey was sent out to identified victims of pluvial floods in Flanders (the northern Dutch-speaking part of Belgium). This survey asked the participants to evaluate several aspects of their well-being and to provide information about the flood disaster they were confronted with. Specifically, they were asked about the severity of the flood (depth, duration and tangible damage they suffered), the recurrence of floods (how often they have been the victim of floods in the past) and their fear of future flooding. This data collection is part of the Plurisk project about pluvial risks (see infra) and is therefore referred to as the Plurisk survey. Our second source is a representative survey (LEVO[1] 2013) of 1291 Flemish respondents, most of whom have of course not experienced flooding. Only 6.1% of the LEVO respondents have been a victim of a pluvial flood, while 5.3% reported another (non-pluvial) flood-related problem. These participants were asked to assess the same aspects of their well-being as in the Plurisk survey, and thus act as the control or reference group.

The Plurisk survey was distributed among private households that were presumed to be affected by one or more pluvial floods. The survey was sent to 3963 addresses all across Flanders. The majority of these addresses come from a database of the Belgian national disaster relief fund. This fund collected the addresses of pluvial flood victims, but only until 2007. The reason for this is a change in the legislation that year, obliging insurance companies to provide fire and flood insurance in one package, thus ending the need for government compensations that were provided by the disaster relief fund (Portaal Belgische overheid, 2012). The lack of recent data was tackled in two ways. First, we included 260 addresses from records of fire and police departments as well as local authorities in villages and cities that were flooded in recent years during a pluvial event. Second, we asked people to fill out the questionnaire for the most severe flood since 2000 at their address. Many of the addresses in the national disaster relief fund were expected to be quite prone to pluvial floods, for instance, because they are close to malfunctioning sewer systems or in lower parts of the village or city. As such, a fairly high number of victims were confronted with flooding on a regular basis. Since participants were asked to take the worst flood as a reference, they could also report floods after 2007. Twenty-one percent of the reported floods occurred after the year 2007. A total of 973 households completed the survey (24.6% of our sample). In a first step, 353 files were deleted, 260 of which were deemed not useful because respondents claimed never to have suffered damage from pluvial floods. A number of respondents suffered from damage caused by hail or winds. This type of damage was not separated from flood damage in the disaster fund database. In addition, some people moved to the address found in the disaster fund database after the recorded pluvial event took place at that address. The files of 93 other respondents were also deleted, mainly because they turned out to be small shopkeepers, farmers or other self-employed businessmen reporting the damage to their business. The data of the remaining 620 respondents were used to perform further analyses. In Van Ootegem et al. (2015), we examine the reported monetary damage and estimate (depth) damage functions. We found flood depth to be an important predictor of damage, but with a different impact depending on whether the flood occurred on the ground floor or in the basement. Non-hazard indicators (e.g., risk awareness) are also important for the predicted damage, revealing that warning systems and policies can be valuable.

The data from the Plurisk survey are compared to self-reported information obtained from the LEVO survey. As the LEVO respondents are used as a control group of non-victims of flooding, we excluded 147 respondents that report that they have experienced flooding. However, including these respondents does not alter our conclusions. Since the Plurisk sample does not contain any students, this group (100 respondents) was also deleted from the control group. Another five respondents were deleted because too many variables were missing. This resulted in a sample of 1039 respondents. These data were then weighted to obtain a sample representative for the Flemish population according to life situation, gender and age distribution. The weighted

[1] LEVO is the Dutch acronym for "LEvensomstandigheden in Vlaanderen Onderzocht" (research on living circumstances in Flanders). It is a yearly large-scale survey organized in the context of a research seminar at Ghent University. The field work is carried out by Ghent University students. Organization, supervision, controlling and cleaning is performed by the authors.