# Understanding Crisis Preparedness: Insights from Personal Values, Beliefs, Social and Personal Norms

**Felix Burger**
Technical University of Darmstadt, FAI
felix.burger@magenta.de

**Jasmin Haunschild**
Technical University of Darmstadt, PEASEC
haunschild@peasec.tu-darmstadt.de

**Christian Reuter**
Technical University of Darmstadt, PEASEC
reuter@peasec.tu-darmstadt.de

**ABSTRACT**

In disasters and crises, crisis preparation at the household level is crucial for societal resilience. However, motivating citizens to take personal responsibility and to implement preparedness measures remains challenging. This study investigates the impact of values, beliefs and norms on preparedness. Through a survey in Germany on resource-oriented crisis preparedness and participants' values, a group of more prepared and less prepared individuals was differentiated. We quantitatively analyzed the correlation between values and crisis preparedness. A quantitative analysis revealed a significant association between the value of *benevolence* and higher preparedness. Follow-up interviews (N=30) explored participants' beliefs and norms, showing minimal group differences. Although crisis preparedness is generally viewed positively, strong negativity exists towards perceived "hoarders". The study discusses implication for crisis communication and the design of nudges and persuasive systems, emphasizing intervention that can trigger benevolence to foster preparedness and appeal to the social benefits to counter the narrative of anti-social crisis preparedness.

**Keywords**

Crisis preparedness, values, beliefs, social norms, personal norms

## INTRODUCTION

Despite advancements in understanding the causes and consequences of disasters, they continue to result in significant harms and losses. Climate change is leading to more frequent and severe natural disasters. Recently, crises such as the global Covid-19 pandemic and the invasion of Russia in Ukraine have demonstrated the importance of societal resilience and crisis preparedness. Crisis preparedness is defined as the knowledge and skills enabling anticipation, response, and recovery from disasters (UNDRR, 2016). This applies across various levels, from individual households to international organizations.

Individual households play a crucial role as even well-prepared regions may wait up to 72 hours for external assistance in disaster situations (Kohn et al., 2012). In addition, due to the increasing dependence of infrastructure, energy and internet outages can have severe negative impacts on civil society (UP KRITIS, 2014). Therefore, civil protection and disaster relief agencies often promote household crisis preparedness. They commonly recommend water and food supplies, energy sources, information access, hygiene maintenance, medical care, document copies, fire protection, and emergency kits (BBK, 2019). However, in many countries, citizens perceive that they are badly informed and unprepared for crises (Appleby-Arnold & Brockdorff, 2018) and many countries note insufficient crisis preparedness (Garschagen et al., 2019; Menski, 2016). Research suggests that families and retirees are better prepared, whereas single households, students/apprentices and people with low financial power

lag behind (Gerhold et al., 2019). Convenience appears to be more significant for preparation than risk awareness (BBK, 2013; Gerhold et al., 2019). In addition, urban residents, possibly due to the lack of space, are less prepared and more dependent on infrastructure (BBK, 2013).

Psychological factors have also been found to influence crisis preparedness behavior, particularly by affecting risk perception. Unrealistic optimism and risk compensation are widespread. In some risk cultures, there is often an overreliance on state agencies to handle crises, affecting individual preparation (Cornia et al., 2016). This indicates that prevailing beliefs about how crises occur and are managed, and prevailing social norms might play a role.

In addition, values influence behavior through norms and beliefs (Schwartz, 1992; Steg et al., 2005). As such, psychological motivation theories, such as the Values-Beliefs-Norms theory (VBN-theory), are often based on the users' values. Values are "desirable transsituational goals varying in importance, which serve as a guiding principle [...]" (Schwartz, 1992, p. 21). They are thus more overarching and stable than beliefs and have been shown to impact behavior related to sustainability, altruism and health (Honka et al., 2019; Schwartz, 2016; Steg et al., 2005). In decision-making and goal-setting values help people define and consider what is meaningful and worthwhile and by shaping moral judgments and actions (Schwartz, 1992). Values impact behavior directly and indirectly through personal norms and beliefs (Steg et al., 2005; Stern, 2000).

Finally, social norms influence behavior (Reynolds et al., 2015). Social norms are unwritten rules for specific behavior that are maintained through group approval or punishment. They manifest, for example, in an individual's perception that most people important to them should or should not do something (Ajzen & Fishbein, 1980; Kim & Seock, 2019). These norms, alongside values, have been shown to influence personal norms and, consequently, have both indirect and direct effects on concrete behavior (Kim & Seock, 2019).

However, the roles of values, beliefs, personal and social norms have so far not been explored with regard to crisis preparedness. This study contributes a first exploration by analyzing differences in these four aspects between people in Germany (N=30) who are more and less prepared for crises. After presenting the state of research concerning crisis preparedness and the impact of values, beliefs, personal and social norms on behavior, we describe the methodologies used. Then, we present the findings from a quantitative survey investigating preparedness and values, and qualitative interviews that explored beliefs and norms. Finally, we discuss the findings, before summarizing the study in the conclusion.

## RELATED WORK

### Crisis Preparedness

Despite the primary responsibility of state and volunteer agencies for emergency management, individual and household crisis preparedness remains crucial, especially in case of large-scale crises or infrastructure failures. Since agencies cannot serve everybody immediately, states give out recommendations for individual and household crisis preparedness. However, factors influencing the implementation of such recommendation and household crisis preparedness are currently not well-understood. Limited data on disaster preparedness exists and little research has explored the individual preparedness of vulnerable population groups (Garschagen & Sandholz, 2018), thus precise reasons for lower crisis preparedness remain unknown. Existing literature suggests factors such as household size, presence of children, square meters per person in the dwelling, educational level, employment situation, and urbanization level in inhabitants per square kilometer as relevant to preparedness levels. Furthermore, nationality may play a role due to lower experience regarding local crises, reduced awareness of informational resources, and weaker social networks potentially contributing to lower preparedness.

While families and retired individuals seem well-prepared in terms of resources, single households and those of students or apprentices often lack the recommended provisions, making them dependent on external assistance (Gerhold et al., 2019). Interestingly, despite better preparation, risk perception decreases with age (Gerhold et al., 2019), suggesting that financial resources and available living space might be important limiting factors. Other studies conclude that household size, educational level or prior crisis experiences have little impact on individual preparedness, instead, well-prepared groups might be better equipped for the sake of convenience (Garschagen et al., 2019). Urbanization also plays a role, with individuals in cities being less prepared and, consequently, more reliant on the extensive infrastructure (BBK, 2013). Particularly in urban areas, extended critical infrastructure failures, such as shortages in drinking water, can lead to severe conditions, given that only half of the surveyed population has water reserves (Garschagen et al., 2019).

### Psychological Constructs and Crisis Preparedness

Alongside demographic factors and living condition, psychological factors influence crisis preparedness and risk perception. The VBN theory posits a causal chain among values, behavior-specific beliefs, personal norms, and behavior (Stern, 2000). While initially designed for environmentally conscious actions, it is believed to also be applicable to other areas of behavioral research (Steg et al., 2005).

Values, having the highest explanatory power, initiate the chain. Behavior is influenced by personal norms, which refer to individual ethical guidelines or self-imposed expectations and obligations. Affected by the general opinion within a group, personal norms can differ from it, particularly influencing altruistic behaviors and others as internalized values (Schwartz, 1977; Thøgersen & Ölander, 2002). Personal norms, in turn, are influenced by behavior-specific beliefs, fundamental thoughts about a specific behavior, affecting how it's perceived in terms of difficulty and facilitators or hindrances e.g., the conviction that there are situations threatening something important to the individual and the belief that the person can reduce this threat through actions. These beliefs, in turn, can be explained by certain values, such as "security" or "benevolence" (Steg et al., 2005; Stern, 2000). In the context of environmental protection, values reflecting concern for non-human species or the biosphere (e.g., "universalism") play a significant role. Conversely, self-centered and conservative values (e.g., "power") are negatively correlated with environmental friendliness (Steg et al., 2005). It is plausible that the value of "security" is related to individual crisis preparedness behavior, although the literature does not specify this connection.

Values "(1) are concepts or beliefs, (2) pertain to desirable end states or behaviors, (3) transcend specific situations, (4) guide selection or evaluation of behavior and events, and (5) are ordered by relative importance" (Schwartz, 1992, p. 4). Twelve internationally universal values have been identified that can be clustered into four categories (Grosz et al., 2021; building on Schwartz et al., 2012). These values serve as guiding principles for individuals, influencing their attitudes, actions, and decision-making. Individuals prioritize values to varying degrees, creating their unique value profiles. They also shape people's personal norms, attitudes, preferences, and worldview. While values are broad, enduring beliefs that guide overall behavior, personal norms are more specific, context-dependent guidelines that help shape behavior in particular situations. As such, values are antecedents to personal norms and help explain them (Steg et al., 2011). Some values have been identified to be more often prioritized together, while others are typically more opposed (see Figure 1).

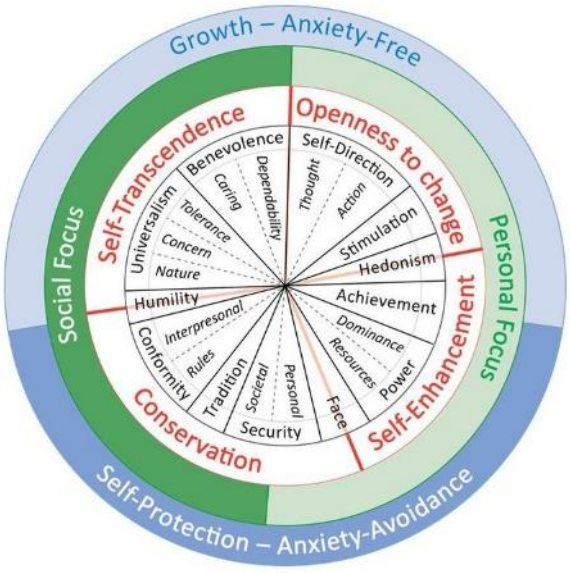


**Figure 1. Value circumplex showing 12 basic values, 19 personal values, four higher-order values, and two underlying motivations. Source: Grosz et al., 2021; building on Schwartz et al., 2012. Licensed under CC-BY 4.0.**

The opposition of *self-transcendence* versus *self-enhancement* reflects the tension between valuing the welfare of others and the broader society versus pursuing one's own interests and success. Self-transcendence includes values such as universalism (promoting understanding, tolerance, and protection of the welfare of all people) and benevolence (caring for others). By contrast, self-enhancement contains values such as power (seeking control over others), achievement (striving for personal success), and hedonism (pursuit of pleasure and enjoyment). The second opposition, openness to change versus conservation reflects the tension between valuing novelty, change, and exploration versus valuing tradition, stability, and preservation of the existing order. Openness to change

includes values such as self-direction (choosing one's own goals and actions), stimulation (seeking excitement and new experiences), and hedonism (pursuit of pleasure and enjoyment). Opposed to this, conservation contains values such as security (seeking safety and stability), tradition (respecting customs and traditions), and conformity (complying with social norms and expectations).

Past research has shown that environmental factors, such as time constraints, decrease the power of values, reducing pro-value behavior, e.g., the likelihood of offering help (Latané & Darley, 1976). Additionally, the impact of values on behavior can be heightened by activating values, and by a behavior being perceived as relevant to the value (Schwartz, 2016).

Cognitive distortions, such as unrealistic optimism, often lead individuals to underestimate their personal vulnerability to crises compared to peers, resulting in insufficient preparation (Weinstein, 1980). Additionally, people tend to engage in risk compensation, adjusting their preparedness behavior based on the subjectively perceived level of threat in their environment (Etkin, 1999). Therefore, visible government-led crisis management measures can reduce individuals' perceived threat, leading to decreased individual preparedness. In some risk cultures, particularly "state-oriented" and "fatalistic" risk-cultures, the populations tend to believe that crises cannot be averted, or that the responsibility for management lies with the government. This diminishes citizens' motivation for personal preparation, leading to relatively poor preparedness and low confidence in the ability to independently cope with crisis situations (Cornia et al., 2016).

### Research Gap

Values, beliefs and norms and related behavior change interventions have so far primarily been investigated with regard to environmentalism and health (Canlas et al., 2022, Nwafor et al., 2021). Only two studies looked at nudging and preparedness: One focused on a single intervention for household flood preparedness (Mol et al., 2021), finding no advantage of their social norm-nudges regarding readiness to prepare. Another has empirically tested the effect of a social and a rational-confrontational nudge on crisis preparedness, finding that only the latter, confronting with the costs and benefits of preparedness, increased the taking of crisis preparedness measures (Haunschild et al., 2023). While some studies have demonstrated that culture shapes crisis preparedness (Appleby-Arnold et al., 2021; Cornia et al., 2016), they have not engaged with underlying values, beliefs or norms.

Still, currently, no research exists on the role specifically of beliefs, norms and values for crisis preparedness. Therefore, we question the impact of each in the following research questions. First, we examine the role of different *values* by asking the question:

- **RQ1:** Do well-prepared individuals differ from less-prepared ones regarding their *value orientations*?

*Personal norms* play a significant role as predictors of behavior within the VBN theory (Stern, 2000). A study investigating relevant factors for flood preparedness suggests that personal norms may be significant (Mol et al., 2021), leading to RQ2:

- **RQ2:** Do well-prepared individuals differ from less-prepared ones with regard to their *personal norms* regarding crisis preparedness?

A previous study analyzing the use of warning apps has found that expected efficacy of the response significantly influences the adoption and continued use of warning apps (Fischer-Preßler et al., 2022). In addition, in most countries, disaster worry is related to the intention to take preparedness measures, whereas in Germany, perceived disaster risk is more relevant (Appleby-Arnold & Brockdorff, 2018). Another branch of research indicates that countries differ with regard to their risk culture and the resulting perceived personal responsibility (Cornia et al., 2016). Therefore, *beliefs* about the effectiveness of individual preparedness measures may influence individual crisis preparedness intentions.

- **RQ3:** Do well-prepared individuals differ from less-prepared ones with regard to their *beliefs* about crisis preparedness?

Perceived *social norms* are generally considered a strong motivator for behavior (Goldstein & Cialdini, 2007). This has also been shown to be relevant for measures related to crisis response, such as the adoption and continued use of warning apps (Fischer-Preßler et al., 2022). However, a study investigating household flood preparedness did not find this to be relevant (Mol et al., 2021), possibly due to the relative invisibility of anti-flood investments or the relatively high costs. Therefore, we explore the unclear role of social norms for less costly household preparedness measures by answering RQ4:

- **RQ4:** Do well-prepared individuals differ from less-prepared ones regarding their *perceived social norms* surrounding crisis preparedness?

## METHOD

### Recruitment and Sample

To recruit the sample, the study was advertised via social media platforms, including Facebook groups focusing on weather, police, and traffic updates, student *WhatsApp* instant messenger groups, the survey website *SurveyCircle* and a university email list. To ensure a diverse sample, encompassing individuals with varying levels of preparedness across demographic characteristics, participants from underrepresented groups were asked to motivate additional participants. Table 1 describes the sample. It shows that gender (with 47% females in the sample compared with 50.7% in Germany (Statista, 2023b)) and the degree of urbanization are well-represented (80% of participants living in cities compared to 78% in Germany (Worldbank, 2023). In terms of citizenship, with 23% foreigners the sample is similar to the German population (with 16% foreigners (Federal Statistical Office, 2023a). Household net income categories are based on the inflation-adjusted categorization from Gerhold et al. (2019) and are well-represented in the sample (Bundeszentrale für politische Bildung, 2020). The age median is in the group of 26-30-year-olds, presenting a section younger than the general population (*MD* = 45 years (Statista, 2023a)). The sample over-represents academics, with 60% having an academic degree compared to 18,5% in the German population (Federal Statistical Office, 2020). The distribution of household size shows fewer single- and more three-person households in the sample compared to the population (Federal Statistical Office, 2023b).

**Table 1. Sample Description**

| | |
|---|---|
| Gender | Female: 13, Male: 17 |
| Age | 21-25 years: 10, 26-30 years: 8, 31-35 years: 3, 36-40 years: 1, 41-50 years: 3, 51-60 years: 2, 61-70 years: 3 |
| Formal Educational | No degree: 2, Secondary or tertiary education: 6, Vocational training: 4, Bachelor's degree: 7, Master's degree or higher: 11 |
| Household Size | Single: 6, Two persons: 8, Three persons: 11 (2 with children), Four persons: 2, Five persons: 1, Six persons: 1, Seven persons: 1 |
| Household Net Income | < 1699€: 10, 1700-3000€: 7, > 3000€: 13 |
| Urbanization | Rural (<1000 persons/km²): 6, Rural-urban (1001-2000 persons/km²): 15, Urban (>2000 persons/km²): 9 |
| Citizenship | German: 23, European: 3, Non-European: 4 |

### Data Collection and Analysis

Data was captured via an online questionnaire and semi-structured follow-up interviews. The survey was conducted online using the GDPR-compliant software *SoSci-Survey*. The average completion time was 20 minutes. The first of three parts gathered individual socio-demographic data (i.e., gender, age, nationality, educational qualification, employment) and data on the participant's household (i.e., size, living space, number of children, net income). For the second part, a definition of crisis preparedness was presented, and participants responded to twelve questions about their preparedness levels. These questions were based on recommendations by the Federal Office of Civil Protection and Disaster Assistance and included primarily resource-oriented preparation, that would be relatively cheap and easy to obtain, such as food, water, first aid and hygiene supplies, fire protection, energy and information sources (batteries, radio) and document backups (BBK, 2019). The third part of the questionnaire assessed values associated with crisis preparedness behavior by using the Portrait Values Questionnaire (PVQ) (Schwartz et al., 2012), adapted to crisis preparedness. For example, for the value "power", participants stated their agreement with the statement "He engages in crisis preparedness because the sense of control that resources can provide is important to him" (adjusted to participants' gender). The adapted PVQ demonstrated acceptable to excellent reliability based on assessments of internal consistency (Cronbach's α between .70 and .96).

A crisis preparedness score was computed by assigning 0 to 3 points to participants based on their responses to various preparedness measures. The assigned value of the measures was based on the risk index by (Nohl & Thiemecke, 1988) which takes the potential negative cost of the missing measure into account (see Table 2). The score was normalized to a measure between 0 and 1 by dividing the score by its maximum of achievable points.

**Table 2. Assignment of Preparedness Score Values**

| **Preparedness measures** | **Points** | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| Number of days household | | | | |
| ... has sufficient food supply is sufficient | 0+ | 3+ | 7+ | 10+ |
| ... water supply | 0+ | 3+ | 7+ | 10+ |
| ... has access to light/heat/cooking (energy sources) | 0+ | 3+ | 7+ | 10+ |
| ... can access news | 0+ | 3+ | 7+ | 10+ |
| ...can maintain hygiene standards | 0+ | 3+ | 7+ | 10+ |
| Time since the last first aid course | > 5 years | 2-5 years | < 2 years | < 6 months |
| Presence of a first aid kit | No | Yes | - | - |
| Presence of medications | No | Yes | - | - |
| Knowledge of the location of important documents & readily available/digital copies | No | Knowledge | Copies | Knowledge + copies |
| Fire protection (fire blanket or fire extinguisher) | No | - | Yes | - |
| Emergency supplies (bug-out bag) | No | - | Yes | - |

The median (*MD*=0.45, *SD*=0.16, spanning from .11 to .78) was used as the baseline to differentiate the groups of rather more (Group 1, N=16) and rather less prepared individuals (Group 2, N=14). Following standard practice (Schwartz & Cieciuch, 2022), the scores for the individual values were computed by averaging the related item scores. To explore the relationship between crisis preparedness behavior and personal values, Mann-Whitney-U-tests for comparing independent groups with non-normally distributed dependent variables, were performed using R statistical software. The interview (see Table 3) started with creating a comfortable environment to encourage open responses, then explored participants' understanding of crisis and preparedness, and offered a definition of crisis preparedness (UNDRR, 2016). Next, participants' beliefs, social norms and personal norms related to the topic were discussed. Interviews were conducted remotely between June 26 and July 19, 2023 and were recorded with participant consent, lasting an average of 25 minutes. The questionnaire (N=5) and interview (N=1) were pretested, leading to minor adjustments.

**Table 3. Interview Guide**

(1) Introduction and establishment of trustful atmosphere

(2) Topic introduction
- Do you engage in crisis preparation?
- What does the term "crisis preparation" mean to you?
- How did you come to (not) prepare yourself?

(3) Beliefs
- What advantages do you see in preparing for crises? What about disadvantages?
- What makes it difficult/easy to prepare for crisis situations?
- What motivated you to buy X/prepare for Y, or what would motivate you to buy X/prepare for Y?

(4) Social norm
- Is crisis preparedness discussed in your environment? If yes, what does it look like? Are practical strategies for dealing with it discussed?
- Do you think other people in your environment prepare for crisis situations? If yes, how?
- Who do you think would approve if you prepare for crisis situations? Who would disapprove?

(5) Personal norm
- What do you think is the right approach to crisis preparedness for you?
- Regardless of what people in your environment think or do, how do you think you should behave?
- What are the characteristics of a person who prepares for crisis situations?

(6) Closing questions
- Do you have any additional points you would like to mention? Do you have any questions?

The interviews were pseudomized, transcribed and the records deleted. The interview data were analyzed using qualitative content analysis (Mayring, 2015), inductively building a coding scheme with relevant themes that emerged from the text analysis (see Figure 2).

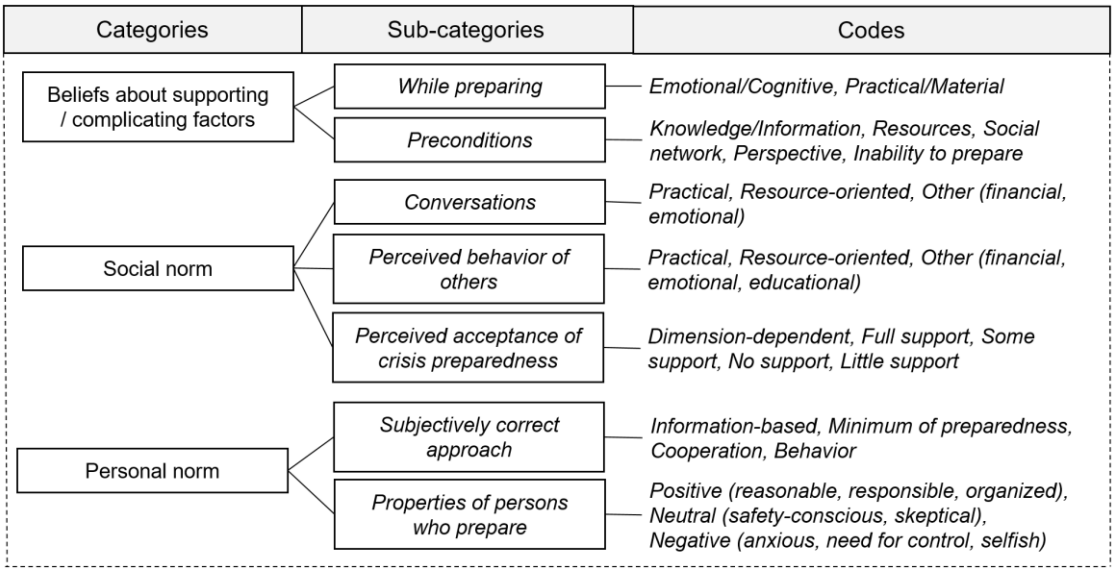


**Figure 2. Coding System**

## RESULTS

### Crisis Preparedness and Values (RQ1): Relevance of Value *Benevolence*

The prerequisites for using t-tests to address the research question were not met due to the non-metric scale level of the crisis preparedness score. Moreover, some value expressions did not fulfill the requirement of normal distribution and variance equality. Therefore, Mann-Whitney-U-tests were employed to examine possible differences in values between the differently prepared groups. Table 4 presents the means, standard deviations, and medians of values in the groups regarding crisis preparedness behavior, as well as the Mann-Whitney-U-statistic, Z-statistic, and p-values. A significant difference exists regarding the value of *benevolence*, which is higher among the individuals in the more-prepared group. An effect size of $r$=-.39 (Fritz et al., 2012) can be assumed, indicating a moderate correlation (Cohen, 1988).

**Table 4. Comparisons between Differently Prepared Groups' Attitudes Regarding Crisis Preparedness Behavior, *$p$ < .05**

| | *Well-prepared (G1)* | | | *Less-prepared (G2)* | | | *Mann-Whitney-U* | *Z-statistic* | *p-value* |
|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *MD* | *M* | *SD* | *MD* | | | |
| Self-Direction | 3.29 | 0.89 | 3.40 | 2.65 | 1.36 | 2.75 | 78.5 | -1.39261 | .17 |
| Stimulation | 2.67 | 1.22 | 2.85 | 2.02 | 1.11 | 1.70 | 80 | -1.33026 | .18 |
| Hedonism | 2.40 | 1.03 | 2.15 | 2.00 | 1.06 | 1.85 | 85.5 | -1.10162 | .27 |
| Achievement | 2.22 | 1.13 | 2.30 | 1.56 | 0.63 | 1.50 | 74 | -1.57968 | .10 |
| Power | 2.15 | 0.85 | 2.20 | 1.55 | 0.62 | 1.30 | 66 | -1.91225 | .06 |
| Face | 2.46 | 1.07 | 2.30 | 1.79 | 0.80 | 1.70 | 70 | -1.74596 | .08 |
| Security | 3.48 | 0.69 | 3.50 | 3.11 | 1.34 | 3.00 | 90.5 | -0.89377 | .38 |
| Tradition | 2.21 | 1.05 | 2.00 | 1.65 | 1.20 | 1.00 | 71 | -1.70439 | .07 |
| Conformity | 2.07 | 0.96 | 1.80 | 1.49 | 0.48 | 1.40 | 69.5 | -1.76675 | .08 |
| Humility | 2.62 | 1.07 | 2.50 | 2.40 | 1.16 | 2.30 | 97.5 | -0.60277 | .56 |
| Benevolence | 3.76 | 0.91 | 4.00 | 2.74 | 1.38 | 3.15 | 60.5 | -2.14088 | .03* |
| Universalism | 3.31 | 1.15 | 3.25 | 2.62 | 1.47 | 2.50 | 78.5 | -1.39261 | .17 |

### Crisis Preparedness and Personal Norms (RQ2): Well-Prepared Group Puts More Emphasis on Minimal Preparation

The personal norm was assessed through questions about the subjectively correct approach to crisis preparedness and the characteristics of individuals engaging in crisis preparedness (see Table 5 for an overview of the results**)**.

**Perceived personal norm by more-prepared individuals:** Concerning the subjectively correct approach, 75% (n=12) stressed information-based measures, with an emphasis on staying informed (n=7) and preparing plans (n=4). Many made statements about the extent of preparation (81%, n=13), primarily focusing on covering the essentials (n=11). People who prepare were described positively as being reasonable, forward-thinking, calm, intelligent, and communicative (75%). Neutral characteristics covered safety-consciousness and skepticism (44%), while negative traits included anxiety, a desire for control, social weakness, and occasional perceptions of being annoying (63%).

**Perceived personal norm by less-prepared individuals:** An information-based strategy was also emphasized by 79% of Group 2 (n=11), involving creating plans (n=5), staying informed (n=4), and following existing recommendations (n=2). Fewer participants discussed the extent of preparation (50%, n=7), suggesting a minimalistic approach (n=5). Positive attributes mentioned by Group 2 included being organized, responsible, and reasonable (71%). Neutral characteristics comprised safety-consciousness and admiration-seeking (36%), while negative traits comprised anxiety, pessimism, egoism, and mistrust (71%).

**Table 5. Personal Norms , Group 1 = more prepared (n=16), Group 2 = less prepared (n=14)**

| | Group 1 | | Group 2 | |
|---|---|---|---|---|
| | **n** | **%** | **n** | **%** |
| **Subjectively correct approach to crisis preparedness** | | | | |
| Information based | 12 | 75% | 11 | 79% |
| *Being informed* | *7* | *44%* | *5* | *36%* |
| *Making plans* | *4* | *25%* | *4* | *29%* |
| *Following recommendations* | *1* | *6%* | *2* | *14%* |
| Minimal preparation | 11 | 69% | 5 | 36% |
| Cooperation based | 1 | 6% | 4 | 29% |
| Behavior based | 4 | 25% | 3 | 21% |
| *Staying healthy* | *2* | *13%* | *2* | *14%* |
| *Do nothing* | *1* | *6%* | *2* | *14%* |
| **Properties of persons who prepare** | | | | |
| Positive | 12 | 75% (reasonable, forward-thinking, calm, intelligent, communicative) | 10 | 71% (organized, responsible, reasonable) |
| Neutral | 7 | 44% (safety-conscious, skeptical) | 5 | 36% (safety-conscious, admiration-seeking) |
| Negative | 10 | 63% (anxious, desiring control, socially weak, annoying) | 10 | 71% (anxious, pessimistic, egoistic, mistrustful) |

### Crisis Preparedness and Beliefs (RQ3): Less Knowledge and Fewer Perceived Benefits among the Less-Prepared

Participants' beliefs were assessed though their beliefs about disadvantages (see Table 6) and advantages (see Table 7) of crisis preparedness behavior, and perceived obstacles and facilitating factors.

**Beliefs about benefits and obstacles by well-prepared individuals:** 63% emphasized emotional-cognitive benefits during preparation, highlighting a sense of security (n=5), competence (n=5), and an opportunity for hypothetical thinking (n=2). A majority (56%, n=9) mentioned discomfort related to engaging with the topic, such as mental strain (n=4) and fear (n=3). Half of the group (n=8, 50%) indicated practical-material benefits, including better crisis management (n=7), such as being able to react faster. Practical-material drawbacks comprised the perceived effort (n=9), wastefulness (n=5), lack of guaranteed returns (n=3), and concerns about fostering competition (n=2). 13% (n=2) attributed no benefits to crisis preparedness behavior.

As preconditions, 69% (n=11) highlighted the importance of knowledge and information, with visibility (n=3), quantity (n=3), and recommendations (n=2) playing a crucial role besides having a plan (n=2). Additionally, 44% (n=7) pointed to needing a resource surplus, including money, space, time, and physical health. Social networks (31%, n=5) and a positive perspective on crisis preparedness (19%, n=3) were also mentioned. Hindering factors

comprised lack of knowledge or information (25%, n=4), specifically a lack of orientation, resource deficiency (50%, n=8), and a negative perspective on crisis preparation (81%, n=13) expressing the demotivating aspect of the unpredictability of crises (n=6), the lack of fun and perceived effort (n=5) and not rating preparedness valuable enough (n=2). Remarkably, 63% (n=10) believed that nothing would impede crisis preparedness behavior. However, 50% mentioned barriers dependent on the extent of preparation, such as high costs (n=8) and the lack of infrastructure for certain measures (n=2).

**Table 6. Beliefs about Disadvantages, Group 1 = more prepared (n=16), Group 2 = less prepared (n=14)**

| | **Group 1** | | **Group 2** | |
|---|---|---|---|---|
| | **N** | **%** | **N** | **%** |
| **While preparing** | | | | |
| Emotional-cognitive | 9 | 56% | 8 | 57% |
| *Worry/fears* | *3* | *19%* | *3* | *21%* |
| *Mental strain* | *4* | *25%* | - | |
| *Stress/anxiety* | - | | *3* | *21%* |
| *Embarrassment* | - | | *1* | *7%* |
| *Unpredictability* | *1* | *6%* | - | |
| Practical-material | 15 | 94% | 13 | 93% |
| *Investments* | *9* | *56%* | *10* | *71%* |
| *Money* | *2* | *13%* | *5* | *36%* |
| *Time* | *2* | *13%* | *3* | *21%* |
| *Space* | *2* | *13%* | *3* | *21%* |
| *Repeated effort* | *2* | *13%* | *1* | *7%* |
| *Physical* | - | | *1* | *7%* |
| *Waste* | *5* | *31%* | *6* | *42%* |
| *Competition* | *2* | *13%* | *3* | *21%* |
| *Uncertain gains* | *3* | *19%* | - | |
| None | - | | 1 | 7% |
| **Preconditions** | | | | |
| Lack of knowledge/information | 4 | 25% | 8 | 57% |
| *Lack of orientation* | *4* | *25%* | *4* | *29%* |
| *Lack of topic visibility* | - | | *3* | *21%* |
| Lack of resources | 8 | 50% | 5 | 36% |
| *Space* | *5* | *36%* | *3* | *21%* |
| *Money* | *3* | *19%* | *2* | *14%* |
| *Time* | *3* | *19%* | *2* | *14%* |
| *Physical* | *2* | *13%* | *1* | *7%* |
| Attitude | 13 | 81% | 7 | 50% |
| *Low gain expectancy* | *2* | *13%* | *4* | *29%* |
| *Unpredictability* | *6* | *38%* | *2* | *14%* |
| *Not feeling like it/exhausting* | *5* | *31%* | *1* | *7%* |
| None | - | | 1 | 7% |
| **What makes it impossible?** | | | | |
| Nothing | 10 | 63% | 8 | 57% |
| Limitations (disability, illness) | 1 | 6% | 4 | 29% |
| Lack of awareness | 1 | 6% | - | |
| Perfect preparedness impossible | 8 | 50% | 3 | 21% |
| Insufficient supply infrastructure | 2 | 13% | - | |

**Beliefs about benefits and obstacles by less-prepared individuals:** Ten participants (71%) emphasized emotional-cognitive benefits related to crisis preparation, with a primary focus on the sense of security and independence (n=9), whereas 57% (n=8) cited emotional-cognitive drawbacks, i.e. fear (n=3) and stress (n=3). 79% (n=11) – more than in the well-prepared group – mentioned practical-material benefits, including improved crisis coping abilities (n=7) and increased flexibility in daily life (n=3). However, 93% (n=13) pointed to practical-material disadvantages, including the perceived effort (n=10), concerns about wastefulness (n=6) and fostering competition (n=3).

When it came to preconditions to preparedness, 79% (n=11) stressed the importance of knowledge and information, including its visibility (n=2) and recommendations (n=2). Around 21% (n=3) stated the value of a supportive network and practical assistance. Over 40% (n=6) mentioned a resource surplus of money, time, physical health, and available space.

Factors hindering access to behavior included lack of knowledge or information (57%, n=8), especially orientation (n=4) and lack of visibility (n=3), resource deficiency (36%, n=5), and a negative perspective on crisis preparation (50%, n=7). Notably, 57% (n=8) believed that nothing rendered crisis preparation impossible, attributing its feasibility to associated costs and effort (21%, n=3), while a third (n=4) discussed hypothetical factors like physical and psychological disabilities.

**Table 7. Beliefs about Advantages, Group 1 = more prepared (n=16), Group 2 = less prepared (n=14)**

| | Group 1 | | Group 2 | |
|---|---|---|---|---|
| | **N** | **%** | **N** | **%** |
| **While preparing** | | | | |
| Emotional-cognitive | 10 | 63% | 10 | 71% |
| *Sense of safety* | *5* | *31%* | *9* | *64%* |
| *Learning* | *2* | *13%* | *1* | *7%* |
| *Feeling competent* | *3* | *19%* | - | |
| Practical-material | 8 | 50% | 11 | 79% |
| *Better crisis management* | *7* | *44%* | *7* | *50%* |
| *Flexibility* | *1* | *6%* | *3* | *21%* |
| *Gains* | - | | *1* | *7%* |
| None | 2 | 13% | - | |
| **Preconditions** | | | | |
| Lack of knowledge/information | 11 | 69% | 11 | 79% |
| *Topic visibility* | *3* | *19%* | *2* | *14%* |
| *Recommendations* | *2* | *13%* | *2* | *14%* |
| *Easy access* | - | | *1* | *7%* |
| *Amount* | *3* | *19%* | - | |
| *Plan* | *2* | *13%* | - | |
| *Habit* | *1* | *6%* | - | |
| Availability of resources | 7 | 44% | 6 | 43% |
| *Money* | *3* | *19%* | *3* | *21%* |
| *Space* | *3* | *19%* | *1* | *7%* |
| *Time* | *2* | *13%* | *3* | *21%* |
| *Health* | *1* | *6%* | *2* | *14%* |
| Network | 5 | 31% | 3 | 21% |
| *Support* | *2* | *13%* | *1* | *7%* |
| *Exchange of experiences* | *2* | *13%* | *1* | *7%* |
| Attitude | 3 | *19%* | 1 | 7% |
| *Positive gain expectancy* | - | | *1* | *7%* |
| *Low effort expectancy* | *3* | *19%* | - | |
| *Enjoyment* | *1* | *6%* | - | |

### Crisis Preparedness and Social Norm (RQ4): More Discussion and Less Disapproval in the Well-Prepared Group

Social norms were assessed by inquiring about the existence and style of discourse surrounding crisis preparedness in the social environment (see Table 8).

**Perceived social norm by well-prepared individuals:** Over two thirds mentioned discourse on the topic (69%, n=11%), dealing with practical strategies, information sharing, discussions on financial security and emotional coping. Half of the group (n=8) believe that their social environment prepares for disasters, noting measures towards energy independence, stockpiling, financial security, and efforts to stay informed. Regarding approval for crisis preparation behavior, around a third mentioned friends (38%, n=6) and family members (31%, n=5). Almost two thirds (63%, n=10) believed that nobody would disapprove of crisis preparedness.

Contrary, a quarter (25%, n=4) states that nobody in their environment approves of crisis preparedness. 25% (n=4) acknowledged that friends might not approve, and 19% (n=3) noted potential disapproval from many in the environment. 13% (n=2) mentioned disapproval from people in the local vicinity. A significant portion of the group felt that approval (19%, n=3) and disapproval (31%, n=5) depended on the extent of preparation.

**Perceived social norm by less-prepared individuals:** In this group the topic is less common in discussions (50%, n=7). Discourse surrounding stockpiling during the COVID-19 pandemic (n=2) and scenarios related to infrastructure failures in the context of the invasion of Russia in Ukraine (n=2) were mentioned, as well as the merit of insurances (n=2) and patient care (n=1).

57% (n=8) assume that their personal environment is not preparing, while 43% (n=6) thought that sufficient preparations were being made. Responses included mentions of stockpiling, financial preparations, survival training, and emotional readiness. In terms of approval of crisis preparedness, 57% in this group (n=8) stated that family members would approve, in about a third (36%, n=5), friends would approve, and 21% (n=3) mentioned their local environment who might profit would be supportive. 29% mentioned that approval and understanding depended on the measures being taken, indicating a strong negative perception of "excessive" crisis preparedness.

36% (n=5) of the group – less than in the well-prepared group – expected no one in their environment to disapprove of crisis preparedness. In contrast, three statements (21%) indicated that many in the environment would not approve, twice (14%) family members were mentioned.

**Table 8. Perception of Social Norm, Group 1 = more prepared (n=16), Group 2 = less prepared (n=14)**

| | Group 1 | | Group 2 | |
|---|---|---|---|---|
| | **n** | **%** | **n** | **%** |
| **Discourse on crisis preparation behavior in social environment** | | | | |
| No | 5 | 31% | 7 | 50% |
| Yes | 11 | 69% | 7 | 50% |
| *Practical* | *7* | *44%* | *2* | 14% |
| *Resource-oriented* | *2* | *13%* | *2* | 14% |
| *Financial* | *2* | *13%* | *2* | 14% |
| *Emotional* | *1* | *6%* | *1* | 7% |
| *Legal* | - | | *1* | 7% |
| *Forwarding information* | *2* | *13%* | - | |
| **Perceived crisis preparation behavior in social environment** | | | | |
| No | 8 | 50% | 8 | 57% |
| Yes | 8 | 50% | 6 | 43% |
| *Supplies* | *2* | *13%* | *3* | *21%* |
| *Energy* | *2* | *13%* | - | |
| *Survival* | - | | *1* | *7%* |
| *Emotional* | - | | *1* | *7%* |
| *Financial* | *2* | *13%* | *1* | *7%* |
| *Information* | *1* | *6%* | - | |

| **Perceived acceptance of crisis preparation behavior in social environment** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Approval** | | **Disapproval** | | **Approval** | | **Disapproval** | |
| Family members | 5 | 31% | - | | 8 | 57% | 2 | 14% |
| Friends | 6 | 38% | 4 | 25% | 5 | 36% | 1 | 7% |
| Local vicinity | 1 | 6% | 2 | 13% | 3 | 21% | - | |
| Dimension-dependent | 3 | 19% | 5 | 31% | 3 | 21% | 4 | 29% |
| Many | - | | 3 | 19% | 1 | 7% | 3 | 21% |
| Nobody | 4 | 25% | 10 | 63% | - | | 5 | 36% |

## DISCUSSION

The quantitative results suggest that only one value is associated with crisis preparedness behavior: *benevolence*. With benevolence being defined as "preservation and enhancement of the welfare of people with whom one is in frequent personal contact" (Schwartz et al., 2000, p. 316), there might be an underlying belief that crisis preparedness contributes to the welfare of others, although this was not explicitly stated. Other values, such as *security*, which was found to be related to macro safety worry (Schwartz et al., 2000), showed no significant

correlation.

Given the importance of benevolence, questions concerning social, personal norms and beliefs could give insights into motivations. The results show that the more and less prepared individuals do not differ drastically in either of the dimensions. The sample described people who engage in crisis preparedness mainly as forward-thinking and reasonable, while a few negative associations pointed towards being egotistical or socially weak. There appeared to be a shared understanding that quite easily, crisis preparedness could become "too much", and people who prepare in this manner were labeled as "preppers" or "hoarders". Instead of emphasizing the positive social impact of crisis preparedness, e.g. by aiding emergency services, concerns about resource scarcity arose, with mentions of shortages during the COVID-19 pandemic, which was blamed on some people hoarding resources (Baddeley, 2020). Future research should investigate whether this notion persists when describing less resource-oriented crisis preparedness measures.

The qualitative content analysis indicated that the less-prepared group exhibited rather goal-oriented motivations, emphasizing a sense of security. In contrast, the well-prepared group valued the process itself, indicating competence and learning opportunities. They also demonstrated a more nuanced perspective considering preparation as a spectrum rather than a binary concept, resulting in a more practical focus on preparing a minimum supply of resources. These advantages may be due to more discourse about practical strategies in their social environment. The study found that over half of the participants perceived discussing crisis preparedness as unpleasant, associating it with fear, stress, and negative emotions. Many held the belief that it is time-consuming, and can lead to waste and competition. Further barriers to preparedness include a lack of differentiation between responsible, cooperative preparedness behavior and "hoarding". Many believe that more accessible information, recommendations, and emergency plans are needed.

From the findings, we can derive strategies for motivating people towards engaging in crisis preparedness. Firstly, given the relevance of benevolence and the negative image of "too much" preparedness, the social benefits of crisis preparedness should be stresses, especially the ways in which they positively affect one's immediate environment. A previous study used interactive nudges, which confronted users with the economic costs and benefits of (non-)preparedness and with the impact on their social environment. Positively framed statistical information, that asked users to guess costs, benefits and consequences of hazards and preparedness measures were found to be effective in increasing crisis preparedness (Haunschild et al., 2023), whereas the social nudges lead users to reconsider their behavior. In light of the identified contestation of crisis preparedness as a pro-social behavior, similar information could be used to stress the social benefits of preparedness, e.g. by confronting with the social consequences or reducing the perceived distance to hazards (Caraban et al., 2019). Research shows that interventions, such as eliciting reasonings for the relevance of a value, can lead to an increased perceived importance of that value (Russo et al., 2022). A future experiment should explore how elicitation of benevolence might affect attitudes towards crisis preparedness.

A second strategy could focus on showing the gaps and waiting times that are inherent in state-provided crisis management or in case of infrastructure failures (Reuter, 2014). This would be especially promising in countries with a state-oriented risk culture, which tend to rely overly on state institutions to manage crises (Reuter et al., 2019). While state institutions were hardly mentioned, there seems to be a common understanding that little individual preparedness is required, as predicted by risk culture theory. Future work should compare other risk cultures to see if attitudes change as the theory predicts.

Finally, in addition to offering more information on crisis preparedness and its effects, agencies should try to activate networks, encouraging individuals to discuss crisis preparedness in their immediate circles can facilitate easier adoption of the behavior. Integrating crisis preparedness into societal life is seen as a means to simplify access. Additionally, strategies from the Persuasive Systems Design model (Oinas-Kukkonen & Harjumaa, 2009), can be employed and potentially integrated into existing warning apps, offering rewards for engagement to make crisis preparedness more appealing.

The study is limited by its relatively small sample size, and future studies should seek to reproduce the connection between benevolence and crisis preparedness and possibly other values. While the median age of the sample (26-30) is younger than median age in Germany (45 years), research indicates that values (apart from conformity values, which tend to increase) remain substantially stable during adulthood (Vecchione et al., 2016). Despite efforts to stress the acceptability of all views, due to the focus of the study, participants may have perceived a desirability of crisis preparedness, introducing potential desirability bias. Additionally, the less-prepared group has lower levels in values overall, possibly influenced by the adapted questionnaire design tailored to crisis preparation behavior. As the items of the PVQ were adapted to crisis preparation behavior, this group may have been less able to identify with the values, which may explain the lower scores. A greater difference in values may have been achieved without adapting the questionnaire. Furthermore, the crisis preparedness score, relying on

official recommendations (BBK, 2019), focused on easily implementable measures. Future research may include measures that require more time, effort or financial investments, such as insurances or construction measures (Mol et al., 2021), to further differentiate people with a high intention and motivation to prepare.

## CONCLUSION

This study has investigated connections between crisis preparedness and personal values, social and personal norms and beliefs. Differentiating more-prepared and less-prepared participants, the study has produced the following key findings:

- The quantitative analysis showed a significant correlation between greater preparedness and the personal value of *benevolence*.
- The qualitative thematic analysis of the interviews showed rather small differences regarding norms and beliefs between the two groups.
- A dominant social norm cannot be identified.
- A limited amount of crisis preparedness is believed to be helpful.
- A prominent theme in both groups is a negative view of "too much" preparation, leading to people being perceived as "hoarders", indicating that certain types of resource-oriented crisis preparedness are perceived as anti-social.

The study discusses strategies, such as confrontational nudges and value elicitation, for stressing the social benefits of crisis preparedness and triggering the value benevolence in this context. Recommendations for future research involve further examination of the impact of social norms and social structures, and investigating further countries characterized by different risk cultures (Reuter et al., 2019). Furthermore, the need for larger sample sizes, cluster analyses as in earlier research (Gerhold et al., 2019), and innovative approaches to promoting crisis preparedness behavior and behavior change are emphasized.

## ACKNOWLEDGEMENTS

This research was funded by the German Federal Ministry of Education and Research and the Hessian Ministry of Higher Education, Research, Science and the Arts within their joint support of the National Research Center for Applied Cybersecurity ATHENE and by the LOEWE initiative (Hesse, Germany) within the emergenCITY centre. We thank Dr. Nina Gerber and Professor Verena Zimmermann for their advice and valuable feedback.

## REFERENCES

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Prentice-Hall.

Appleby-Arnold, S. & Brockdorff, N. (2018). Culture and disaster risk management-synthesis of citizens' reactions and opinions during 6 Citizen Summits: Romania, Malta, Italy, Germany, Portugal and the Netherlands. CARISMAND report. https://www.um.edu.mt/library/oar/handle/123456789/53192

Appleby-Arnold, S., Brockdorff, N., Jakovljev, I., & Zdravković, S. (2021). Disaster preparedness and cultural factors: A comparative study in Romania and Malta. *Disasters*, *45*(3), 664–690. https://doi.org/10.1111/disa.12433

Baddeley, M. (2020). Hoarding in the age of COVID-19. *Journal of Behavioral Economics for Policy*, *4*(COVID-19 Special Issue), 69–75.

BBK. (2013). Kapazitäten der Bevölkerung bei einem Stromausfall. In *Empirische Untersuchung für das Bezugsgebiet Deutschland*. https://www.lkee.de/media/custom/2112_3209_1.PDF?1434529466

BBK. (2019). Katastrophenalarm. Ratgeber für Notfallvorsorge und richtiges Handeln in Notsituationen. In *Ratgeber für Notfallvorsorge und richtiges Handeln in Notsituationen* (7. Auflage). https://www.bbk.bund.de/SharedDocs/Downloads/DE/Mediathek/Publikationen/Buergerinformationen/Ratgeber/ratgeber-notfallvorsorge.pdf?__blob=publicationFile&v=32

Bundeszentrale für politische Bildung. (2020). *Einkommen privater Haushalte*. https://www.bpb.de/kurz-knapp/zahlen-und-fakten/soziale-situation-in-deutschland/61754/einkommen-privater-haushalte/

Canlas, I. P., Karpudewan, M., & Mohamed Ali Khan, N. S. (2022). More Than Twenty Years of Value-Belief-Norm Theory of Environmentalism: What Has Been and Yet To Be Done? *Interdisciplinary Journal of Environmental and Science Education*, *18*(2), e2269. https://doi.org/10.21601/ijese/11801

Caraban, A., Karaponos, E., Goncalves, D. & Campos, P. (2019). 24 Ways to Nudge: A Review of Technology-Mediated Nudging in Human-Computer Interaction. Conference on Human Factors in Computing Systems (*CHI19)*, https://doi.org/10.1145/3290605.3300733.

Cohen, J. (1988). *Statistical Power Analysis for Behavioral Sciences (2nd Ed)*. Lawrence Erlbaum Associates.

Cornia, A., Dressel, K., & Pfeil, P. (2016). Risk cultures and dominant approaches towards disasters in seven European countries. *Journal of Risk Research*, *19*(3), 288–304. https://doi.org/10.1080/13669877.2014.961520

Etkin, D. (1999). Risk transference and related trends: Driving forces towards more mega-disasters. *Environmental Hazards*, *1*(2), 69–75. https://doi.org/10.3763/ehaz.1999.0109

Federal Statistical Office. (2020). *Educational attainment of the population in Germany*. https://www.destatis.de/EN/Themes/Society-Environment/Education-Research-Culture/Educational-Level/Tables/educational-attainment-population-germany.html

Federal Statistical Office. (2023a). *Foreign population, 2015 to 2022 by selected citizenships*. https://www.destatis.de/EN/Themes/Society-Environment/Population/Migration-Integration/Tables/foreigner-citizenship-time-serie.html

Federal Statistical Office. (2023b). *Haushalte nach Haushaltsgrößen im Zeitvergleich*. https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Haushalte-Familien/Tabellen/1-3-privathaushalte-neuer-zeitvergleich.html

Fischer-Preßler, D., Bonaretti, D., & Fischbach, K. (2022). *A Protection-Motivation Perspective to Explain Intention to Use and Continue to Use Mobile Warning Systems*. *64*(2), 167–182. https://doi.org/10.1007/s12599-021-00704-0

Garschagen, M., & Sandholz, S. (2018). The role of minimum supply and social vulnerability assessment for governing critical infrastructure failure: Current gaps and future agenda. *Natural Hazards and Earth System Sciences*, *18*(4), 1233–1246. https://doi.org/10.5194/nhess-18-1233-2018

Garschagen, M., Sandholz, S., Wannewitz, M., Sabelfeld, R., & Krist, L. (2019). *Stand der Vorbereitung der Bevölkerung auf längere KRITIS-Ausfälle: Vorbereitung auf KRITIS-Ausfälle aus Endnutzer-Perspektive. Verortung von Verantwortung, Verwundbarkeit und Mindestversorgung*. https://kirmin.web.th-koeln.de/?page_id=707

Gerhold, L., Wahl, S., & Dombrowsky, W. R. (2019). Risk perception and emergency food preparedness in Germany. *International Journal of Disaster Risk Reduction*, *37*, 1–10. https://doi.org/10.1016/j.ijdrr.2019.101183

Goldstein, N. J., & Cialdini, R. B. (2007). Using social norms as a lever of social influence. In A. R. Pratkanis (Ed.), *Frontiers of social psychology. The science of social influence: Advances and future progress* (pp. 167–192). Psychology Press.

Grosz, M. P., Schwartz, S. H., & Lechner, C. M. (2021). The longitudinal interplay between personal values and subjective well-being: A registered report. *European Journal of Personality*, *35*(6), 881–897. https://doi.org/10.1177/08902070211012923

Haunschild, J., Pauli, S., & Reuter, C. (2023). Preparedness nudging for warning apps? A mixed-method study investigating popularity and effects of preparedness alerts in warning apps. *International Journal of Human-Computer Studies*, *172*. https://doi.org/10.1016/j.ijhcs.2023.102995

Honka, A., Helander, E., Pavel, M., Jimision, H., Mustonen, P., Korhonen, I., & Ermes, M. (2019). Exploring associations between the Self-Reported Values, Well-Being, and Health Behaviors of Finnish Citizens. *JMIR Mental Health*, *6*(4), 1–18.

Kim, S. H., & Seock, Y.-K. (2019). The roles of values and social norm on personal norms and pro-environmentally friendly apparel product purchasing behavior: The mediating role of personal norms. *Journal of Retailing and Consumer Services*, *51*, 83–90. https://doi.org/10.1016/j.jretconser.2019.05.023

Kohn, S., Eaton, J. L., Feroz, S., Bainbridge, A. A., Hoolachan, J., & Barnett, D. J. (2012). Personal disaster preparedness: An integrative review of the literature. *Disaster Medicine and Public Health Preparedness*, *6*(3), 217–231. https://doi.org/10.1001/dmp.2012.47

Latané, B., & Darley, J. M. (1976). *Help in a crisis: Bystander response to an emergency*. General Learning Press.

Mayring, P. (2015). *Qualitative Inhaltsanalyse*. Beltz.

Menski, U. (2016). *Neue Strategien der Ernährungsnotfallvorsorge. Ergebnisse aus dem Forschungsverbund NeuENV*. Freie Universität Berlin. https://doi.org/10.17169/refubium-21512

Mol, J. M., Botzen, W. J. W., Blasch, J. E., Kranzler, E. C., & Kunreuther, H. C. (2021). All by myself? Testing descriptive social norm-nudges to increase flood preparedness among homeowners. *Behavioural Public Policy*, 1–33. https://doi.org/10.1017/bpp.2021.17

Nohl, J., & Thiemecke, H. (1988). *Systematik zur Durchführung von Gefährdungsanalysen*. Fachverlag NW.

Nwafor, O., Singh, R., Collier, C., DeLeon, D., Osborne, J., & DeYoung, J. (2021). Effectiveness of nudges as a tool to promote adherence to guidelines in healthcare and their organizational implications: A systematic review. *Social Science & Medicine*, *28*, 1–13.

Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive Systems Design: Key Issue, Process Model, and

System Features. *Communications of the Association for Information Systems*, *24*(1), 485–500. https://doi.org/10.17705/1cais.02428

Reuter, C. (2014). Communication between Power Blackout and Mobile Network Overload: *International Journal of Information Systems for Crisis Response and Management*, *6*(2), 38–53. https://doi.org/10.4018/ijiscram.2014040103

Reuter, C., Kaufhold, M.-A., Schmid, S., Spielhofer, T., & Hahne, A. S. (2019). The impact of risk cultures: Citizens' perception of social media use in emergencies across Europe. *Technological Forecasting and Social Change*, *148*, 1–17. https://doi.org/10.1016/j.techfore.2019.119724

Reynolds, K. J., Subašić, E., & Tindall, K. (2015). The Problem of Behaviour Change: From Social Norms to an Ingroup Focus. *Social and Personality Psychology Compass*, *9*(1), 45–56. https://doi.org/10.1111/spc3.12155

Russo, C., Danioni, F., Zagrean, I, & Barni, D. (2022). Changing Personal Values through Value-Manipulation Tasks: A Systematic Literature Review Based on Schwartz's Theory of Basic Human Values. *European Journal of Investigation in Health, Psychology and Education*, *12*(7), 692-715.

Schwartz, S. H. (1977). Normative Influences on Altruism. *Advances in Experimental Social Psychology*, *10*, 221–279. https://doi.org/10.1016/S0065-2601(08)60358-5

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. *Advances in Experimental Social Psychology*, *25*, 1–65. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S. H. (2016). Basic individual values: Sources and consequences. In D. Sander & T. Brosch (Eds.), *Handbook of value* (Vol. 4, pp. 1–23). Oxford University Press.

Schwartz, S. H., & Cieciuch, J. (2022). Measuring the Refined Theory of Individual Values in 49 Cultural Groups: Psychometrics of the Revised Portrait Value Questionnaire. *Assessment*, *29*(5), 1005–1019. https://doi.org/10.1177/1073191121998760

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., Dirilen-Gumus, O., & Konty, M. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology*, *103*(4), 663–688. https://doi.org/10.1037/a0029393

Schwartz, S. H., Sagiv, L., & Boehnke, K. (2000). Worries and Values. *Journal of Personality*, *68*(2), 309–346. https://doi.org/10.1111/1467-6494.00099

Statista. (2023a). *Population in Germany: Average age 2011-2022*. https://www.statista.com/statistics/1127805/population-average-age-germany/

Statista. (2023b). *Population of Germany 1990-2022, by gender*. https://www.statista.com/statistics/454338/population-by-gender-germany/

Steg, L., De Groot, J. I. M., Dreijerink, L., Abrahamse, W., & Siero, F. (2011). General Antecedents of Personal Norms, Policy Acceptability, and Intentions: The Role of Values, Worldviews, and Environmental Concern. *Society & Natural Resources*, *24*(4), 349–367. https://doi.org/10.1080/08941920903214116

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology*, *25*(4), 415–425. https://doi.org/10.1016/j.jenvp.2005.08.003

Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, *56*(3), 407–424. https://doi.org/10.1111/0022-4537.00175

Thøgersen, J., & Ölander, F. (2002). Human values and the emergence of a sustainable consumption pattern: A panel study. *Journal of Economic Psychology*, *23*(5), 605–630. https://doi.org/10.1016/S0167-4870(02)00120-4

UNDRR. (2016). *Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction* (pp. 1–41). United Nations Office for Disaster Risk Reduction. https://www.undrr.org/publication/report-open-ended-intergovernmental-expert-working-group-indicators-and-terminology

UP KRITIS. (2014). *Öffentlich-Private Partnerschaft zum Schutz Kritischer Infrastrukturen. Grundlagen und Ziele* (pp. 1–54). BSI. https://www.bsi.bund.de/SharedDocs/Downloads/DE/BSI/KRITIS/UPK/upk-grundlagen-ziele.pdf?__blob=publicationFile&v=6

Vecchione, M., Schwartz, S., Alessandri, G., Döring, A. K., Castellani, V., & Caprara, M. G. (2016). Stability and change of basic personal values in early adulthood: An 8-year longitudinal study. *Journal of Research in Personality*, *63*, 111–122. https://doi.org/10.1016/j.jrp.2016.06.002

Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, *39*(5), 806–820. https://doi.org/10.1037/0022-3514.39.5.806

Worldbank. (2023). *Urban population - Germany*. https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=DE