State-of-the-Art Review

Navigating Theories of Actions on Disaster Prevention: A Systematic Review on Disaster Research in Japan

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Abstract: To present a hybrid theory of disaster prevention actions and develop a common framework, this study theoretically and systematically reviewed recent research in Japan on actions from three perspectives: definition, multidisciplinarity, and multidimensionality. First, this research validated that the definition of actions on disaster prevention and reduction should be understood in three contexts: responsibility, willingness, and habituation; the diversity of terminology; and the type of measure. Second, the multidisciplinary nature of the approach affirmed that the motivations and approaches could be organized according to the axes of individual and social models and epistemic and design sciences. Third, per the multidimensional nature of theories explaining actions, the applied theories were organized based on the four perspectives: process, motivation, internal experience, and context. Furthermore, it was suggested that there are three critical perspectives: complicity in neoliberalism, invisibility of social inequalities, and bias in reporting desirable results (expert-serving bias). Taking an approach that emphasizes interdisciplinarity and multidimensionality, this study details the background of Japanese research used to employ a theoretical approach to understand individual cognition and demonstrates the need for research to understand the political, cultural, social, and economic environments that support disaster prevention behavior, noting that this is tied to the unique Japanese context of individual will and dependence on the government. This study is significant in that it provides a map for positioning one's research and pointing the way toward future collaboration in the direction showing definition, interdisciplinarity, and multidimensionality are important components in understanding disaster prevention behavior. **DOI: 10.1061/NHREFO.NHENG-1630.**

Practical Applications: This study reviewed three aspects of recent disaster research in Japan to better understand disaster prevention behavior: what it is and what areas and aspects of it are being studied. First, Japanese disaster prevention behavior can be understood in relation to "responsibility," "will," and "habit"; the diversity of behaviors; and the types of measures applied. Second, motivations and approaches could be amenable to organization along the axes of whether the coping subject is an individual or society and whether the science focuses on "what it is" or "what it can do." Third, explanations of disaster prevention behaviors were found to be viewable in relation to four perspectives: process, motivation, experience, and context. Three criticisms were also found: social inequalities are less visible, many results that are preferable to the researcher are reported, and there is a risk of becoming connected to particular political policies. This study found that although many theories that explain individuals' perceptions are used to explain their disaster prevention behavior, it is also important to understand the environment of the political, cultural, social, and economic aspects that surround the individual.

Introduction

With an increasing number of disasters, a comprehensive understanding of people's disaster prevention actions is an important academic issue. Various theories (Ajzen and Fishbein 1980; Breznitz 1984; Rogers 1975) have been used to explain the psychological factors that lead people to prepare for disasters, and numerous studies have been conducted, such as in social psychology (Ejeta et al. 2015; Lindell and Perry 2012; Siegrist and Gutscher 2006; Solberg et al. 2010; Trainor et al. 2015; Wachinger et al. 2013). Recently, a comprehensive understanding that includes cognitive factors and experiences, trust, responsibilities, resources, abilities, and social context and background has become crucial in explaining disaster prevention actions (Bubeck et al. 2012; Siegrist and Gutscher 2006; Solberg et al. 2010; Wachinger et al. 2013). However, no sufficient review or framework has been presented to comprehensively and systematically provide an understanding of personal behavior in disaster prevention.

This study proposes a framework for a comprehensive understanding of interdisciplinary and multidimensional aspects of disaster prevention behavior using studies in Japan as a case study. There are two main reasons for focusing on studies of disaster prevention behavior in Japan. The first is that, although numerous studies have been conducted in Japan, no review has brought them together in an interdisciplinary and multidimensional manner. Research related to individual disaster prevention actions in Japan has increased dramatically since the Great Hanshin–Awaji Earthquake in 1995 (Motoyoshi 2004), and it has been performed in various fields, as discussed in the following section. Certainly, there are reviews in Japan on evacuation behavior during floods (Kinoshita et al. 2010; Tanaka et al. 2016), research trends in resident actions on disaster prevention (Kondo et al. 2017; Kondo and Meguro 2013;

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Yamada and Karatani 2014), and psychological factors (Motoyoshi 2004). Nonetheless, all of these only highlight cognitive factors and have not yet developed a comprehensive theory. The second reason is that although Japan has accumulated a wide variety of research, most of it is published in Japanese, which is difficult for English readers to access, and thus, it is important to introduce this work to the international audience and readership. At least 1,296 articles from 28 journals (the review target of the present study) on "actions on disaster prevention (*bousai koudou* in Japanese)" discussing risk perception (*bousai-ishiki*, disaster consciousness) have been published in Japan since as recently as 2010, which not only makes it increasingly difficult to grasp them systematically but also shows a certain potential to produce novel insights from scattered disaster-related studies.

The present study, therefore, theoretically and systematically organized recent studies explaining disaster prevention actions in Japan from the perspective of multidisciplinary and multidimensionality of theories. Moreover, in terms of the definition of disaster prevention action and multidisciplinarity and multidimensionality of theories (i.e., Hustinx et al. 2010), it aimed to present a hybrid theory (DiMaggio 1995) that explains disaster prevention actions. This paper also reviewed Japanese studies on disaster prevention actions published after 2010. This review presents a framework for understanding not only Japanese studies but also disaster prevention behavior in different cultures and contexts.

Methodology

Many disaster management studies are directed toward frameworks that *integrate* their contradictions and inconsistencies (e.g., Dash and Gladwin 2007; Ejeta et al. 2015; Lindell and Perry 2012; Siegrist and Gutscher 2006; Solberg et al. 2010) rather than emphasizing the integration and multifacetedness of the theories. Although good theory promotes an understanding of the subject from a multidisciplinary and multidimensional perspective and a hybrid one explains the occurrence and nonoccurrence of phenomena (DiMaggio 1995), in fact, theoretical differences and contradictions are rarely emphasized to approach the multifaceted nature of the phenomenon of individual disaster prevention actions (e.g., Alexander 2013; Bubeck et al. 2012; Wachinger et al. 2013). Additionally, many studies have been limited to examining the validity of the theories adopted (e.g., theory of planned behavior; Daellenbach et al. 2018; Ejeta et al. 2015, protective motivation theory; Lindell and Perry 2012, the cry wolf effect; LeClerc and Joslyn 2015; Trainor et al. 2015). This tendency is consistent with that found in Japanese review studies (e.g., Kinoshita et al. 2010; Motoyoshi 2004; Tanaka et al. 2016; Yamada and Karatani 2014). The main focus is on *modifying* external factors (e.g., knowledge and information), mediating factors (e.g., intention and background), and the relationships among factors influencing cognitive factors such that it overrides already existing theories (Kinoshita et al. 2010; Motoyoshi 2004; Tanaka et al. 2016). Furthermore, some are found to be simply put-together articles (Yamada and Karatani 2014) or data and factors (Tanaka et al. 2016) rather than systematically explaining the difference between the occurrence and nonoccurrence of a phenomenon. They are more like a collage of literature, data, explanatory variables, and figures, which do not meet the requirements of a good theory (Sutton and Staw 1995).

Therefore, the current paper reviews research in Japan regarding disaster prevention actions from the standpoint of a methodology that provides a hybrid theory (DiMaggio 1995), which emphasizes the diversity and pluralism of approaches. DiMaggio (1995) described covering law theory as a strategy to enhance the explanatory power of phenomena by introducing multiple theories. This suggests that contradictions among multiple arguments should not be attributed to the incompleteness of theories but should be interpreted as mutually complementary to understanding the diversity of disaster prevention actions. For instance, protective motivation theory explains that information about a threat (forming the motive for an individual to take protective actions) can lead an individual to take protective actions. However, this appears to contradict the "Cry-Wolf Effect," which states that repeated forecasting failures will prevent people from taking protective actions. Nonetheless, according to covering law theory, they represent the multiple perspectives of the diversity of phenomena, and the inconsistency is rather favorably accepted as a complementary perspective that other theories have overlooked. As will be reviewed, research on disaster prevention actions in Japan has already expanded to include engineering, education, nursing, psychology (social psychology), sociology, behavioral economics, and anthropology, and each of these fields has been focusing on several subjects of discussion. To comprehensively understand the diversity of behaviors, it is beneficial to adopt a strategy that emphasizes multidisciplinarity and diversity rather than a strategy toward integration.

The present study reviewed studies on disaster prevention actions in Japan corresponding to the three layers and subsequent questions presented in Table 1. The layers presented here are based on the elements of the three theories presented by DiMaggio (1995) and referred to a review of individual behavior (volunteering) across psychology, economics, sociology, and political science conducted by Hustinx et al. (2010) to review research that spans multiple disciplines. Table 1 contains the following three central questions: (1) the question of definition (What do we study?), (2) the question of multidisciplinarity (Why do we study it?), and (3) the question of the multidimensionality of theory (theory as explanation and narrative and as enlightenment) (cf. Hustinx et al. 2010). On the basis of this framework, this study conducted a review on theories and studies explaining individual behavior for disaster prevention in Japanese journals published mainly in the last decade (after 2010).

Problem of Definition: The Context and Elements That Define Disaster Prevention Actions

Although many studies on disaster prevention actions are available, only a few have specifically defined what disaster prevention action is, and, in fact, its meaning varies and changes depending on the context, period, and research field (Martinez et al. 2018). Here, the multifaceted nature of the definition will be elaborated upon by presenting three contexts (responsibility, will, and habituation) in which disaster prevention actions are discussed and by exhibiting actual concrete actions while considering Japan-specific meanings.

The first context is that disaster prevention behavior incorporates the built-in meaning of the responsibility of citizens whose premises voluntarily engage in disaster prevention and reduction in the anticipation of the absence of government support. The Japanese-specific *Jijo-Kyoujo-Koujo* (self-help, mutual help, and government help) framework for categorizing actors responsible for disaster management provides a reference axis for understanding individual disaster prevention behavior. Self-help (*Jijo*) refers to protecting oneself in the event of a disaster, and the actors are individuals; mutual help (*Kyoujo*) means to help one another and refers to the local community; and government help (*Koujo*) refers to rescue by public organizations, such as firefighters and self-defense forces, and refers to the government or administration. Disaster prevention action is then understood that is not government help (*Koujo*) performed by the

Table 1. Hybrid conceptual framework of disaster prevention

Layer of complexity	Theoretical building block	Key frameworks and approaches
Problem of definition	What do we study?	• What are disaster prevention actions?
Problem of multidisciplinary	Why do we study it? • Epistemic versus design sciences • Individual versus social models	• Psychology and social psychology: personality and norms • Anthropology: learning and meaning • Sociology: group and culture • Education: character development and management • Behavioral economics: bias and induction • Engineering: understanding actual conditions and promoting action • Nursing science: intervention and care
Problem of theory as multidimensional	Theory as an explanation and a narrative • Why *not* take an action? • Why *take* an action? • Who will take? • Experience • Context Theory as enlightenment • Critical perspectives	 • Cognitive bias and risk communication • Intentions and motivations • Personalities and determinants • Internal experience • Micro, meso, and macro contexts • Complicity in neoliberalism • Invisibilization of social inequality • Expert-serving bias

Source: Adapted from Hustinx et al. (2010).

government from the perspective of three roles (Chosokabe et al. 2017; Haraoka et al. 2009; Kawata 2021; Matsuzawa et al. 2014). In fact, in a major disaster (e.g., the Great Hanshin–Awaji Earthquake), rescue by the government (government help) was limited (cf. Nagamatsu 2015). If this is the case, then it would be more reasonable for individuals and local communities to take charge of disaster response, rescue, and prevention actions themselves in anticipation of government dysfunction. On the basis of these reflections after the experience of a disaster, there is a context in which disaster prevention actions should be considered voluntary actions taken by individuals (self-help) and local communities (mutual help).

Hence, the second context is that disaster prevention action is attributed to the voluntary will of individuals, which is called disaster prevention consciousness (*Bousai-Ishiki*). It is employed in Japan (and in the formal governmental documents and mass media reports) as a term familiar to the general population and is used as a broader concept (e.g., concern for others, anxiety about disasters, and coping with disasters) that includes risk perception (Ozeki and Shimazaki 2017; Shimazaki and Ozeki 2017). Disaster prevention consciousness refers to risk perception and the willingness of protecting people's own lives and local communities and even helping others (Ozeki et al. 2017). Thus, disaster prevention action refers to individual actions driven by the will of individuals (disaster prevention consciousness) to recognize risks, know how to cope with risks, and provide assistance to others.

The third context is the perspective that individual actions taken during disasters are related to the habituation of disaster prevention actions. For instance, people are encouraged to develop the habit of evacuating when a typhoon approaches even before damage occurs (Kakimoto et al. 2014; Yamada and Inamoto 2014). The high frequency of sensitive earthquakes, issuance of earthquake early warnings, and flood and tsunami warnings and advisories usually form "non-damaging" disaster experiences (Takenouchi et al. 2019), and they create repeated opportunities for decision-making about evacuation. Therefore, continuing to take actions in a disaster as if damage might occur is considered a kind of "hands-on training" and forms the habit of avoiding disasters. Thus, whether in daily life without a disaster or when a disaster is imminent (Takenouchi et al. 2019), the habit of acting to reduce damage is interpreted as a kind of disaster prevention action (e.g., daily-life disaster prevention, Yamori 2011).

Considering the three contexts, Table 2 presents the actual actions and behaviors of individuals used in the research articles. Although the terms employed to refer to individual disaster reduction behaviors are diverse, they can be sorted by two main categories: abstract and concrete (action content). As abstract expressions, terms such as action, preparedness, countermeasure, capability, and coping are frequently used, but there are at least 221 variations of expressions (e.g., evacuation behavior and disaster preparedness) and no set expression. In addition, when specific actions are organized into three phases (normal times, under disaster, and postdisaster)

Table 2. Contents of "disaster prevention actions"

Expression	Normal times	During disaster	Postdisaster
Abstract	Action, preparedness, countermeasures, capabilities, and coping		
Concrete	1. Preparation and stockpiling of supplies (personal effects, food, and valuables) 2. Fire prevention (installation of fire extinguishers) 3. Earthquake countermeasures (furniture fixing, seismic diagnosis and retrofitting, and purchasing earthquake insurance) 4. Discussion (confirmation of evacuation routes and locations, information, and means of communication) 5. Residence choice (residence preference and induction) 6. Participation in activities (disaster drills, study groups, and workshops)	1. Protective action 2. Information acquisition 3. Evacuation	1. Reconstruction and relocation 2. Radiation measures

Table 3. Positioning of fields that capture disaster prevention actions

The science motivates	Individual	Social
Epistemic	Psychology (social psychology)	Anthropology and sociology
Design	Education, behavioral economics, and engineering	Nursing

(cf. Yamada and Karatani 2014), they are categorized by six items that are mainly discussed during normal times, three items under disaster, and two items postdisaster. Disaster prevention behaviors should be captured according to the level of abstraction and multifacetedness of the terms and the context in which they are used because they have extremely diverse usages.

Problem of Multidisciplinarity: Why Do We Study It?

Several studies and fields focus on disaster prevention actions and diverse approaches, although the only common understanding of disaster prevention actions is that they are acts to prevent or reduce the damage caused by disasters. Table 3 categorizes the interests and motives of each field according to the following two criteria: (1) individual and social (context and environment) models; and (2) epistemic and design sciences. The first criterion is contested with the question of whether disaster prevention actions taken should be attributed to individuals or the society (environment and context). Hence, the two approaches differently cast questions: the individual model inquires, "What is it about individuals that causes it?", whereas the social model asks, "What kind of environment or background causes it?" (cf. Oliver 1990). The second axis is the epistemic science motive, "What is it?", or alternatively, the design science motive, "What do you want to do?" (Atsumi 2007). On the basis of the motive of epistemic science, the key concern is to elucidate the factors and causes that promote or inhibit disaster prevention actions. Conversely, in design science, the key concern is to create practices and models that promote disaster prevention actions.

In this section, the differences among the seven disciplines ([social] psychology, anthropology, sociology, education, behavioral economics, engineering, and nursing) that concern disaster prevention actions in Japan are explained according to Table 3. The table should be interpreted as a conceptual map to identify whether a given study adopts the mainstream approach; the table does not mean that the approach of one field is not taken in other fields (e.g., double-bind in social psychology, Yamori 2009a; use of protective motivation theory in engineering, Kakimoto et al. 2016). The fact that a study in one area is oriented toward another area of motives does not mean that the study is unimportant (cf. Kuhn 1996). Rather, Table 3 raises the awareness of the possibility of encouraging cooperation with each discipline by understanding the differences between them.

Epistemic Science

Psychological and Social–Psychological Perspectives: Personality and Norms

In psychology, especially in the field of social psychology, there have been numerous studies on the disaster prevention actions of individuals compared with other fields (e.g., Hiroi 2004; Hirose 1984; Kimura 1997). The old–new interest of social psychology is to identify the psychological characteristics and cognitive biases that distort risk perceptions when individuals are exposed to crises (e.g., Breznitz 1984; Hirose and Sugimori 2005; Mcluckie 1973). Given that the "so-called risk information, which is in some way related to risk, is transformed by the function of a physio-psychological lens called a 'bias mechanism'" (Hirose and Sugimori 2005, p. 81), attention should be focused on identifying the factors that create such biases. Another traditional position focuses on the norms involved in the formation of motives and attitudes that cause behavior in addition to risk perceptions (e.g., planned behavior theory, Ajzen 1991; Ajzen and Fishbein 1980; protective motivation theory, Kimura 1997; Rogers 1975; regulatory focus theory, Higgins 1997, 2000; Tanaka and Takehashi 2019). In addition to risk perception, the research has attempted to identify complex factors, such as norms, degree of threat, and self-efficacy.

Recently, two trends of research can be observed: one is a trend toward "more" epistemic science, such as clarifying psychological personalities, and the other is a shift from epistemic science toward design science. The first group includes a series of studies that attempt to develop psychological scales to predict the disaster prevention actions of individuals (Motoyoshi 2018a, b; Ozeki and Shimazaki 2017; Ozeki et al. 2017). The "Disaster Prevention Consciousness Scale" (Ozeki and Shimazaki 2017; Shimazaki and Ozeki 2017) and the "Disaster Self-Efficacy Scale" (Motoyoshi 2017, 2018a) have been invented and affirmed to be related to actual disaster prevention actions (Motoyoshi 2018a; Ozeki and Shimazaki 2017). The second group is a stream that criticizes mainstream psychology's focus on epistemic science, takes a social constructionist stance emphasizing field narratives, and is oriented toward the transformation of the real world (Atsumi 2007). There is a critical attitude toward psychology that deals with "psychological care" (e.g., counseling), which is most commonly mentioned in the postdisaster context (Yatsuzuka 2013), and a practice-oriented approach that attempts to enrich the discourse of people in the field (e.g., days-before, Sugiyama and Yamori 2015; Yamori and Sugiyama 2015; "Crossroads" gaming approach, Yamori 2007).

Anthropological Perspectives: Learning and Meaning

The anthropological approach to individual disaster prevention behavior links to its attempt to reexamine the meanings of evacuation and disaster prevention that arise in the semantic world of residents from a learning perspective. The first perspective criticizes the asymmetrical framework of transmission of disaster prevention from experts (who are considered to have knowledge and skills) to nonexperts (lay people) (who are ostensibly considered not to have such knowledge and skills) (Nakano and Yamori 2018). It also proposes that disaster prevention actions be viewed from the perspective of "learning," which is how learners interpret and understand knowledge and behaviors (Kitagawa 2020). For instance, it focuses on the participation and legitimacy of a community of practice wherein learning takes place (i.e., Lave and Wenger 1991) and the metamessages that are nonexplicitly issued by the issuance and announcement of disaster information (i.e., double-bind theory, Bateson 1972). The second perspective tries to capture the meaning of disaster prevention and preparedness in the lives of residents (Kimura 2005). This line of study has been particularly prompted by the critiques of elevations and upland relocations made in the name of "disaster prevention" in the affected areas after the Great East Japan Earthquake in 2011 (Kimura 2013). By clarifying what is meant in the lifeworld of the people who live there (Ingold 2000), the practice or policies can contribute to disaster prevention and reduction actions (Kimura et al. 2021).

Sociological Perspective: Risk Society (*Risikogesellschaft*) and Culture

The sociological approach is characterized by individuals as an embedded entity in society and looks at the social and group contexts behind individuals (Mugikura and Yoshino 2013; Nishikido 2010). Hence, to understand the disaster prevention of an individual,

attention is paid to the group (the society and community surrounding the individual), social aspects (policy, science, and technology), and historical–cultural aspects (the influence of a significant disaster and lessons learned and taboos within the community) rather than the individual *in vitro*. In response to the assumption that evacuation actions are conducted by a single individual, Tanaka (2013) criticized this and argued that "people are in a web of various social networks and groups (with varying degrees of organization though), experience earthquakes, and receive information about tsunamis; in this situation, they make certain collective and situational decisions and take evacuation actions together with the people around them" (p. 380). The premise here is to understand the actors of disaster prevention and reduction as inherently embedded in social relations.

There are two approaches to the social context of individuals who engage in disaster prevention actions: risk theory and ethnological study. The first approach focuses on the reflexive aspects of risk and self-determination (Beck 1992; Beck et al. 1994; Luhmann 2002) created by social changes and scientific and technological developments associated with modernization. The forms of the individual perception of risk are influenced by countermeasures, such as seawalls (Masamura 2013), and science and technology, such as nuclear power plants (Kainuma 2010), which have been formed by estimation about the scale of earthquakes and tsunamis. The second approach focuses on the culture of the community that supports disaster prevention actions. For instance, it pays attention to local communities that support disaster prevention actions, such as ethnological perspectives on communities (Kanebishi and Ueda 2013), "disaster" culture (Nishikido 2010), and social capital (Fujimi et al. 2011; Harada 2012).

Design Science

Educational Perspective: Character Development and Management

The approach from education is characterized by the perspectives of teachers about disaster prevention associated with the school system. The first characteristic is that it views disaster prevention actions as an opportunity for personality development. Engaging in disaster education goes beyond merely imparting knowledge and skills to save lives and learn lessons from the past. It also includes developing sympathy for the experience of the loss of those affected by disasters, the perspective of empathizing with volunteers for recovery (Kurihara 2017), and fostering contributing and altruistic feelings toward those affected by disasters as essential perspectives (Hirose et al. 2013). Another characteristic is that the term "disaster" education (Hirose et al. 2013; Ogawa et al. 2013) is preferred instead of using "disaster prevention" education in the sense of fostering tacit knowledge (Polanyi 1966), such as appreciation for lives and autonomy (Murakoshi and Muramatsu 2014).

The second characteristic is the focus on the responsibility to manage and save children under the school system. Particularly, research on disaster education and related school education in disaster-affected areas since 2011 has reflected on the sacrifices of children during the tsunami evacuation at the time of the Great East Japan Earthquake (Kazumi 2013). Therefore, there is interest in developing methods to incorporate disaster prevention into the school system (e.g., new teaching materials). Contrarily, there is always a shortage of personnel and time allocated for disaster education in schools (Sato et al. 2016); thus, the main interest is not to introduce new classes and lesson programs but to rediscover (Suekawa and Amano 2017), partially introduce (Mori and Nakano 2017), or improve (Fujimoto et al. 2017) the elements of disaster prevention within the existing school curriculum.

Behavioral Economics Perspective: Psychological Bias and Induction

Studies in behavioral economics (e.g., Kawami et al. 2016; Nakano and Yamori 2020; Ohtake et al. 2020; Ozaki and Nakayachi 2021; Yamaga 2020) are a relatively novel phenomenon in Japan, and critical examination (Ozaki and Nakayachi 2021) has not been adequately considered in its moral and ethical aspects (Thaler 2018) regarding inducing individuals' behavior. From a behavioral economics perspective, however, the disaster prevention behavior of an individual is considered the result of a psychological bias rather than the result of rational decision-making (Kawami et al. 2016). Following this premise, assuming bias and emphasizing what leads to behavioral change (externalities) are more effective than forming appropriate risk perceptions (Ohtake et al. 2020). Among them, researchers are coming to pay attention to behavior change (expressions of evacuation messages, Ohtake et al. 2020, descriptive norms, Ozaki and Nakayachi 2021; institutions and programs, Nakano and Yamori 2020) that focuses on nudges, which lead people to desirable behavior without limiting their choices or changing their financial incentives (Thaler and Sunstein 2008). Although still underresearched, this area has received attention in recent years as a critical approach to cognitive processes involving rational judgment.

Engineering Perspective: Understanding Actual Conditions and Promoting Action

The engineering approach can be characterized by two aspects: the behavioristic aspect, which is rooted in what has been done, measured, and verified, and the outcome-based aspect, which introduces various methods from other fields to promote behavior. The behavioristic approach means that the awareness (consciousness) for prevention actions is measured by behavior. In fact, although many studies on this discipline focus on what kind of disaster prevention behavior has been carried out, psychological mechanisms are rarely mentioned (Sekiya and Tanaka 2016). Furthermore, items employed to measure risk perception or disaster prevention consciousness are generally measured by what people *do* rather than what they *think* (e.g., Chen et al. 2013; Ishihara and Matsumura 2012; Tsukada et al. 2014). Nevertheless, this behaviorist aspect may need to be understood in terms of the conjunction between behavior and consciousness. In most cases, behavioral intentions, rather than actual behavior, are the target of evaluation as a proxy variable for behavior using questionnaire (Hokari and Karashima 2016; Ishihara and Matsumura 2014; Itoh et al. 2011) and interview surveys (Fujimura et al. 2019; Hagiwara et al. 2018; Hayashi et al. 2018; Kawasaki et al. 2016) to verify the effectiveness of practice in the community.

The second outcome-based aspect stems from the emphasis on the effectiveness of the practices being invented and introduced. Programs related to disaster prevention (e.g., Futagami and Hatori 2016) and the dissemination of hazard maps (e.g., Kubota et al. 2018) are the practice reports of improved awareness, perception, and consciousness of disaster prevention. Theories from diverse fields (e.g., cry wolf effect, Honma 2017; regulatory focus theory, Unagami et al. 2012; protective motivation theory, Kakimoto et al. 2014, 2016, 2017; social capital, Itogawa and Yuzawa 2008; normalcy bias, Shinobe 2019) will also be introduced. Outcome reports from practice programs (e.g., Fujimura et al. 2019; Hagiwara et al. 2018; Kakimoto and Yamada 2013; Masuda and Kaida 2019; Ohno and Takagi 2013) are examined through the assumption that increased risk perception (awareness) promotes behavior. Hence, one of the characteristics of the engineering approach is to propose the ways of raising awareness based on the premise of the linkage between awareness (perception and consciousness) and behavior.

Nursing Perspective: Intervention and Care

A major characteristic of the approach to disaster prevention actions from the nursing perspective is the practice orientation to support individuals from the perspective of care, such as medical intervention and assistance by caregivers. The reason some individuals do not take disaster prevention actions is not simply due to their abilities. Vulnerable people in disasters (especially the disabled and the elderly), who have difficulty evacuating in the events of disasters and who actually have a high rate of dying in disasters, are the main targets of care. Therefore, perspectives, such as support from the government (Uda et al. 2015, 2016), acquaintances, and relationships that allow them to withdraw support (Miyake and Nakatani 2013; Yamazaki and Kuroda 2019), and the elimination of language and cultural barriers (Fujita 2018) are necessary concerns in practical studies. It is not the perception of the threat or severity of a disaster but social resources from others that promote disaster prevention actions of individuals (Uda et al. 2015), and the direct link between individual risk perception and disaster prevention is considered relatively weak (Kato et al. 2012; Katsuura et al. 2018; Nakamura et al. 2013; Uda et al. 2016; Watanabe 2015). Accordingly, this implies that intervention practices must be based on the premise that individuals cannot take disaster prevention actions rather than on individuals who do not take them.

Therefore, what is important is prevention on the part of caregivers (e.g., nurses). This prevention often refers to the actions (e.g., safety assurance, evacuation guidance, daily-life support, and information provision and dissemination) that nurses as caretakers should take in the hospital (e.g., Fujita 2018). The interest is oriented toward education and training on the part of caregivers (Taniguchi et al. 2019; Tazaki et al. 2013; Watanabe et al. 2012), leadership (Mashimo et al. 2018), and effectiveness of care (Hashiura et al. 2019; Matsuzawa et al. 2014) through examining the effective support of individuals for disaster prevention actions.

Explanation of Disaster Prevention Actions

Disaster prevention behavior will be explained by focusing on the process by which individuals come to perform (or not perform) it and the personality traits of who performs it. First, there are two major perspectives on what explains disaster prevention behavior from the process: one is the approach that explains nondisaster prevention behavior, that is, why people do *not* take disaster prevention actions despite the imminent risk of a disaster (e.g., normalcy bias, cry wolf effect, dysfunction of disaster experiences, and double-bind); the other is the approach that elucidates disaster prevention behavior, which is how individuals become aware of the situations and take action (e.g., planned behavior, protective motivation, and regulatory focus). Thereafter, it is followed by an explanation of the profile of individuals who engage in disaster prevention behavior, focusing mainly on the psychological trait of disaster prevention consciousness and disaster self-efficacy.

Why Do Individuals Not Take Actions in Disaster Prevention?

Disaster prevention action has traditionally been debated in terms of why people *do not* take actions—a behavior that is to their own benefit of protecting their own lives (e.g., Hiroi 2004; Hirose 1984). Human beings do not necessarily act rationally under the situation of disaster, as is seen in delays in evacuation even in times of crisis. This is because people have an innate psychological function (normalcy bias) that causes them to underestimate the magnitude of risk as it gets serious (Honma 2017; Kato 2010). Normalcy bias is the most commonly used explanation of nondisaster management behavior (e.g., Yamada and Karatani 2014). In fact, it is reported that the low evacuation rate at the time of the Great East Japan Earthquake in 2011 was influenced by the normalcy bias such that people thought there would be no tsunami that would endanger them (Fujimoto et al. 2012).

However, such cognitive biases are not only constituted by psychological functions innately embedded in human beings but also formed by past experiences in disasters. This can be explained by the following two factors: forecasting failure (cry wolf effect, Breznitz 1984) and minor disaster experience (dysfunction of disaster experience, Nakamura et al. 2020). The former is when people tend to disregard disaster information (such as heavy rainfall and evacuation warnings) when they have repeatedly experienced disasters that did not cause any damage. The latter is the tendency of people (dysfunction of disaster experience) to use their past experiences of disasters as a reference point and underestimate the extent of the disaster they are currently facing (Kakimoto and Enomura 2012; Matsumoto 2013). In Japan, where the risk of natural disasters is high, approximately 20% of the population has been affected by a natural disaster (Daimon and Atsumi 2018), and the mindset about disasters formed by past disaster experiences is an important topic for consideration.

However, the reason individuals do not (or cannot) take disaster prevention actions lies not only in their perception of risk but also in the contradiction of information (double-bind, Bateson 1972) issued by the government and experts (e.g., Nakano and Yamori 2018; Yamori 2009a). For instance, the information (level of the message) that announces and encourages early evacuation contains a "meta-message that 'evacuation is to wait for such a message'" (Yamori 2009a, p. 30). It is experienced as a double-bind with contradictory messages simultaneously: "We should actively evacuate earlier" and "We should wait for information before evacuating." The presentation of information, such as "If your house is made of wood, then it may be swept away; thus, you should evacuate from your house immediately," actually decreases the intention to evacuate among people who live in reinforced concrete houses (Kanai et al. 2011). The problem lies in the contradiction between the messages and the meta-messages inherent in the information because individuals rationally make decisions on the basis of the information. Hence, to promote appropriate individual disaster prevention actions, focusing on the cognitive biases that prevent people from receiving risks and information appropriately and on the way of risk communication that embraces the contradictive messages is crucial.

Why Do We Take Actions to Prevent Disasters?

The reasons individuals *do not* take disaster prevention actions alone cannot positively explain why individuals actively take disaster prevention actions. To explain it, focusing on cognitive factors and the intention to perform the behavior (theory of planned behavior, Ajzen 1991; Ajzen and Fishbein 1980) is useful. The intention is formed from three social–psychological factors that determine the occurrence of an action: what attitude one has toward the action (attitude), what the expectations are of crucial surrounding factors are (subjective norm), and how much one believes it is possible to take the action (perceived behavioral control). Therefore, the present study aimed to identify a combination of cognitive factors (e.g., "effect evaluation, feasibility, subjective norm, descriptive norm, risk perception, and cost," Udagawa et al. 2017, 2019; "risk perception, norm, knowledge, and psychological costs," Sekiya and Tanaka 2016) that predict the disaster prevention behavior of individuals.

Motivation

Another perspective on an approach to mediating factors between cognition and behavior is to focus on motivations. These can be

broadly divided into the following two streams: threat appeal (protective motivation theory) and regulatory focus theory. First, threat appeal research, in a classical position in Japan, is an approach wherein a protective action, such as a disaster prevention action, is performed by making people understand the threat of disasters (Kimura 1997). Hence, individuals are persuaded to take disaster prevention actions when they are given fear-provoking messages by the actor giving the information. Since the Great Hanshin-Awaji Earthquake in 1995, disaster prevention education in Japan has become more widespread (Yamori 2010), and many of the adopted approaches have attempted to promote disaster prevention behaviors by transforming disaster risks, fears, and threats to children (Iwata 2016; Matsumoto et al. 2018; Katada 2012). However, appealing to fearful emotions and risk perceptions of disasters is ineffective if disaster prevention actions do not reduce fear emotions. Therefore, appealing to the sense of efficacy as well is critical (Toyosawa et al. 2010). Various models explain threat appeals and the effects of persuasion (Toyosawa et al. 2010), but the recipients of information can be persuaded not only by approaching "threatening disaster prevention education" (Katada 2012), which emphasizes only danger, but also by the sense of efficacy, which increases the possibility of coping with disasters.

In threat appeal research that explores the balance between threat perception and self-efficacy, protection motivation theory (Maddux and Rogers 1983; Rogers 1975, 1983) is relatively often cited as a systematic presentation of threat appeal studies (Kakimoto et al. 2014, 2016, 2017; Yoshida and Kakimoto 2018). According to protection motivation theory, behavior is induced by protective motives formed from two mediation factors: threat appraisal (intrinsic and extrinsic rewards, severity, and probability of occurrence) and coping appraisal (response efficacy and self-efficacy and response costs) (Kimura 1997). A positive association exists between coping appraisals and motive formation (Kakimoto et al. 2016); however, there has been controversy over whether threat appraisals are positively (Mitsuhashi et al. 2018) and nonsignificantly (Kakimoto et al. 2016) linked to protective motive arguments.

Regulatory focus theory (Higgins 1997, 2000) is more commonly used in contexts that are oriented toward practices that promote disaster prevention action compared with the previous theory. Regulatory focus theory explains that there are differences in the type and tendency for behaviors to be performed when people "try to act to gain something [promotion focus]" and when they "try to act to avoid losing something [prevention focus]" (Unagami et al. 2012, p. 8). On the basis of this theory, for instance, by modifying (framing) the presentation of risk information from "If you do not evacuate, then you may increase the likelihood of losing your life" to "If you do evacuate, then you may increase the likelihood of saving your life," the motivation of individuals will change considerably. For instance, it has been demonstrated that those who have prevention focus tend to estimate the cost of performing disaster prevention actions as lower (Tanaka and Takehashi 2019).

Who Takes Disaster Prevention Actions?

Personality Traits

To measure psychological characteristics related to disaster prevention actions, two scales have been invented, the Disaster Prevention Consciousness Scale (Shimazaki and Ozeki 2017) and the Disaster Self-Efficacy Scale (Motoyoshi 2017, 2018a). In the former, disaster prevention consciousness is defined as "the degree of recognizing the fact that one can be affected by a disaster and the necessity for informational, physical, and social preparation and the level of protecting lives and properties of oneself and people around one as well as local cultures and communities" (Ozeki et al. 2017, p. 632) and consists of the following five subscales: disaster imagination, sense of current crisis, other directed, anxiety, and disaster indifference. Disaster self-efficacy is defined as "confidence in one's ability to take appropriate actions in the event of a disaster and in one's ability to survive the disaster" (Motoyoshi 2018a, p. 104) and comprises the following two subscales: self-response ability and interpersonal resource use. The Disaster Prevention Consciousness and Disaster Self-Efficacy Scales predict actual disaster prevention actions (e.g., fixing furniture, stockpiling supplies, and checking hazard maps) to the extent that their degrees are higher (Motoyoshi 2018a; Ozeki and Shimazaki 2017).

Determinants

Determinants are a point that should be fully explored in future studies. There is a scant theory that predicts demographic factors such as gender and age, economic factors such as occupation and income, social factors such as social network and religious and group participation, and human capital factors such as education. With regard to gender, women are more likely to feel anxiety about disasters and earthquake shaking (Tatebe et al. 2017, 2019), and given the threat appraisal in protective motive theory or the psychological trait of anxiety in the Disaster Prevention Consciousness Scale, it is expected that women are more likely to act to prevent disasters. Nonetheless, it is found that they are less likely to evacuate (Urata and Hato 2013) and read and possess hazard maps (Kanai et al. 2017) than males. Age is also not a consistent factor, with some claiming that older people are more likely to take disaster prevention actions (Kishimoto et al. 2017; Kanai et al. 2017), whereas others claim the opposite (Isagawa et al. 2012).

Experience

A disaster prevention action is not only regarded as a consequence of a certain process but must also be viewed from the aspect of the experience that individuals have learned disaster prevention. This aspect of internal experience can be discussed in teaching and learning disaster prevention. One is self-determination theory (Deci and Ryan 1991), which focuses on the process from extrinsic to intrinsic motivation, and the other is based on legitimate peripheral participation theory (situated learning theory) (Lave and Wenger 1991). The two theories have in common that disaster prevention actions should be understood through repeated learning and individual experience and are difficult to evaluate when they are decontextualized from their community or lives or by a one-time teaching of disaster education, such as seminars and workshops (Chijiwa and Yamori 2020).

Individuals who engage in disaster prevention are the autonomous subjects who repeatedly form and reform the motivation for disaster prevention as learners rather than being objects of understanding to elucidate the psychological mechanism. In this context, interest is focused on the subjects and methods of spontaneous disaster prevention actions, even in the absence of a teacher. Thus, the practice of disaster education should support the process of moving from motivation given by others (extrinsic motivation) to higher-order motivation through one's own self-determination (external, introjected, identified, integrated, and intrinsic regulation) (Deci and Ryan 1991), and the focus is on how to provide effective learning (Fukumoto et al. 2018; Fukumoto and Nakamura 2019; Nishira et al. 2011). For instance, learning simply provided by others, such as evacuation drills and textbook learning, tends to be limited to more extrinsic motivation, whereas learning that possibly induces fun through a gaming approach (e.g., disaster-prevention *Karuta* [playing cards]) is more likely to elicit the potential to increase intrinsic motivation (Fukumoto and Nakamura 2019).

The learning of disaster prevention behavior should be evaluated by the acquisition of knowledge and transformation of the identity of learners. This is because risk communication is not performed through a one-way knowledge transfer from experts to lay people within an asymmetrical relationship but through a symmetrical relationship and cooperation between lay people, who are the actors involved in disaster prevention actions, and experts and the government (Shiroshita 2012; Yamori 2010). Therefore, what is necessary for effective disaster prevention is not the transmission of knowledge or evaluation of knowledge acquisition but the way in which learners of disaster prevention legitimately participate in the community of practice and the surrounding environment including artifacts and institutions (cf. Lave and Wenger 1991). Learning, then, represents a transformation of the identity of learners (Iwahori et al. 2015; Sun et al. 2012). One of the aspects of learning disaster prevention actions is that learners gradually acquire an identity as teachers (Sun et al. 2012), as in the case of a student who becomes aware of his new role through maintaining seismographs and teaching lower-class students (Iwahori et al. 2015).

Context

Individuals who take disaster prevention actions are influenced by a particular context that is formed by a culture and society especially related to disaster management. In this section, its elements from three levels (micro, meso, and macro) are organized according to the range of contexts that can influence individuals in Japan. The chapter on definitions presents three contexts to capture the aspect of what disaster prevention action is for individuals, and it will dive into further analysis to capture the aspect of what influences disaster prevention actions with them.

First, at the micro level, disaster prevention actions are articulated from four perspectives as collective actions wherein the influence of others and support for others mutually interact. The first perspective is to understand the impact of the actions of others as triggers for evacuation decisions (e.g., initiative evacuees, tsunami *tendenko*, Tanaka 2013; Yamori 2012). Evacuation behavior is fundamentally a collective action, as calls by family members, neighbors, firefighters, and the government (Yasumoto et al. 2018) and the evacuation actions of others (Inaba and Tanaka 2011) play an essential role in evacuation decision-making. The reverse is also true; thus, evacuation should be interpreted not only as the act of protecting oneself from risk but also the act of helping others to evacuate with them (Urata and Hato 2013) and an implicit appeal to other residents to evacuate (Ohno and Takagi 2013; Yamori 2012). The second perspective is that encouragement from others complements the lack of resources for disaster prevention actions. For elderly and disabled people (Uda et al. 2015, 2016) and foreigners with cultural and language barriers (Fujita 2018), who find it difficult to take disaster prevention actions on their own, the promotion of actions by changing their risk perceptions is limited. Rather, social relationships with familiar people who can elicit support are more important (Miyake and Nakatani 2013; Yamazaki and Kuroda 2019). Third, through the intervention of others, the disaster prevention actions of individuals can have a spillover effect. For instance, disaster prevention education in schools promotes disaster prevention behaviors of children and their parents through communication within the family (Chen et al. 2013; Toyosawa et al. 2010). Last, the care relationship to others can also be a factor that inhibits disaster prevention behaviors. One example can be found in the implicit role of care giving in Japanese society. In fact, the evacuation intentions of families with a disabled member or a person being cared for are lower than those of families without them (Akaike and Tsukai 2014; Ichiko et al. 2010; Katada et al. 2018), and due to problems with the hardware of evacuation shelters and centers (Isouchi et al. 2019), even in the event of a disaster, those family members are likely to stay at home for the needs of providing care rather than to evacuate to shelters (Ishizuka 2017).

Meso-level influences have the following three major components: trust (subjectivity and dependence), embeddedness (community engagement and social capital), and collective memory (fading of and passing on disaster remembering). The first is the influence of trust in the government and experts. For residents, trust in the government and experts not only promotes disaster prevention behaviors (Kakimoto et al. 2017; Mitsuhashi et al. 2018; Nakayachi 2019) but also creates a dependency relationship (cf. Doi 1973) between residents and the government that inhibits proactive disaster prevention actions by residents (Kakimoto et al. 2016; Katada et al. 2011). Trust always has the potential to create excessive expectations of and dependence on the government for residents (Yamada and Karatani 2014), and dependence on the government undermines the autonomy of residents and inhibits individual disaster prevention actions (Ito et al. 2019; Katada et al. 2011). Thus, trust between the government and experts is a "stumbling block" to restore the voluntarism of individual disaster prevention behavior (e.g., Yamada and Karatani 2014). The second perspective understands disaster prevention actions as always already *embedded* in the local community; it is not only because the actions can be decontextualized (e.g., stockpiling supplies) but also because a certain type of elements that already exist in the community (e.g., socializing with neighbors and the use of wood stoves) can be transferred to disaster prevention actions in the event of a disaster (Ishihara and Matsumura 2012). Community activities during normal times (e.g., neighborhood associations and voluntary disaster prevention organizations) foster disaster prevention actions (Chen et al. 2013; Ishihara and Matsumura 2012; Kakimoto and Yamada 2013; Terumoto 2012; Yamauchi and Sakamoto 2013), and bonding social capital creates the fundamental safety nets of disasters among local communities (Fujimi et al. 2011; Harada 2012). The third point captures the influence of collective memory (Halbwachs 1950) and remembrance (Connerton 1989), which are related to the dynamics of the fading of and passing on disaster remembering. In the immediate aftermath of a disaster, community-wide interest in disaster prevention is intense, whereas the level of awareness (Kanai and Katada 2015) and action (Kaziya et al. 2018) declines as time passes. The disaster prevention actions of local communities are implicitly directed by museums (Sakamoto 2012), monuments (e.g., stone monuments of past tsunamis) (Sato et al. 2017; Hirakawa et al. 2016; Sakamoto 2012), lessons learned (Matsuo et al. 2010; Sato et al. 2018), and local events (Takahashi and Otsuzuki 2012), which are means to preserve the memory of past disasters and attempt to pass on and recall them.

Finally, the macro-level context can be captured from the perspective that risks are reflexive, arising from decision-making in a modernized society (Beck et al. 1994). Disaster prevention measures (e.g., seawalls, Masamura 2013) and risks (e.g., nuclear power plants, Kainuma 2010) created by science and technology provide a cognitive frame and object for disaster prevention actions pertaining to what individuals should respond to and what they should recognize as risks. Catastrophic disasters (e.g., the Great Hanshin–Awaji Earthquake in 1995 and the Great East Japan Earthquake in 2011) that could produce cultural trauma (Eyerman 2015) have a significant influence on subsequent government disaster policies and social discourse of disaster countermeasures. Risks are not brought from outside of society but are reproduced by the decisions of society. Following the Great East Japan Earthquake, discussions mainly

centered on issues related to evacuation (Sun et al. 2013), and the government's announcement of new estimation for a tsunami had a significant impact on community perceptions and disaster prevention actions (Matsuda 2013; Onishi 2018).

Critical Perspectives

Critical perspectives on capturing disaster prevention actions arise primarily through skepticism about the assumption that the more risk perception increases, the more disaster prevention is performed. The linear correlation between cognitive factors inducing risk perceptions and disaster prevention consciousness masks two negative aspects, complicity in neoliberalism and the invisibilization of social inequality. Furthermore, the meta-level analysis of articles suggests a researcher bias in which only the results that support the effectiveness of the introduced disaster management research and practices are reported (expert-serving bias for disaster prevention actions). Complicity in neoliberalism, the invisibility of social inequality, and expert-serving bias (bias in reporting positive results) will be presented subsequently.

First, the common sense that disaster prevention behavior is carried by the responsibility and will of lay people resonates with the ideology of neoliberalism in the sense that it justifies avoiding the responsibility of the government and administration (*Koujo*, government help). In reality, there is a complex and contradictory relationship, rather than a causal one, between risk perception and disaster prevention action (Kakimoto et al. 2016, 2017). Studies support some deviation between cognition, awareness, and consciousness and behavior (e.g., Kakimoto et al. 2017), which is also consistent with studies outside Japan that support the discrepancy between risk perception and personal behavior (e.g., Wachinger et al. 2013). Disaster experiences with no significant correlation (Fujimoto et al. 2012; Kanai and Katada 2011, 2012; Takenouchi 2019; Yamasaki et al. 2011) and even some with negative associations (Katada et al. 2005; Oikawa and Katada 1999) have been reported. The discrepancy between intentions and behaviors is even larger (Isagawa et al. 2012; Kato 2019); responses to questions about behavioral intentions represent socially *appropriate* responses (e.g., evacuation from a tsunami *should* be done by walking rather than by car because it might create traffic congestion) rather than what a person would actually do (Sun et al. 2014). In addition, disaster prevention consciousness (or risk perception) does not predict all disaster prevention actions in general but has different effects (Takagi et al. 2019) and trade-offs (Masuda and Kaida 2019) depending on the type of disaster prevention actions. Despite the wide variety of decision-making involved in disaster prevention actions, the logic that "if disaster prevention actions are not implemented, then the cause will be found in the inability to recognize the danger properly" is still valid because there are a priori beliefs that there is an individual (mind) that should correctly assess the "true" danger (Yamori 2009b). Furthermore, even if disaster prevention actions are performed, it does not necessarily mean that people make the right decisions and may even put individuals at risk (e.g., damage *during* evacuation) (Ushiyama and Katada 2010). In the case of the Great East Japan Earthquake, the most common report of why survivors were saved was "by chance" (Ohno and Takagi 2013). Nonetheless, emphasizing that individuals and local communities are the main actors in disaster prevention may encourage governmental avoidance of responsibility (Research Strategy Center, Hyogo Earthquake Memorial 21st Century Research Institute 2019) and government paternalism (Kanebishi 2013; Kanebishi and Ueda 2013). It may simply justify the withdrawal of disaster prevention issues from the realm of politics and administration.

Second, attributing disaster prevention actions to individual cognition and awareness makes gender, physical, social, and economic differences invisible and, thus, perpetuates the current inequalities and disparities. For instance, disaster research in Japan is rarely viewed from a gender perspective (Ikeda 2015). Despite inadequate educational opportunities for women and disaster preparedness in Japan (Petraroli and Baars 2022), the situation where community activities are conducted mainly by men (Tsukamoto 2012) may maintain the current inequality. Problems related to physical abilities are more pronounced among the elderly and disabled people (Isouchi et al. 2019). The mortality rate in the Great East Japan Earthquake was approximately twice as high for the disabled and 2 to 3.5 times higher for the elderly (Tatsuki 2013), and the elderly have rarely accounted for less than 60% of disaster related deaths since 1995 (Yoshida 2014). Additionally, the challenges faced by foreign residents and nonnative speakers of Japanese tend to be invisible (Uekusa and Lee 2020). The difficulty of non-Japanese speakers to take disaster prevention actions should be understood as a result of cultural differences and social issues, such as language barriers and the lack of social networks with supporters, rather than because of low risk perception (Fujita 2018). The aspects of socioeconomic disparities, such as household income and occupation, have also not been adequately examined. Although individual cases, such as income (Ito et al. 2019; Kondo and Karatani 2018) and subsidies (Asai and Kumagai 2017), for housing reconstruction are being examined, a systematic understanding remains unclear. Only the purchase of earthquake insurance, which is financially costly, is not found to be associated with disaster prevention consciousness (Ozeki and Shimazaki 2017). Disaster prevention action from the perspective that it is the responsibility of citizens to voluntarily engage in is premised on the individual model that anyone has the ability to take disaster prevention actions. This assumption masks individual inequalities and vulnerabilities (Nagamatsu 2015) and poses the risk of functioning as a device to reproduce the concentration of damage on the socially vulnerable.

Finally, there is a bias, observable in the evaluation of disaster prevention practice and research outcomes, that we have termed "expert-serving bias." Most practical studies on disaster prevention workshops, education, and practices have only tested for effectiveness by measuring the level of understanding and risk perception immediately after they have been conducted, and there have been few studies verifying longitudinal effectiveness and questioning whether they lead to actual disaster prevention actions (Chijiwa and Yamori 2020). Although the negative results of practicing disaster prevention education are sometimes reported (Toyosawa et al. 2019), most studies emphasize that disaster prevention practices have transformed disaster prevention actions and awareness of individuals positively. Furthermore, this tendency is also related to the format of the reports in journals. It is characterized by attributing the "failure (with damage)" by the disaster prevention actions of lay people to the internal problems of individuals while attributing the "success (without damage)" by disaster prevention actions to uncontrollable external factors. For instance, "failure" to evacuate from a tsunami is attributed to low awareness (e.g., normalcy bias) and becomes a personal issue, whereas "survival" through evacuation is treated as a coincidence that no damage has occurred, and it has ended up encouraging people to take more prevention actions. The existence and traits of the expert-serving bias must be thoroughly examined because it is more serious than the various cognitive biases that lay people have toward disaster prevention.

Conclusion

This study provided a review of the literature on disaster prevention behavior in Japan, the multidisciplinary nature of the theory presented, and the multidimensional nature of the phenomenon by means of which this study can provide a navigational compass to identify the causes of unresolved issues, understudied areas of research, emerging approaches, and possible directions to advance in the future. For example, this study identified the need for research that focuses on more than cognitive factors, such as self-efficacy, extending to the context surrounding the individual and the physical environment and institutions; in fact, it coincides with the new challenges in Japan, where many people are losing their lives due to physical challenges caused by the aging of the population and other factors. This multifaceted understanding indicates why it is difficult to depart from a cognitive approach that relies more on individual capabilities than it does on social changes, given that disaster prevention behavior is strongly associated with a context wherein disaster prevention is considered performed under the guidance of one's own will and trust in government is critically viewed as dependence. This is in line with research trends in Japan, which is increasingly focusing on noncognitive approaches that involve physical intervention, such as nudge theory in behavioral economics and actor–network theory in anthropology.

Furthermore, this understanding of disaster prevention action has a highly practical departure. The significance of hybrid theory (DiMaggio 1995) in this study, which emphasizes the differences in approaches, is not that it deepens the conflict between those studies but that it presents a "map," as it were, that encourages one to become aware of the complementary aspects of each (for example, Table 3). The understanding and evaluation of individual behavior in disaster prevention in Japan involve social context that relies on the individual model based on the idea that disaster prevention should rely on self-help, and it actually affects the researchers' tendency to adopt cognitive-centered theory and even possible reporting bias. The contribution of this paper is that the development of multidisciplinary and multidimensional theories has led to a comprehensive and multifaceted understanding of disaster prevention actions and provided a new perspective to change actual disaster prevention behaviors.

Data Availability Statement

No data, models, or code were generated or used during the study.

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