Article

Willingness to Prepare for Disasters among Individuals with Disabilities: An Essential Component for Building Disaster Resiliency

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Abstract: This study focuses on exploring the factors influencing individuals' preparedness for disasters. Drawing upon the protection motivation theory (PMT) and the prototype willingness model (PWM), a conceptual framework was proposed to investigate the determinants of willingness to prepare for disasters and its impact on disaster preparedness. Data was collected through an online survey, involving 377 participants with disabilities and medical special needs residing in the Rio Grande Valley (RGV). The collected data was analyzed using generalized structural equation modeling (GSEM) to examine the associations among the selected study variables. The findings indicate that both coping appraisal and threat appraisal significantly influence individuals' willingness to prepare for disasters, which, in turn, has a notable impact on disaster preparedness. Recognizing the significance of disaster preparedness in building resilience and effectively responding to and recovering from disasters, it is crucial to acknowledge the importance of the willingness component in these efforts to cope effectively with future extreme events.

Keywords: willingness; disaster preparedness; disability; medical special needs; Rio Grande Valley

1. Introduction

In recent years, there has been a noticeable increase in the frequency of disasters compared to the past. The Federal Emergency Management Agency (FEMA) reported in the National Preparedness Report 2021 that, between 1 January 1953 and 30 December 2020, there were 4498 disaster declarations. However, the number of declarations made after 2020 has surpassed any point since 1953, primarily due to the effects of climate change (FEMA 2021). In order to effectively manage disasters, the process begins with disaster preparedness. A higher level of preparedness plays a crucial role in successfully implementing activities in the subsequent phases of mitigation, response, and recovery. This, in turn, leads to improved response and recovery efforts, ultimately enhancing disaster resilience. Various studies have examined the relationship between disaster preparedness and community resilience (Kapucu et al. 2013; Madrigano et al. 2017). Furthermore, preparedness is a critical component of disaster risk management and reduction (Al-Rousan et al. 2014). On a global scale, countries worldwide have collaborated in implementing disaster risk reduction measures, guided by the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) (United Nations 2015). Within this framework, one of the four key priorities is to enhance disaster preparedness to ensure an effective response and to facilitate "Building Back Better" during recovery, rehabilitation, and reconstruction efforts (United Nations 2015).

At the national level, disaster preparedness for a wide range of hazards, including natural disasters, disease pandemics, chemical spills, and man-made threats such as terrorist attacks and cyberattacks, is systematically guided by the Presidential Policy Directive (PPD)-8 National Preparedness. This directive recognizes that preparedness is a collective responsibility (The White House 2011). The overarching objective of national preparedness

is to foster a secure and resilient nation, equipped with the necessary capabilities across all segments of society, in order to effectively prevent, protect against, mitigate, respond to, and recover from the most significant threats and hazards. This comprehensive approach is aimed at achieving a state of preparedness that addresses the highest risks faced by the country (FEMA 2020). The concept of the "whole community" plays a pivotal role in national preparedness. It encompasses the active involvement and cooperation of various stakeholders, including individuals, families, communities, localities, tribal nations, territories, states, and federal agencies. By engaging all these entities, a collective and inclusive approach to preparedness is fostered, maximizing the nation's capacity to face and overcome challenges (Congressional Research Service 2022).

Despite the concerted efforts in implementing systematic disaster preparedness measures at all levels of government, the nation continues to grapple with a low level of individual disaster preparedness. A national survey conducted by Rave Mobile Safety in June 2022, involving over 1000 respondents, revealed that only about 27% of participants reported feeling adequately prepared to handle natural disasters or severe weather events. This highlights a significant gap in individual preparedness (Congressional Research Service 2022). Furthermore, another study focusing on adults aged 50 years or older, comprising a sample size of more than 1304 individuals, identified lower levels of overall preparedness among those with disability status or functional limitations; these vulnerable populations, susceptible to the impact of disasters, were found to exhibit a lower degree of disaster preparedness (Congressional Research Service 2022). Similarly, an analysis of the 2006–2010 Behavioral Risk Factor Surveillance System, encompassing a large sample of 104,654 respondents, indicated that only 25.3% of the population felt adequately prepared for disasters. Additionally, a mere 12.3% possessed all five of the recommended disaster preparedness items, underscoring a significant deficit in readiness levels (DeBastiani et al. 2015).

While it may seem that disasters affect everyone equally in at-risk areas, the reality is that certain groups bear a disproportionate impact, particularly those with low socioeconomic conditions, the elderly with disabilities, and individuals with medical special needs (Elisala et al. 2020). A notable example is Hurricane Harvey, one of the most severe storms in U.S. history, where individuals facing cognitive and ambulatory difficulties were found to reside in neighborhoods with a higher concentration of flooded areas compared to those with different types of difficulties (Chakraborty et al. 2019). Similarly, individuals with disabilities residing in congregate care facilities faced a disproportionate impact during the COVID-19 pandemic (Marcelin et al. 2016). Additionally, a survey conducted by Disability Rights Texas during the 2021 Winter Storm Uri, which resulted in prolonged power outages and water shortages, revealed that Texans with disabilities faced significant challenges, including a lack of transportation and access to life-saving medical equipment due to power disruptions (Ahmed 2021). These examples underscore the critical importance of disaster preparedness specifically for individuals with disabilities. Recognizing the unique vulnerabilities and needs of this population is essential for ensuring their safety and well-being during emergencies.

The existing studies on individual disaster preparedness encompass a wide range of focus areas. These include conceptual frameworks aimed at understanding the principles of disaster preparedness (Lorenzoni et al. 2022), the examination of perceptions regarding preparedness (DeBastiani et al. 2015; Elisala et al. 2020; Smith et al. 2015; Sultan et al. 2020; Yoo et al. 2016), the exploration of both objective and subjective aspects of preparedness (Kyne et al. 2020), the identification of factors influencing preparedness levels, an evaluation of preparedness levels (Lorenzoni et al. 2022), and investigating the relationship between disaster preparedness and community resilience. Furthermore, the voluntary nature of disaster preparedness emphasizes the crucial role played by individuals' willingness to prepare. Some studies have explored the willingness of emergency managers, volunteers, and medical students to participate in preparedness and response activities (Brice et al. 2017; Ma et al. 2021; Odai et al. 2019; Sultan et al. 2020). However, empirical research inves-

tigating the association between willingness and disaster preparedness among individuals is scarce in the existing literature. Given the current circumstances, it is crucial to address the situation faced by individuals with disabilities, who have been disproportionately affected by past disasters and the ongoing pandemic. Their low level of disaster preparedness necessitates immediate attention to examine any potential association between the willingness of individuals with disabilities and their preparedness levels.

Considering the aforementioned context, this study offers two significant contributions to the existing knowledge base. Firstly, it empirically examines the association between individuals' willingness and their level of disaster preparedness. This fills a crucial research gap and enhances our understanding of the factors influencing disaster preparedness. Secondly, this study stands as the pioneering investigation into the willingness to prepare for disasters, shedding light on an essential aspect of preparedness. The findings of this study are expected to enhance our comprehension of disaster preparedness among individuals who are particularly vulnerable to the impacts of disasters.

2. Willingness to Prepare

According to the Cambridge Dictionary, willingness is defined as "cheerful readiness to do something (Merriam-Webster 2023)." A cheerful readiness is influenced by conducive conditions (Pomery et al. 2009). According to the PMT, the occurrence of a threat and the effectiveness of a coping response show a positive association with intentions to adopt a recommended preventive behavior (Conner and Norman 2005; Gumasing et al. 2022; Kurata et al. 2023; Maddux and Rogers 1983). In another related theory, PWM, the willingness behavior is highly correlated with behavior intention, and it is a better predictor of health risk (Gibbons 2020). In addition, studies show that disaster preparedness is associated with the willingness to prepare for disasters (Al-Hunaishi et al. 2019; Byrne et al. 2021; Hu et al. 2022). Integrating the two, the PMT and PWM, this study proposes that the willingness to prepare for disasters (X3) is associated with threat appraisal (X1) and coping appraisal (X2), and X3 is associated with disaster preparedness (X4) (Figure 1).

X1=Threat appraisal; X2=Coping appraisal; X3=Willingness to prepare; X4=Disaster preparedness; X5=Disability; X6=Demographic Characteristics
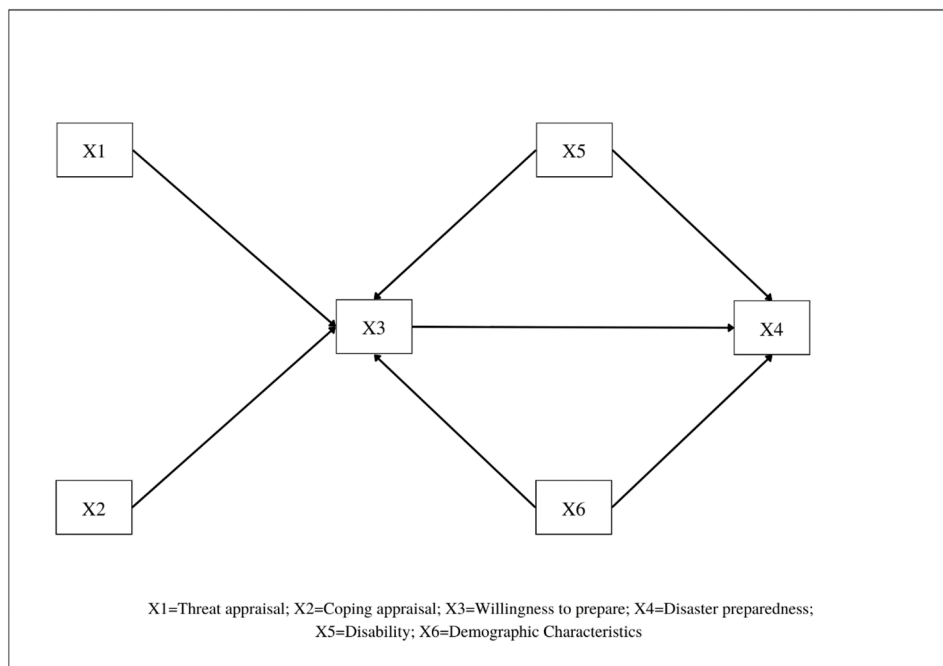
Figure 1. A conceptual framework for willingness to prepare for disasters among individuals with disability.

H1. *Perceived threat appraisal has a significant effect on willingness to prepare.*

H2. *Perceived coping appraisal has a significant effect on willingness to prepare.*

2.1. Disability and Health Conditions

Research indicates that individuals, both children and adults, with disabilities are often inadequately prepared for disasters, despite facing a higher level of risk (Mann et al. 2021; Stough et al. 2017). Likewise, individuals with specific medical needs also exhibit lower levels of preparedness for disasters (Mann et al. 2021; Stough et al. 2017; Toor et al. 2018). Furthermore, individuals with medical special needs are less inclined to engage in disaster preparedness efforts (Meyer et al. 2015; Uscher-Pines et al. 2009). Thus, disability and health conditions (X5) are associated with both disaster preparedness (X4) and willingness to prepare for disasters (X3) (Figure 1).

H3. *Disability has a significant direct effect on willingness to prepare.*

H4a. *Type of disability has a significant direct effect on willingness to prepare.*

H4b. *Type of disability has a significant direct effect on disaster preparedness.*

H5a. *Health condition has a significant direct effect on willingness to prepare.*

H5b. *Health condition has a significant direct effect on disaster preparedness.*

H6a. *Medical special needs have a significant direct effect on willingness to prepare.*

H6b. *Medical special needs have a significant direct effect on disaster preparedness.*

2.2. Demographic Characteristics

Among demographic characteristics, research suggests that age, especially among young individuals and the elderly living with disabilities, exhibits a negative correlation with the level of disaster preparedness (Mann et al. 2021; Stough et al. 2017). According to literature reviews (Fothergill and Peek 2004; Hallegatte et al. 2020), poverty significantly contributes to the vulnerability of economically disadvantaged populations in the United States to natural disasters. A nationwide survey (Al-Rousan et al. 2014) examining preparedness for natural disasters among older adults in the US found that elderly individuals lacking resources tend to have lower preparedness scores. Similarly, individuals with specific medical needs demonstrate lower levels of preparedness for disasters (Mann et al. 2021; Stough et al. 2017; Toor et al. 2018). Additionally, individuals with medical special needs are less likely to participate in disaster preparedness efforts (Meyer et al. 2015; Uscher-Pines et al. 2009). Consequently, demographic characteristics (X6) are connected to both the willingness to prepare for disasters (X3) and disaster preparedness (X4) (Figure 1).

H7a. *Age has a significant direct effect on willingness to prepare.*

H7b. *Age has a significant direct effect on disaster preparedness.*

H8a. *Gender has a significant direct effect on willingness to prepare.*

H8b. *Gender has a significant direct effect on disaster preparedness.*

H9a. *Level of education has a significant direct effect on willingness to prepare.*

H9b. *Level of education has a significant direct effect on disaster preparedness.*

H10a. *Ethnicity has a significant direct effect on willingness to prepare.*

H10b. *Ethnicity has a significant direct effect on disaster preparedness.*

H11a. *Race has a significant direct effect on willingness to prepare.*

H11b. *Race has a significant direct effect on disaster preparedness.*

H12a. *Level of income has a significant direct effect on willingness to prepare.*

H12b. *Level of income has a significant direct effect on disaster preparedness.*

3. Materials and Methods

3.1. Data

This study utilized data from a big survey collected during February and April 2019. The data collection process involved an online survey tool (Kyne et al. 2020) and convenience sampling. The study centered on the Rio Grande Valley (RGV), which includes four counties in the state of Texas, United States: Cameron, Hidalgo, Willacy, and Starr. Students enrolled in the Disaster and Society course aided in the distribution of questionnaires to individuals they deemed eligible to participate in the survey. After applying specific criteria, including residency in one of the zip codes within the RGV and completion of the survey, the final sample consisted of 377 respondents aged 18 or older. These respondents either had a disability and/or medical special needs or served as caretakers.

3.2. Measures

The focus of this study is on individuals' "willingness" to prepare for disasters, which serves as the dependent variable. To measure this willingness, a set of five items (W1–W5) is specifically designed to assess participants' readiness. Each item corresponds to a statement: (1) "Getting information about what to do in an emergency is too hard"; (2) "I don't know how to get prepared"; (3) "Preparing is too expensive"; (4) "I don't want to think about preparing for disasters"; and (5) "I have just never thought about preparing for disasters" (Table 1). Respondents provide their level of agreement with each statement using a five-point scale, ranging from "agree strongly" to "disagree strongly." Before analyzing the data, the scores for the first four items (W1–W4) are reversed to ensure that higher values indicate a higher level of willingness. The reversed scores range from 1 (representing low willingness) to 5 (representing high willingness), as depicted in Table 1. To obtain the overall willingness (WILL) score, the scores of all five items are summed up, as presented in Table 1.

The assessment of disaster preparedness (PRP) involves two dimensions: preparing for disasters and having supplies at home. The first dimension is evaluated using five items that require respondents to rate their level of agreement on a five-point scale, ranging from "not at all like me" to "very much like me." These items are as follows: (1) "I have not yet prepared, but I intend to in the next six months" (P1); (2) "I have not yet prepared, but I intend to in the next month" (P2); (3) "I just recently began preparing" (P3); (4) "I have been prepared for at least the past six months" (P4); and (5) "I am not planning to do anything about preparing" (P5), which is reverse coded. The second dimension is assessed using three items with binary response options ("Yes" or "No"): (1) Supplies set aside at home (S1); (2) Supplies set aside at the office (S2); and (3) Update supplies regularly (S3). Preparedness scores will be coded as "Yes" if at least one of the responses to items P1 to P5 indicates a "Yes" answer (rating of 4 or 5), and if at least one of the responses to items S1 to S3 is also a "Yes" answer. Please refer to Table 1 for further details.

Table 1. Measures for selected study variables.

Concept	Variable	Code	Constructs	Scale	Remark
Threat Appraisal	Perceived severity	TA1	Perceived severity of a natural disaster if it were to happen in your community	1–5	
	Disaster experience	TA2	Disasters I have experienced make me think about getting prepared	1–5	
	Occurrence	TA3	Some type of natural disaster will occur in your community	1–5	
		THA	TA1 + TA2 + TA3		
Coping Appraisal	Respond costs	CA1	Preparing is too expensive	1–5	Reverse coded
	Self-efficacy	CA2	Confident in my ability to know what to do in a weather emergency	1–5	
	Response efficacy	CA3	Preparing for a weather event will make a difference in handling the situation	1–5	
		COPE	CA1 + CA2 + CA3		
Willingness	Willingness to prepare	W1	Getting information about what to do in an emergency is too hard	1–5	Reverse coded
		W2	I don't know how to get prepared	1–5	Reverse coded
		W3	I don't want to think about preparing for disasters	1–5	Reverse coded
		W4	I have just never thought about preparing for disasters.	1–5	Reverse coded
		W5	Disasters in other places make me think about getting prepared	1–5	
		WILL	W1 + W2 + W3 + W4 + W5		
Preparedness	Disaster preparedness	P1	I have not yet prepared, but I intend to in the next six months	1–5	
		P2	I have not yet prepared, but I intend to in the next month	1–5	
		P3	I just recently began preparing	1–5	
		P4	I have been prepared for at least the past six months	1–5	
		P5	I am not planning to do anything about preparing.	1–5	Reverse coded
		S1	Supplies set aside at home	Yes/No	
		S2	Supplies set aside at office	Yes/No	
		S3	Update supplies regularly	Yes/No	
		PRP	One out of P1-P5 + One out of S1–S3	Yes/No	
Disability	Disability types (DIS)	D0	No conditions	Yes/No	
		D1	Hearing	Yes/No	
		D2	Vision	Yes/No	
		D3	Cognitive	Yes/No	
		D4	Ambulatory	Yes/No	
		D5	Self-care	Yes/No	
		D6	Independent Living	Yes/No	
		D7	Multi-conditions	Yes/No	

Concept	Variable	Code	Constructs	Scale	Remark
Health	Health conditions (HTH)	H1	Poor	1	
		H2	Fair	2	
		H3	Good	3	
		H4	Very good	4	
		H5	Excellent	5	
Medical Special Needs	MSN (MSN)	M0	No special needs: no medical needs and no required assistance	Yes/No	
		M1	Level 0: no medical needs, but require transportation assistance for evacuation	Yes/No	
		M2	Level 1: dependent on others for routine care (eating, walking, toileting, etc.) and children under 18 without adult supervision	Yes/No	
		M3	Level 2: physical or developmental disabilities, such as blindness, significant hearing impairment, amputation, deafness, and mental retardation	Yes/No	
		M4	Level 3: require assistance with medical care administration, monitoring by nurse, dependent on equipment, assistance with medications, and mental health disorders	Yes/No	
		M5	Level 4: persons outside an institutional facility care setting, who require extensive medical oversight (i.e., IV, chemotherapy, life support equipment, morbidly obese)	Yes/No	
		M6	Don't know/Would rather not say		
Demographics	Age (AGE)	AG_P1	18–25	Yes/No	
		AG_P2	26–35	Yes/No	
		AG_P3	36–45	Yes/No	
		AG_P4	46–60	Yes/No	
		AG_P5	60 or older	Yes/No	
	Gender (GND)	M	Male	Yes/No	
		F	Female	Yes/No	
		O	Others	Yes/No	
	Income (INC)	INC1	Less than $25,000	Yes/No	
		INC2	$25,000 to less than $50,000	Yes/No	
		INC3	$50,000 to less than $75,000	Yes/No	
		INC4	$75,000 or more	Yes/No	
		INC5	Don't know/Would rather not say	Yes/No	

Table 1. *Cont.*

Concept	Variable	Code	Constructs	Scale	Remark
	Education (EDU)	EDU1	No Diploma	Yes/No	
		EDU2	High School Graduate or GED	Yes/No	
		EDU3	Some College but No Degree	Yes/No	
		EDU4	Associate Degree	Yes/No	
		EDU5	Bachelor's Degree	Yes/No	
	Race (RAC)	RAC1	White	Yes/No	
		RAC2	Others	Yes/No	
	Ethnicity (ETN)	ENT1	Hispanic/Latino/Spanish origin	Yes/No	
		ENT2	Others	Yes/No	

The measurement of threat appraisal consists of three variables: perceived severity (TA1), which assesses the perceived severity of a natural disaster if it were to occur in the respondent's community; disaster experience (TA2), which gauges whether personal experience with disasters prompts thoughts about preparedness; and occurrence (TA3), which evaluates the belief that some type of natural disaster will happen in the respondent's community. To obtain an overall score for threat appraisal, the scores from these three variables (TA1, TA2, and TA3) are summed together. Similarly, coping appraisal is measured using three variables: response costs (CA1), which examines the perception of preparing as too expensive; self-efficacy (CA2), which measures confidence in one's ability to know what to do in a weather emergency; and response efficacy (CA3), which assesses the belief that preparing for a weather event will make a difference in handling the situation. The scores from these three items (CA1 to CA3) are summed up to derive an overall score (COPE) for coping appraisal, as shown in Table 1.

The control variables in the study include age, education, income, gender (1 = female, 2 = male, 3 = other), race (1 = white, 0 = others), Hispanic ethnicity (1 = Hispanic, 0 = others), disability types (0 = No Condition, 1 = Hearing, 2 = Vision, 3 = Cognitive, 4 = Ambulatory, 5 = Self-Care, 6 = Independent, 7 = Multi-condition), and medical special needs. Medical special needs are categorized as 1 = no special needs: no medical needs and no required assistance, 2 = Level 0: no medical needs but require transportation assistance for evacuation, 3 = Level 1: dependent on others for routine care and unsupervised children under 18, 4 = Level 2: physical or developmental disabilities, 5 = Level 3: require assistance with medical care administration and mental health disorders, 6 = Level 4: require extensive medical oversight, 7 = Don't know/Would rather not say. The participants also rate their perceived health conditions on a five-point scale, ranging from 1 (poor) to 5 (excellent). The severity of anticipated disasters and the likelihood of impact are recorded by considering answers of 4 or 5 as "1 = yes," and 1, 2, or 3 as "0 = no" (Table 1).

3.3. Generalized Structural Equation Modeling (GSEM)

In this study, generalized structural equation modeling (GSEM) is utilized to investigate the factors identified in the proposed framework (Figure 1) that impact willingness to prepare for disasters and disaster preparedness. Generalized structural equation modeling (GSEM) combines the strengths of Structural Equation Modeling (SEM) and Generalized Linear Modeling (GLM) within a cohesive framework (Lombardi et al. 2017). It effectively addresses the constraint of SEM, which mandates normal distribution for all the variables. Consequently, GSEM is well-suited for models encompassing both continuous and discrete variables that are grouped together in a latent construct (Lombardi et al. 2017). GSEM has been utilized in studies that placed emphasis on willingness (Jafarabadi et al. 2018; Hashimoto et al. 2022).

4. Results

4.1. Bivariate Analysis

A bivariate analysis was performed using Pearson correlation tests to examine the relationships between the variables (Appendix A, Table A1). The results indicate that willingness to prepare for disasters is moderately correlated with both coping appraisal (r = 0.432, $p < 0.001$) and threat appraisal (r = 0.123, $p < 0.001$). On the other hand, preparedness for disasters is correlated with coping appraisal (r = 0.317, $p < 0.001$) and threat appraisal (r = 0.157, $p < 0.001$) (Appendix A, Table A1). The correlations among other study variables were also examined and no correlation value exceeded an acceptable threshold.

4.2. Generalized Structural Equation Modeling Results

In Figure 2, a conceptual framework with hypotheses is depicted, and these hypotheses are examined using GSEM. Significant associations are represented by bold solid lines, while insignificant associations are indicated by dotted lines.
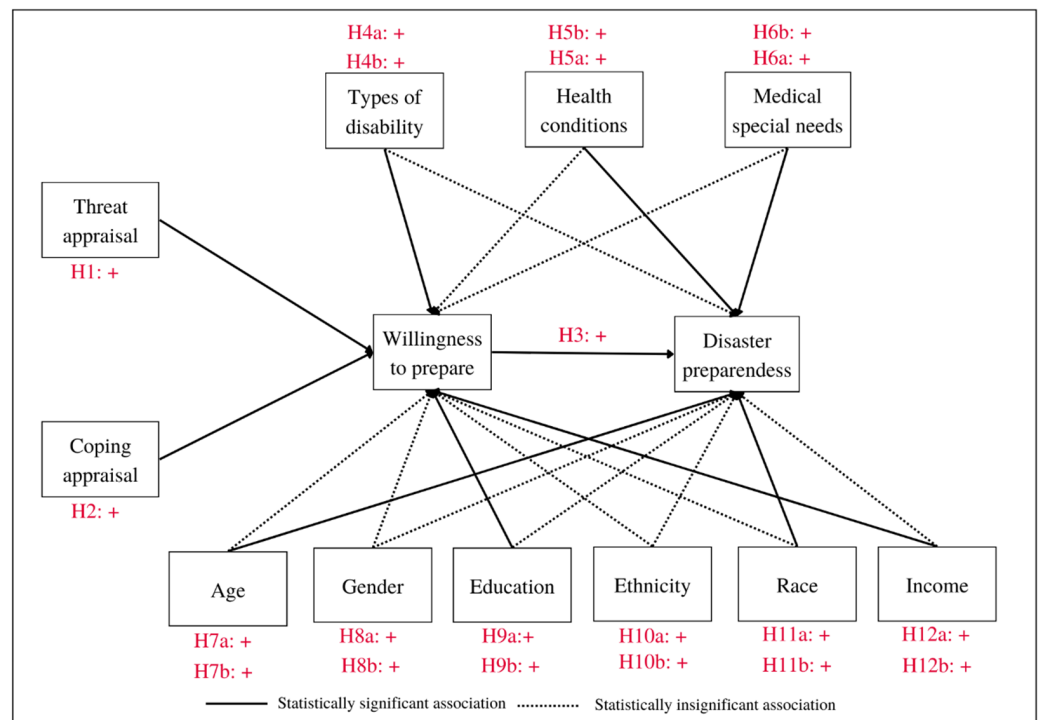
Figure 2. Shows hypothesized relationships among study variables and their statistical significance.

Appendix A, Table A2 displays the outcomes of the GSEM model, which includes two dependent variables: willingness to prepare and disaster preparedness. The model comprises six equations, as follows:

$$\text{WILL} = \beta + \beta1 \text{ THA} + \beta2 \text{ COPE}$$

$$i.\text{PRP} = \beta + \beta1 \text{ WILL}$$

$$\text{WILL} = \beta + \beta1 \text{ i.AGE} + \beta2 \text{ i.GND} + \beta3 \text{ i.EDU} + \beta4 \text{ i.INC} + \beta5 \text{ i.RAC} + \beta6 \text{ i.ETN}$$

$$i.\text{PRP } \beta = \beta1 \text{ i.AGE} + \beta2 \text{ i.GND} + \beta3 \text{ i.EDU} + \beta4 \text{ i.INC} + \beta5 \text{ i.RAC} + \beta6 \text{ i.ETN}$$

$$\text{WILL} = \beta + \beta1 \text{ i.MSN} + \beta2 \text{ i.HTH} + \beta3 \text{ i.DIS}$$

$$i.\text{PRP} = \beta + \beta1 \text{ i.MSN} + \beta2 \text{ i.HTH} + \beta3 \text{ i.DIS}$$

The association between threat appraisal and coping appraisal with the willingness to prepare is statistically significant. Threat appraisal demonstrates a significant association ($\beta = 0.219$, $z = -4.3$, $p < 0.001$) with the willingness to prepare for disasters (Table 2). Similarly, coping appraisal also shows a significant association ($\beta = 0.458$, $z = -8.27$, $p < 0.001$) with the willingness to prepare for disasters. Additionally, the willingness to prepare for disasters predicts a significant association ($\beta = 0.213$, $z = -3.67$, $p < 0.001$) with disaster preparedness (Table 2). The results for other study variables can be found in Appendix A, Table A2. It is noted that the GSEM method only provides non-standardized coefficients (Landry et al. 2011).

Table 2. Results from generalized structural equation modeling analysis.

Dependent Variables	Willingness to Prepare		Disaster Preparedness	
	Coefficient	z	Coefficient	z
Willingness <-				
Threat appraisal	0.219 ***	−4.3		
Coping appraisal	0.458 ***	−8.27		
Preparedness <-				
Willingness			0.213 ***	−3.67
Age (based group = 18–25)	0	(.)	0	(.)
26–35	−0.312	(−0.63)	−0.329	(−0.60)
36–45	−0.775	(−1.58)	−1.098 *	(−2.02)
46–60	0.303	−0.69	−0.181	(−0.38)
>60	0.0268	−0.06	−0.405	(−0.83)
Gender (base group = Male)	0	(.)	0	(.)
Female	−0.178	(−0.73)	0.0781	−0.28
Others	0.0709	−0.06	−0.604	(−0.48)
Education (base group = No Diploma)	0	(.)	0	(.)
High School Graduate or GED	0.195	−0.53	−0.0389	(−0.09)
Some College but No Degree	1.143 **	−2.81	0.408	−0.92
Associate Degree	0.682	−1.44	−0.768	(−1.46)
Bachelor's Degree	1.990 ***	−4.41	0.878	−1.73
Income (base group = Less than $25,000)	0	(.)	0	(.)
$25,000 to less than $50,000	0.248	−0.75	0.436	−1.19
$50,000 to less than $75,000	0.993 *	−2.15	0.649	−1.24
$75,000 or more	−0.698	(−0.83)	1.262	−0.98
Don't know/Would rather not say	0.00784	−0.02	−0.714	(−1.82)
Race (base group = Others)	0	(.)	0	(.)
White	0.105	−0.35	−1.308 ***	(−3.73)
Ethnicity (base group = Others)	0	(.)	0	(.)
Hispanic/Latino/Spanish origin	0.456	−1.16	−0.21	(−0.48)
MSN# (Level 0; base group = no special needs)	0	(.)	0	(.)
Level 1	−0.473	(−1.01)	−1.368 *	(−2.40)
Level 2	0.0109	−0.02	−0.821	(−1.47)
Level 3	−0.262	(−0.64)	−1.481 **	(−3.09)
Level 4	0.231	−0.38	−0.479	(−0.67)
Level 5	−0.842	(−0.97)	−0.843	(−0.84)
Don't know/Would rather not say	0.481	−0.84	−0.269	(−0.43)
Health condition (base group = Poor)	0	(.)	0	(.)
Fair	0.186	−0.44	1.078 *	−2.09
Good	0.632	−1.35	1.698 **	−2.94
Very good	0.326	−0.59	0.892	−1.37
Excellent	0.328	−0.5	1.096	−1.41
Disability (base group = No conditions)	0	(.)	0	(.)
Hearing	1.359 **	−3.24	−0.408	(−0.84)
Vision	−0.127	(−0.30)	−0.112	(−0.24)
Cognitive	0.554	−1.25	−0.74	(−1.42)
Ambulatory	0.762	−1.72	−0.349	(−0.70)
Self-care	0.399	−0.61	−0.142	(−0.19)
Independent Living	0.575	−0.73	−1.907	(−1.85)
Multi-conditions	0.940 *	−2.01	0.548	−1.04
Constant	7.445 ***	−7.28	−2.277	(−1.92)
var (e.WILL)	4.547			
N	339			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Testing for model fitness yielded an AIC of 1966.75 (df = 72) and a BIC of 2242.22 (df = 72). The causal relationships among study variables and the values of direct, indirect, and total effects are presented in Appendix A, Table A2. The threat appraisal has a total effect of β = 0.219, $p < 0.001$ on the willingness to prepare for disasters, while the coping appraisal has a total effect of β = 0.458, $p < 0.001$ on the willingness to prepare for disasters (Table 2 and Appendix A, Table A2).

5. Discussion

Disaster preparedness is a fundamental component of the disaster management process, playing a critical role in mitigating disaster risks and promoting resilience. The key to effective disaster preparedness starts with individuals. The study reveals that threat appraisal directly and significantly influences (β = 0.219, z = −4.3, $p < 0.001$) individuals' willingness to prepare for disasters. This finding underscores the significance of comprehending the potential impacts of disaster risks, emphasizing the importance of understanding localized risk information, exposure, and potential hazards in fostering relevant threat appraisal. Recognizing and addressing these factors is essential for enhancing individuals' readiness and willingness to engage in disaster preparedness efforts.

Likewise, the coping appraisal assesses the effectiveness of disaster preparedness in making a difference when responding to disasters. The study's results indicate a significant association (β = 0.458, z = −8.27, $p < 0.001$) between coping appraisal and the willingness to prepare for disasters. These findings underscore the importance of individuals recognizing the efficacy of disaster preparedness and its associated advantages. When individuals possess a positive coping appraisal, they exhibit a greater willingness to engage in disaster preparedness activities.

Another significant finding from the study is that individual willingness (β = 0.213, z = −3.67, $p < 0.001$) predicts disaster preparedness. This finding emphasizes the importance of individuals' readiness and willingness to prepare for disasters. It implies that simply providing information about disaster preparedness is not enough. The information should encompass two crucial aspects: localized threat appraisal of disaster risks and their impacts, and tailored coping efficacy based on localized risk information. To effectively promote disaster preparedness, it is essential to address both these factors in the information and education efforts.

Additional findings indicate that certain demographic factors have a significant impact on disaster preparedness. Specifically, age groups (36–45) (β = −1.098, z = −2.02, $p < 0.05$) show a notable association with disaster preparedness compared to the reference group of individuals aged 18–25. This underscores the need for increased efforts to enhance willingness and preparedness among vulnerable population groups, including seniors and youths, considering their unique needs and characteristics.

Moreover, levels of educational attainment also play a role in the willingness to prepare for disasters. Some college education, but no degree (β = 1.143, z = −2.81, $p < 0.01$), and a bachelor's degree (β = 1.990, z = −4.41, $p < 0.001$) have positive effects on willingness to prepare. Similarly, middle-income earners in the range of $50,000 to less than $75,000 (β = 0.993, z = −2.15, $p < 0.05$) demonstrate a significant effect on willingness to prepare for disasters. Health status is also linked to disaster preparedness. Individuals with fair health (β = −1.078, z = −2.09, $p < 0.05$) and good health (β = 1.698, z = −2.94, $p < 0.01$) exhibit a significant association with disaster preparedness. Furthermore, respondents with Level 1 MSN (β = −1.368, z = −2.40, $p < 0.05$) and Level 3 MSN (β = −1.481, z = −3.09, $p < 0.05$) are less prepared, compared to the reference group with no medical special needs. These findings emphasize the need to provide vulnerable groups with low socioeconomic status with the necessary educational information and resources to enhance their willingness and increase disaster preparedness.

In terms of disaster preparedness, the results of this study indicated that 43% (161) of the total of 377 respondents demonstrated preparedness for disasters, surpassing the findings of other studies focusing on individuals with disabilities. For example, a nation-

wide survey titled "Preparedness for Natural Disasters Among Older US Adults" revealed that only 34% of older adults with disabilities participated in educational programs related to disaster preparedness (Al-Rousan et al. 2014). It is important to note that this variation can be attributed to the age group targeted in the previous study (individuals aged 50 years or older), as well as the socioeconomic challenges faced by many elderly individuals with disabilities, who often lack sufficient resources to adequately prepare for disasters (Al-Rousan et al. 2014). Another study, which conducted a comprehensive review of emergency and disaster preparedness among children, youth, caregivers, and service providers with disabilities and/or chronic conditions, found that 43% of the participants had implemented preparedness measures that could sustain them for at least 72 h (Lindsay and Hsu 2023).

Studies have focused on the willingness to examine various aspects of disaster management, including the willingness to pay for risk reduction (Landry et al. 2011), willingness to cope with impending disasters (De Dominicis et al. 2014), willingness to follow evacuation instructions (FEMA 2022), willingness to participate in disaster preparedness, health professionals' willingness to work during disasters (Brice et al. 2017; Sultan et al. 2020), and willingness to volunteer (Byrne et al. 2021). These studies consistently demonstrate the significant influence of willingness on individuals' engagement in intended disaster-related activities. The findings of this study revealed a similar pattern. In general, individuals are more likely to exhibit a willingness to prepare for disasters when they have a clear understanding of the threats and potential impacts they may face. Moreover, possessing a genuine comprehension of the effectiveness of coping strategies enhances their willingness to engage in disaster preparedness activities. The presence of willingness among individuals plays a crucial role in encouraging their active participation and involvement in various disaster-preparedness initiatives.

Last, but not least, the composition of the study's population in the RGV is an important aspect that merits discussion. With a predominantly Hispanic population of 92%, and approximately 30% living below the poverty line (U.S. Census Bureau 2023), the region faces significant socioeconomic challenges. Additionally, the RGV has a history of being severely impacted by various natural disasters, such as hurricanes, storms, inland flooding, flash flooding, and storm surges (NWS 2021). Given its vulnerable geographic location, the population in this area is particularly prone to the adverse effects of natural disasters. Moreover, their susceptibility is further heightened by the high levels of poverty, as poverty plays a crucial role in increasing people's vulnerability to disasters (Hallegatte et al. 2020).

6. Conclusions

Disaster preparedness has emerged as a key focus for various stakeholders in emergency management, including practitioners, researchers, and academics. Despite considerable efforts to enhance disaster preparedness at a national level, the overall preparedness level remains alarmingly low (FEMA 2022; Kyne et al. 2020; The White House 2011, 2023). To address this issue, the present study applies the PMT and the PWM to examine the factors influencing disaster preparedness and willingness to prepare for disasters. Utilizing data from 377 observations gathered through an online survey instrument, the findings highlight the significant and profound effects of coping appraisal and threat appraisal on individuals' willingness to prepare for disasters, consequently positively impacting disaster preparedness. The conceptual framework developed in this study has the potential for extension to investigate the willingness for disaster preparedness in different geographical areas worldwide. Recognizing the vital role of disaster preparedness in building resilience, it is crucial to acknowledge the critical component of willingness to prepare for disasters and its significant contribution to overall preparedness efforts for future extreme events.

The findings of this study make a significant contribution to the existing knowledge of disaster preparedness. The proposed framework of willingness to disaster preparedness provides a comprehensive understanding of individuals' willingness to prepare for disasters and its profound impact on disaster preparedness. By examining the crucial components of threat appraisals and coping appraisals, this study sheds light on the factors

that influence individuals' readiness to engage in disaster preparedness activities. Numerous studies have emphasized the importance of disaster preparedness for communities to achieve resilience and effectively respond to and recover from disasters. The conceptual framework employed in this study serves as a foundation for further exploration of willingness to prepare for disasters among diverse populations in various geographical regions.

However, it is important to note that the generalizability of the findings is limited, as the study specifically focuses on a particular population group living with disabilities and medical special needs in the RGV. Additionally, the study adopts convenience sampling methods. Future studies should target other population groups and consider incorporating focus group interviews to complement the quantitative findings and provide a more comprehensive understanding of disaster preparedness.

Appendix A

Table A1. Pearson correlations among study variables.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Threat Appraisal	1												
2	Coping Appraisal	0.123 **	1											
3	Willingness	0.283 ***	0.432 ***	1										
4	Preparedness	0.157 ***	0.317 ***	0.262 ***	1									
5	Age Group	−0.029	−0.096 *	−0.056	−0.046	1								
6	Gender	0.017	0.005	0.026	0.035	0.055	1							
7	Education	0.204 ***	0.262 ***	0.350 ***	0.217 ***	−0.219 ***	0.038	1						
8	Income	0.028	0.011	0.033	−0.08	−0.062	0.057	0.135 ***	1					
9	Race	0.038	−0.081	−0.027	−0.224 ***	−0.110 **	−0.036	−0.011	0.209 ***	1				
10	Ethnicity	0.022	−0.051	0.005	−0.009	0.008	−0.071	−0.082	−0.097 *	0.026	1			
11	MSN #	−0.04	−0.140 ***	−0.101 *	−0.172 ***	0.154 ***	0.001	−0.146 ***	0.115 **	0.143 ***	−0.036	1		
12	Health	0.08	0.246 ***	0.176 ***	0.184 ***	−0.367 ***	0.04	0.349 ***	0.115 **	0.031	−0.068	−0.395 ***	1	
13	Disability types	−0.071	−0.062	−0.02	−0.003	0.082	0.02	−0.108 **	−0.197 ***	−0.265 ***	0.017	0.192 ***	−0.345 ***	1

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. # Medical Special Needs.

Table A2. Direct, indirect, and total effects.

			Willingness to Prepare									Disaster Preparedness					
			Direct Effect	*p*-Value	Indirect Effect	*p*-Value	Total Effect	*p*-Value				Direct Effect	*p*-Value	Indirect Effect	*p*-Value	Total Effect	*p*-Value
1	THA	→	WILL	0.219	0.000	-	-	0.219	0.000	THA	→	PRP			0.466	0.005	0.466	0.005
2	COPE	→	WILL	0.458	0.000	-	-	0.458	0.000	COPE	→	PRP			0.976	0.001	0.976	0.001
3										WILL	→	PRP	0.213	0.000			0.213	0.000
4	AG_P2	→	WILL	−0.312	0.529	-	-	−0.312	0.529	AG_P2	→	PRP	−0.329	0.546	−0.066	0.535	−0.395	0.477
5	AG_P3	→	WILL	−0.775	0.114	-	-	−0.775	0.114	AG_P3	→	PRP	−1.098	0.044	−0.165	0.146	−1.263	0.023
6	AG_P4	→	WILL	0.303	0.490	-	-	0.303	0.490	AG_P4	→	PRP	−0.181	0.703	0.064	0.498	−0.116	0.810
7	AG_P5	→	WILL	0.027	0.952	-	-	0.027	0.952	AG_P5	→	PRP	−0.405	0.407	0.006	0.952	−0.399	0.422
8	F	→	WILL	−0.178	0.463	-	-	−0.178	0.463	F	→	PRP	0.781	0.779	−0.038	0.472	0.094	0.779
9	O	→	WILL	0.071	0.951	-	-	0.071	0.951	O	→	PRP	−0.604	0.632	0.015	0.951	−0.733	0.632
10	EDU2	→	WILL	0.195	0.594	-	-	0.195	0.594	EDU2	→	PRP	0.039	0.925	0.042	0.598	0.002	0.995
11	EDU3	→	WILL	1.143	0.005	-	-	1.143	0.005	EDU3	→	PRP	0.408	0.357	0.243	0.026	0.651	0.144

Table A2. *Cont.*

				Willingness to Prepare										Disaster Preparedness					
				Direct Effect	*p*-Value	Indirect Effect	*p*-Value	Total Effect	*p*-Value				Direct Effect	*p*-Value	Indirect Effect	*p*-Value	Total Effect	*p*-Value	
12	EDU4	→	WILL	0.682	0.149	-	-	0.682	0.149	EDU4	→	PRP	−0.767	0.144	0.145	0.179	−0.622	0.241	
13	EDU5	→	WILL	1.990	0.000	-	-	1.990	0.000	EDU5	→	PRP	0.878	0.840	0.424	0.005	1.301	0.009	
14	INC2	→	WILL	0.248	0.451	-	-	0.248	0.451	INC2	→	PRP	0.436	0.236	0.052	0.461	0.488	0.191	
15	INC3	→	WILL	0.992	0.031	-	-	0.992	0.310	INC3	→	PRP	0.649	0.213	0.211	0.063	0.860	0.101	
16	INC4	→	WILL	−0.698	0.408	-	-	−0.698	0.408	INC4	→	PRP	1.262	0.329	−0.148	0.420	1.113	0.393	
17	INC5	→	WILL	0.008	0.981	-	-	0.008	0.981	INC5	→	PRP	−0.714	0.680	0.002	0.981	−0.712	0.073	
18	RAC1	→	WILL	0.105	0.726	-	-	0.105	0.726	RAC1	→	PRP	−1.307	0.000	0.022	0.727	−1.285	0.000	
19	ENT1	→	WILL	0.456	0.246	-	-	0.456	0.246	ENT1	→	PRP	−0.210	0.630	0.097	0.268	−0.113	0.798	
20	M1	→	WILL	−0.473	0.314	-	-	−0.473	0.314	M1	→	PRP	−1.368	0.017	−0.291	0.042	−1.659	0.017	
21	M2	→	WILL	0.011	0.982	-	-	0.011	0.982	M2	→	PRP	−0.821	0.140	−0.174	0.169	−0.995	0.141	
22	M3	→	WILL	−0.262	0.525	-	-	−0.262	0.525	M3	→	PRP	−1.481	0.002	−0.315	0.019	−1.796	0.002	
23	M4	→	WILL	0.231	0.707	-	-	0.231	0.707	M4	→	PRP	−0.479	0.500	−0.102	0.507	−0.581	0.500	
24	M5	→	WILL	−0.842	0.332	-	-	−0.842	0.332	M5	→	PRP	−0.843	0.400	−0.179	0.406	−1.023	0.399	
25	M6	→	WILL	0.481	0.400	-	-	0.481	0.400	M6	→	PRP	−0.269	0.665	−0.057	0.668	−0.326	0.665	
26	H2	→	WILL	0.186	0.663	-	-	0.186	0.663	H2	→	PRP	1.078	0.037	0.229	0.071	1.308	0.038	
27	H3	→	WILL	0.632	0.177	-	-	0.632	0.177	H3	→	PRP	1.698	0.003	0.361	0.021	2.059	0.004	
28	H4	→	WILL	0.326	0.552	-	-	0.326	0.552	H4	→	PRP	0.891	0.170	0.189	0.198	1.081	0.170	
29	H5	→	WILL	0.328	0.620	-	-	0.328	0.620	H5	→	PRP	1.095	0.157	0.233	0.187	1.329	0.158	
30	D1	→	WILL	1.359	0.001	-	-	1.359	0.001	D1	→	PRP	−0.408	0.399	−0.086	0.426	−0.495	0.403	
31	D2	→	WILL	−0.127	0.765	-	-	−0.127	0.765	D2	→	PRP	−0.112	0.814	−0.024	0.814	−0.136	0.081	
32	D3	→	WILL	0.554	0.212	-	-	0.554	0.212	D3	→	PRP	−0.740	0.154	−0.157	0.195	−0.897	0.158	
33	D4	→	WILL	0.762	0.086	-	-	0.762	0.086	D4	→	PRP	−0.349	0.484	−0.744	0.500	−0.424	0.486	
34	D5	→	WILL	0.399	0.545	-	-	0.399	0.545	D5	→	PRP	−0.141	0.846	−0.030	0.847	−0.172	0.847	
35	D6	→	WILL	0.575	0.465	-	-	0.575	0.465	D6	→	PRP	−1.906	0.065	−0.406	0.107	−2.312	0.067	
36	D7	→	WILL	0.940	0.044	-	-	0.940	0.044	D7	→	PRP	0.547	0.296	0.116	0.304	0.664	0.295	

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