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Original Article

SEM of Disaster Preparedness, Resiliency, Risk Perception, Protective Behavior, and Social Media Use

Jayson U. Gerona, *Nestor C. Nabe*

Author Information:

University of Mindanao, Davao City, Davao del Sur, Philippines

Correspondence:
jaysongerona00@gmail.com

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Abstract. This study aimed to develop and test a structural equation model (SEM) to explain community disaster preparedness and resilience, based on disaster risk perception, protective behavior against natural calamities, and the use of social media for disaster management, addressing the limited empirical research that integrates these factors within a single analytical framework. A quantitative, descriptive-correlational design was employed, involving 400 adult respondents from the Caraga Region, Philippines, using validated survey instruments. Results revealed high levels of disaster risk awareness, protective behavior, social media engagement, and community resilience. Correlation and regression analyses showed that disaster risk perception and protective behavior were the strongest predictors of community preparedness and resilience. At the same time, social media use played a supportive but significant role. Structural equation modeling identified the best-fitting model with acceptable goodness-of-fit indices, confirming the interrelated influence of cognitive, behavioral, and communication factors on disaster readiness. The findings provide empirical support for integrating Protection Motivation Theory and the Theory of Planned Behavior in disaster risk reduction planning. Overall, the study offers practical, policy-relevant insights for strengthening community-based disaster preparedness and supports the advancement of sustainable, resilient communities in line with Sustainable Development Goal 11.

Keywords: *Disaster risk perception; Protective behavior; Social media in disaster management; Community disaster preparedness; Happy Structural Equation Modeling.*

Community disaster preparedness and resiliency have emerged as critical priorities in the face of increasingly frequent and severe natural calamities. Despite sustained awareness campaigns and disaster education efforts, many communities remain inadequately prepared to respond to and recover from hazards such as typhoons, earthquakes, floods, and volcanic eruptions. This persistent gap between awareness and action highlights a central problem in disaster risk reduction: communities may recognize disaster risks, yet this awareness does not consistently translate into effective preparedness and resilient behavior. As a result, existing disaster interventions often lack an integrated approach that explains how awareness, behavior, and communication jointly influence community readiness.

Disaster risk perception is widely recognized as a key determinant of preparedness, as individuals who understand the likelihood and consequences of hazards are more inclined to consider mitigation and preparedness measures (Slovic, 1987). However, empirical findings reveal inconsistencies: some communities demonstrate high levels of risk awareness but limited preparedness actions (Wachinger et al., 2013). For example,

residents in hazard-prone areas may acknowledge disaster risks but fail to prepare due to limited resources, competing priorities, or insufficient guidance. These observations suggest that while risk perception initiates concern, it alone may be insufficient to drive sustained preparedness behaviors.

Protective behavior in response to natural disasters is the behavioral response that translates risk perception into action. Such behaviors include preparing emergency supplies, participating in evacuation drills, and complying with disaster warnings. Research indicates that communities that exhibit consistent protective behaviors tend to demonstrate higher levels of disaster resilience (Paton, 2019). However, protective behavior is influenced by various constraints, including access to information, socioeconomic conditions, and institutional support. Even when individuals recognize disaster risks, misinformation or limited disaster education can hinder the adoption of appropriate protective measures (Hansson et al., 2020). These findings highlight the need to examine how protective behavior interacts with other enabling factors in strengthening community preparedness.

The increasing use of social media in disaster management adds an important communication dimension to disaster preparedness. Social media platforms serve as rapid channels for disseminating early warnings, advisories, and real-time updates, while also enabling community members to share localized information and coordinate responses. Studies have shown that social media engagement can enhance situational awareness, encourage participation, and support collective preparedness efforts (Dargin et al., 2021; Fathi & Fiedrich, 2022). However, concerns persist regarding misinformation, information overload, and unequal access to digital platforms, which may undermine effective disaster communication (Muhamad & Merle, 2021). These mixed findings suggest that social media can either strengthen or weaken preparedness, depending on how it interacts with risk perception and protective behavior.

While prior studies have examined disaster risk perception, protective behavior for natural disasters, and social media use independently, limited empirical research has examined their simultaneous and interdependent effects on community disaster preparedness and resiliency within a single structural model. This gap restricts theoretical advancement by treating these constructs as isolated predictors rather than interconnected processes, and it limits practical application by encouraging fragmented disaster interventions. An integrated analytical framework is therefore necessary to better explain how awareness leads to action and how communication channels shape this process. Thus, the purpose of this study is to develop and test a structural equation model that explains community disaster preparedness and resiliency in terms of disaster risk perception, protective behavior during natural calamities, and the use of social media for disaster management. By integrating psychosocial and communication variables within a unified model, this study advances theoretical understanding of community disaster preparedness. It provides evidence-based insights for disaster risk reduction planning, public information strategies, and community-level resilience initiatives.

Methodology

Research Design

This study employed a quantitative, descriptive-correlational research design to examine the relationships among disaster risk perception, protective behavior for natural calamities, social media use for disaster management, and community disaster preparedness and resiliency. This design was deemed appropriate because the study sought to explain the strength, direction, and predictive relationships among multiple latent constructs rather than to establish causal effects through experimental manipulation. Structural Equation Modeling (SEM) was explicitly adopted as the primary analytical approach to test the hypothesized relationships and identify the most parsimonious, theoretically sound model. SEM is particularly suitable for this study because it allows the simultaneous examination of complex relationships among observed and latent variables while accounting for measurement error (Hidayat & Wulandari, 2022). Given the adequate sample size of 400 respondents and the theory-driven nature of the proposed model, SEM provided a robust framework for theory testing and model validation. Model modifications, when necessary, were guided by theoretical justification and supported by goodness-of-fit indices rather than exploratory data-driven adjustments, ensuring the integrity and validity of the final model (Afthanorhan et al., 2015).

Research Participants

The study involved adult residents of the Caraga Region, with an estimated adult population of 1,887,606. Using the Raosoft Sample Size Calculator, a target sample of 400 respondents was determined at a 95% confidence level and a ±5% margin of error. A stratified random sampling technique was employed to ensure adequate

representation across the region. Stratification was based on provincial location and community classification to capture variations in disaster exposure and preparedness experiences. Lists of eligible participants were obtained from local government unit records and community databases and were validated through coordination with barangay officials and community leaders. Inclusion criteria required respondents to be at least 18 years old, have resided in the area for a minimum of one year, have experienced natural disasters, use social media for disaster-related information, and participate in community preparedness activities. Individuals unable to provide informed consent were excluded. Within each stratum, simple random sampling was applied to ensure equal selection probability. After data screening and cleaning, a final sample size of 400 respondents was retained for analysis, ensuring transparency and statistical adequacy.

Research Instrument

The study used a structured questionnaire comprising four sections, adapted from established instruments and modified to ensure relevance and construct equivalence within the local context. Content validity was established through expert evaluation by subject-matter specialists in disaster management and social research. In contrast, construct validity was assessed via confirmatory factor analysis within the SEM. Internal consistency reliability was assessed using Cronbach's Alpha, and all scales demonstrated acceptable coefficients.

The first section measured Disaster Risk Perception using indicators of response efficacy, probability, threat, and self-efficacy adapted from Xue et al. (2021). The second section assessed Protective Behavior for Natural Calamities, adapted from Gumasing and Sobrevilla (2023), covering perceived severity, vulnerability, self-efficacy, response efficacy, response cost, attitude, subjective norms, perceived behavioral control, behavioral intention, ergonomic appraisals, and protective behaviors. The third section measured the use of social media for disaster management based on the framework of Ngamassi et al. (2016), focusing on capacity, effort, task complexity, and willingness to use social media. The fourth section assessed community disaster resilience using the instrument developed by Deng et al. (2022), which included infrastructure, governance, community capacity, community capital, and community intelligence. All items were rated using a five-point Likert scale, with the following descriptive equivalents: 4.20–5.00 (very high clarity), 3.40–4.19 (high clarity), 2.60–3.39 (moderate clarity), 1.80–2.59 (low clarity), and 1.00–1.79 (very low clarity).

Data Gathering Procedure

Data collection commenced after securing approval from the University of Mindanao Ethics Review Committee, the dean of the University of Mindanao Professional Schools, and the Office of the Governor of Region 13. Surveys were administered primarily through face-to-face distribution, with assistance provided to respondents when clarification was needed to ensure a consistent understanding of the questionnaire items. Coordination with local officials and community leaders facilitated systematic distribution and retrieval of questionnaires across the Caraga Region. Data collection was conducted in early 2025, as per the approved timeline. Completed questionnaires were screened for completeness, and invalid or incomplete responses were excluded prior to data encoding. Throughout the process, ethical standards were strictly observed, including voluntary participation, informed consent, and confidentiality of responses.

Data Analysis

Data analysis began with descriptive statistics, including the mean, to summarize levels of disaster risk perception, protective behavior, social media use for disaster management, and community disaster resilience. Pearson product-moment correlation analysis was conducted to determine the strength and direction of relationships among the study variables, followed by multiple regression analysis to assess their predictive influence. Structural Equation Modeling (SEM) was then employed, beginning with confirmatory factor analysis (CFA) to validate the measurement model, followed by evaluation of the structural model. Diagnostic procedures included assessment of normality, multicollinearity, and outliers prior to model estimation. Model fit was evaluated using standard thresholds: $\chi^2/df \leq 3.00$, RMSEA $\leq .08$, and CFI and GFI $\geq .90$. These criteria were used to determine the adequacy and acceptability of the final model in addressing the study objectives.

Ethical Considerations

The study strictly adhered to established ethical standards to protect the rights and welfare of all participants. Approval was obtained from the University of Mindanao Ethics Review Committee (Protocol No. UMERC-2025-304), the dean of the University of Mindanao Professional Schools, and relevant local authorities. Participation was voluntary, and respondents were informed of the study's purpose, procedures, estimated time commitment,

and their right to withdraw without penalty. Informed consent was secured prior to participation, and confidentiality was maintained by removing personal identifiers from all datasets. Data were stored in password-protected electronic files accessible only to the researcher. They will be retained for a specified period in accordance with institutional policy before being securely disposed of. The study posed no significant physical, psychological, or socioeconomic risks, and all data were used solely for academic and research purposes to enhance disaster preparedness and community resilience.

Results and Discussion

Disaster Risk Perception

Table 1 presents the data regarding the Level of Disaster Risk Perception.

Table 1. *Level of Disaster Risk Perception*

Indicators	Mean	SD	Descriptive level
Probability	4.12	0.582	High
Threat	4.21	0.581	Very High
Self-Efficacy	3.98	0.618	High
Response Efficacy	4.05	0.576	High
Disaster Risk Perception	4.09	0.463	High
Overall	**4.09**	**0.564**	**High**

The findings indicate that respondents generally exhibit a high level of disaster risk perception, suggesting strong cognitive awareness of the probability, threat, and efficacy of disaster responses. Threat perception emerged as the most salient dimension, reflecting widespread recognition of the seriousness and potential consequences of natural disasters. In contrast, self-efficacy, while still rated high, was comparatively lower, suggesting that confidence in personal disaster response capabilities may be lower than awareness of risk. This contrast highlights an important insight: high awareness does not automatically translate into confidence or readiness to act. In disaster-prone communities, repeated exposure to hazards may heighten perceived threat while simultaneously reinforcing feelings of dependence on external assistance. As argued by Seebauer and Babcicky (2020), risk perception motivates preparedness most effectively when individuals also believe they can perform protective actions. The consistently high ratings across indicators may also reflect a degree of social desirability or response bias, which is common in self-reported disaster preparedness surveys. Nonetheless, the pattern suggests a strong cognitive foundation upon which behavioral and institutional interventions may build.

Protective Behavior for Natural Calamities

Table 2 depicts the motivation level of Protective Behavior for Natural Calamities.

Table 2. *Level of Protective Behavior for Natural Calamity*

Indicators	Mean	SD	Descriptive Level
Understanding Natural Calamities	4.13	0.549	High
Geographical Perspective	4.25	0.603	Very High
Perceived Severity	4.34	0.495	Very High
Perceived Vulnerability	4.26	0.433	Very High
Self-Efficacy	4.20	0.569	Very High
Response Efficacy	4.31	0.504	Very High
Response Cost	4.32	0.545	Very High
Attitude	4.30	0.454	Very High
Subjective Norm	4.25	0.518	Very High
Behavioral Intention to Prepare for a Natural Calamity	4.06	0.614	High
Physical Ergonomic Appraisal	4.14	0.540	High
Macro-Ergonomic Appraisal	4.19	0.609	High
Cognitive Ergonomic Appraisal	4.14	0.554	High
Protective Behavior for Natural Calamity	4.18	0.544	High
Overall	**4.22**	**0.538**	**Very High**

Protective behavior indicators demonstrated very high overall levels, particularly in perceived severity, perceived vulnerability, response efficacy, and response cost. These findings suggest that respondents not only recognize disaster risks but also acknowledge the value of preparedness actions in reducing harm. However, behavioral intention to prepare, while still high, was comparatively lower than other cognitive indicators, indicating a potential gap between preparedness beliefs and sustained action. This disparity reinforces the well-documented

awareness–action gap in disaster research. Communities may possess strong knowledge and favorable attitudes toward preparedness, yet structural constraints, resource limitations, or competing priorities may inhibit consistent practice. Wong-Parodi et al. (2022) emphasized that protective behavior is most likely to occur when supportive social norms and accessible preparedness mechanisms reinforce perceived risk. The findings suggest that while protective behaviors are conceptually endorsed, continued emphasis on translating intention into habitual preparedness remains necessary.

Use of Social Media for Disaster Management

Table 3 illustrates the Level of Social Media Use for Disaster Management.

Table 3. *Level of Social Media Use for Disaster Management*

Indicators	Mean	SD	Descriptive Level
Ability	4.19	0.658	High
Effort	4.19	0.654	High
Task Difficulty	4.17	0.705	High
Intention to Use Social Media	4.13	0.743	High
Use of Social Media for Disaster Management	4.15	0.549	High
Overall	**4.15**	**0.662**	**High**

Results indicate that social media is widely perceived as a valuable and manageable tool for disaster-related communication. Respondents rated ability and effort particularly high, suggesting general digital competence and willingness to engage with online platforms during emergencies. Intention to use social media, although still high, showed slightly more variability, implying differences in trust, access, or perceived usefulness during actual disaster events. In disaster-prone settings, social media often supplements traditional communication systems, especially when official channels are disrupted. Lovari and Bowen (2020) noted that social media's effectiveness lies not only in speed but also in its capacity to foster peer-to-peer coordination. However, the uniformly high ratings may also indicate optimism bias regarding digital tools, underscoring the need for critical digital literacy to manage misinformation and information overload.

Community Disaster Preparedness and Resiliency

Table 4 illustrates the Level of Community Disaster Preparedness and Resiliency.

Table 4. *Level of Community Disaster Preparedness and Resiliency*

Indicators	Mean	SD	Interpretation
Infrastructure	4.25	0.639	Very High
Government Governance	4.21	0.574	Very High
Community Capacity	4.02	0.576	High
Community Capital	4.01	0.416	High
Community Intelligence	4.01	0.510	High
Community Disaster Preparedness and Resiliency	4.10	0.384	High
Overall	**4.10**	**0.517**	**High**

Communities demonstrated high levels of preparedness and resiliency, with infrastructure and governance emerging as the strongest dimensions. These findings suggest that institutional mechanisms and physical systems play a central role in community readiness. In contrast, community capacity, capital, and intelligence—while still rated high—were comparatively lower, indicating opportunities to strengthen social cohesion, shared knowledge, and local initiative. This pattern supports the argument of Ma, Qirui, and Lv (2023) that resilience extends beyond physical structures to include social relationships and collective learning. The results imply that while governance and infrastructure provide a strong foundation, long-term resilience depends on strengthening community-driven capacities that enable adaptive responses.

Correlation Between Disaster Risk Perception and Community Preparedness

Table 5 shows the relationship between disaster risk perception and community disaster preparedness and resilience. Correlation analysis revealed strong positive relationships between disaster risk perception and all dimensions of community preparedness and resiliency. Among the indicators, threat perception and self-efficacy showed powerful associations with infrastructure, governance, and community capacity.

Table 5. *The Relationship Between Disaster Risk Perception and Community Disaster Preparedness and Resilience*

Variable	Infrastructure	Government Governance	Community Capacity	Community Capital	Community Intelligence	Overall Mean	Decision of H0
Probability	0.637	0.742	0.867	0.711	0.709	**0.733**	**Rejected**
	0.026	0.041	0.039	0.042	0.039	**0.037**	
Threat	0.863	0.713	0.831	0.745	0.713	**0.773**	**Rejected**
	0.001	0.001	0.001	0.032	0.021	**0.011**	
Self-Efficacy	0.814	0.748	0.812	0.811	0.722	**0.781**	**Rejected**
	0.022	0.003	0.017	0.027	0.025	**0.019**	
Response Efficacy	0.781	0.728	0.796	0.779	0.788	**0.774**	**Rejected**
	0.045	0.011	0.001	0.015	0.048	**0.024**	
Overall Mean	**0.774**	**0.733**	**0.827**	**0.762**	**0.733**	**0.766**	**Rejected**
	0.024	**0.014**	**0.015**	**0.029**	**0.033**	**0.023**	

This suggests that individuals who recognize disaster threats and believe in their response capabilities are more likely to belong to communities with stronger preparedness systems. It is important to note that correlation does not imply causation; however, these findings indicate that cognitive factors are closely intertwined with collective preparedness outcomes. As emphasized by Lechowska (2018), heightened risk perception can encourage proactive engagement when supported by community-level structures and resources.

Correlation Between Protective Behavior for Natural Calamities and Community Disaster Preparedness

Table 6 illustrates the relationship between individuals' protective behaviors during natural disasters and various dimensions of community preparedness and resilience.

Table 6. *Correlation Between Protective Behavior for Natural Calamities and Community Disaster Preparedness and Resilience*

Variable	Infrastructure	Government Governance	Community Capacity	Community Capital	Community Intelligence	Overall Mean	Decision of H0
UNC	0.727	0.763	0.734	0.796	0.723	**0.749**	**Rejected**
	0.011	0.001	0.001	0.046	0.043	**0.020**	
GP	0.737	0.751	0.766	0.775	0.741	**0.754**	**Rejected**
	0.006	0.002	0.001	0.033	0.009	**0.010**	
PS	0.714	0.742	0.724	0.734	0.762	**0.735**	**Rejected**
	0.002	0.005	0.028	0.029	0.018	**0.016**	
PV	0.721	0.755	0.789	0.074	0.746	**0.617**	**Rejected**
	0.029	0.027	0.026	0.018	0.036	**0.027**	
SE	0.794	0.748	0.787	0.707	0.734	**0.754**	**Rejected**
	0.021	0.003	0.001	0.032	0.007	**0.013**	
RE	0.791	0.726	0.768	0.731	0.733	**0.750**	**Rejected**
	0.029	0.011	0.001	0.009	0.008	**0.012**	
RC	0.706	0.795	0.702	0.739	0.718	**0.732**	**Rejected**
	0.031	0.027	0.042	0.034	0.019	**0.031**	
ATT	0.721	0.759	0.737	0.737	0.757	**0.742**	**Rejected**
	0.023	0.001	0.006	0.046	0.027	**0.021**	
SN	0.797	0.789	0.722	0.758	0.705	**0.754**	**Rejected**
	0.023	0.027	0.001	0.002	0.027	**0.020**	
BC	0.719	0.759	0.705	0.766	0.765	**0.743**	**Rejected**
	0.027	0.038	0.035	0.019	0.015	**0.027**	
PNC	0.783	0.703	0.738	0.738	0.711	**0.735**	**Rejected**
	0.001	0.001	0.006	0.006	0.046	**0.012**	
PEA	0.794	0.796	0.735	0.743	0.717	**0.757**	**Rejected**
	0.001	0.001	0.042	0.026	0.019	**0.018**	
MEA	0.782	0.724	0.735	0.704	0.761	**0.741**	**Rejected**
	0.001	0.001	0.022	0.041	0.001	**0.013**	
CEA	0.732	0.736	0.702	0.727	0.728	**0.725**	**Rejected**
	0.001	0.001	0.015	0.022	0.010	**0.010**	
PBNC	0.775	0.774	0.786	0.721	0.715	**0.754**	**Rejected**
	0.001	0.001	0.028	0.041	0.003	**0.015**	
Overall Mean	**0.753**	**0.755**	**0.742**	**0.697**	**0.734**	**0.736**	**Rejected**
	0.014	**0.010**	**0.018**	**0.027**	**0.019**	**0.018**	

Legend: UNC - Understanding Natural Calamities, GP - Geographical Perspective, PS - Perceived Severity, PV - Perceived Vulnerability, SE - Self-Efficacy, RE - Response Efficacy, RC - Response Cost, ATT - Attitude, SN - Subjective Norm, BC - Behavioral Control, PNC - Prepare for a Natural Calamity, PEA - Physical Ergonomic Appraisal, MEA - Macro-Ergonomic Appraisal, CEA - Cognitive Ergonomic Appraisal, PBNC - Protective Behavior for Natural Calamity

Protective behavior exhibited robust correlations with all dimensions of community preparedness and resiliency. Socially oriented indicators, such as subjective norms and self-efficacy, demonstrated particularly strong

relationships with governance, infrastructure, and community capital. This pattern suggests that preparedness behaviors are reinforced within social and institutional contexts where preparedness is valued and supported. Some variability across indicators may reflect differences in how protective actions are practiced or supported at the community level. Overall, the findings reinforce the argument of Whittaker et al. (2020) that individual preparedness behaviors are deeply embedded in social environments and that fostering collective responsibility enhances resilience outcomes.

Correlation Between Use of Social Media for Disaster Management and Community Resilience

Table 7 presents the relationship between social media utilization for disaster management and the preparedness and resilience of communities.

Table 7. *Correlation Analysis Between Use of Social Media and Community Disaster Preparedness and Resiliency*

Variable	Infrastructure	Government Governance	Community Capacity	Community Capital	Community Intelligence	Overall Mean	Decision of H0
Ability	0.769	0.713	0.713	0.751	0.719	**0.733**	**Rejected**
	0.001	0.009	0.001	0.007	0.008	**0.005**	
Effort	0.743	0.717	0.723	0.703	0.748	**0.727**	**Rejected**
	0.037	0.023	0.014	0.026	0.037	**0.027**	
Task Difficulty	0.777	0.701	0.748	0.747	0.737	**0.742**	**Rejected**
	0.024	0.021	0.001	0.003	0.006	**0.011**	
Intention to Use Social Media	0.723	0.713	0.704	0.747	0.738	**0.725**	**Rejected**
	0.014	0.001	0.001	0.003	0.006	**0.005**	
Overall Mean	**0.753**	**0.711**	**0.722**	**0.737**	**0.736**	**0.732**	**Rejected**
	0.019	**0.014**	**0.004**	**0.010**	**0.014**	**0.012**	

Social media use showed consistent positive relationships with all components of community preparedness and resiliency. Task difficulty and ability demonstrated particularly strong associations with infrastructure and community intelligence, suggesting that digital competence enhances a community's capacity to coordinate, disseminate information, and respond efficiently during disasters. While these findings support the functional value of social media, they should be interpreted cautiously. Digital engagement enhances preparedness primarily when information is accurate, accessible, and actionable. Jaeger et al. (2007) emphasized that social media's effectiveness depends on users' ability to process and apply information, highlighting the importance of digital literacy within disaster preparedness strategies.

Influence of Disaster Risk Perception, Protective Behavior, and Social Media Use on Community Preparedness

Table 8 presents the regression analysis of how disaster risk perception, protective behaviors, and social media use influence community preparedness and resilience.

Table 8. *Test of Significant Influence of Predictors on Community Disaster Preparedness and Resiliency*

	B	SE	*B*	t	p
(Intercept)	3.329	0.284		11.724	0.001
Disaster Risk Perception	0.291	0.046	0.354	6.256	0.001
Protective Behavior for Natural Calamity	0.376	0.079	0.267	4.733	0.001
Use of Social Media for Disaster Management	0.089	0.037	0.128	2.396	0.017
R2=0.111					
Adj R2=0.104					
F-value=16.492					
p-value= 0.005					

Regression analysis demonstrated that disaster risk perception, protective behavior, and social media use significantly influence community disaster preparedness and resiliency. Protective behavior emerged as the strongest predictor, underscoring the central role of action-oriented preparedness in strengthening community readiness. Disaster risk perception followed closely, while social media use functioned as a complementary facilitator. Although the model explained a modest proportion of variance, this indicates that preparedness is a multifaceted phenomenon influenced by additional factors not included in the model, such as governance quality, prior disaster experience, and socioeconomic conditions. Coffé and Geys (2005) similarly emphasized that resilience emerges from the interaction of cognitive, behavioral, and contextual factors.

Summary of Goodness-of-Fit Measures of Generated Models

Table 9 summarizes the goodness-of-fit indices for five structural models examining the relationships among disaster risk perception, protective behavior, and social media use.

Table 9. *Goodness-of-Fit Measures of 5 Models*

Model	p-value >0.05	CMIN/DF (0<value<3)	CFI >0.95	NFI >0.95	TLI >0.95	RMSEA <0.09	p-close >0.05
1	0.0	2.447	0.827	0.899	0.845	0.037	0.000
2	0.0	1.767	0.831	0.899	0.997	0.020	0.000
3	0.0	2.167	0.911	0.886	0.888	0.049	0.000
4	0.0	1.497	0.946	0.932	0.916	0.094	0.000
5	0.0	1.828	0.990	0.978	0.980	0.046	0.604

Among the five tested structural models, Model 5 demonstrated the best overall statistical fit, as indicated by multiple goodness-of-fit indices. This confirms that Model 5 most accurately represents the structural relationships among disaster risk perception, protective behavior, social media use, and community preparedness.

Regression Weights of the Five Generated Models

Table 10 presents the Regression Weights of the Five Generated Models.

Table 10. *Regression Weights of the Five Generated Models*

	Exogenous Variables to Endogenous Variables		
Model	Disaster Risk Perception	Protective Behavior	Use of Social Media
1	0.039	0.031	0.043
2	0.037	0.026	0.042
3	0.047	0.041	0.046
4	0.041	0.041	0.021
5	0.022	0.029	0.046

*Significant @p-value=0.05

While Model 5 exhibited the best statistical fit, Model 3 demonstrated more balanced regression weights across the three predictors. This distinction is important: Model 5 is statistically superior, whereas Model 3 offers conceptual insight into how cognitive, behavioral, and technological factors may exert relatively comparable influence. Recognizing this distinction prevents misinterpretation and highlights the complementary value of both statistical rigor and theoretical balance.

Regression Weights of the Five Generated Models

Table 11 presents the covariance results among disaster risk perception, protective behavior, and social media use in the best-fit model.

Table 11. *Covariance Best-Fit Model*

			Estimate	S.E.	P
Disaster Risk	<-->	Use of Social Media	0.150	0.030	.040
Disaster Risk	<-->	Protective Behavior	0.120	0.025	.038
Protective Behavior	<-->	Use of Social Media	0.180	0.033	.026

The covariance analysis revealed significant positive relationships among disaster risk perception, protective behavior, and social media use, confirming that these constructs are mutually reinforcing. The strongest covariance between protective behavior and social media use suggests that digital engagement may facilitate translating awareness into action. Consistent with Bonfanti et al. (2023), the findings emphasize that integrated strategies—combining risk awareness, behavioral readiness, and effective communication—are essential for enhancing community disaster preparedness and resiliency.

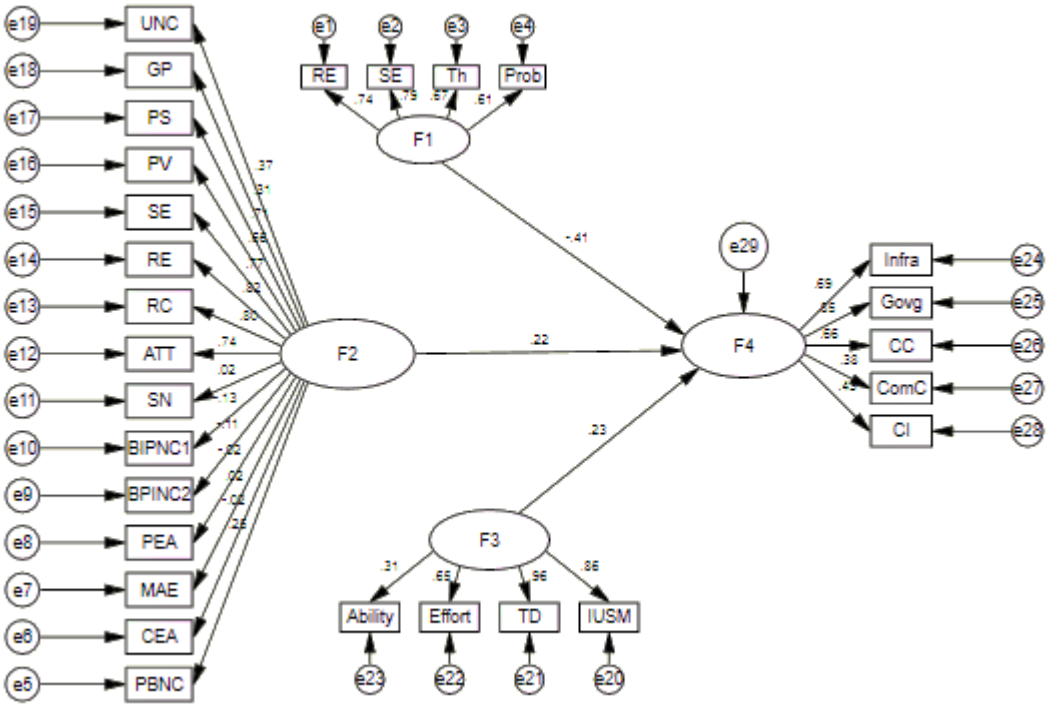

Figure 1. *Model*

Conclusion

This study provides empirical evidence that community disaster preparedness and resilience are not shaped solely by risk awareness but by the interaction among cognitive, behavioral, and communication-related factors. By validating an integrated model that combines disaster risk perception, protective behavior, and social media use, the findings clarify how these elements jointly influence community readiness and adaptive capacity in disaster contexts. The results demonstrate that while the community exhibits a significantly high level of disaster risk perception, confidence in personal capability—particularly self-efficacy—remains comparatively lower. This confirms that recognizing hazards and threats does not automatically translate into confidence or readiness to respond effectively. The study therefore underscores the critical need for community-based capacity-building initiatives that move beyond information dissemination toward skill-based training, practical disaster drills, and experiential learning designed to strengthen individual and collective self-efficacy.

Protective behavior emerged as a central determinant of disaster preparedness and resilience. Although participants acknowledged the seriousness of natural disasters and the importance of preparedness, self-efficacy again emerged as the weakest indicator. This finding reinforces the conclusion that confidence-building measures must support preparedness beliefs. Local governments and disaster councils are therefore encouraged to prioritize family-oriented disaster planning, simulation exercises, and participatory preparedness activities that translate awareness into sustained action. The study also highlights the supportive role of social media in disaster management. While social media was recognized as a valuable tool, the intention to use it during emergencies ranked lowest, suggesting inconsistent engagement. This indicates that digital platforms function more effectively as facilitators rather than primary drivers of preparedness. Strengthening official local government unit platforms, promoting verified information sources, and conducting community orientations on responsible social media use may enhance its effectiveness during disaster events.

Regarding community preparedness and resilience, the findings reveal generally favorable conditions, particularly in governance and infrastructure. However, community intelligence emerged as the weakest dimension, pointing to gaps in information flow, collective decision-making, and shared situational awareness. Enhancing disaster information hubs, early warning systems, and inclusive communication platforms is therefore

essential to strengthen collaboration and adaptive capacity at the community level. Correlation and regression analyses further confirmed that disaster risk perception, protective behavior, and social media use significantly influence preparedness and resilience, with protective behavior exerting the most substantial effect. Social media use demonstrated the lowest influence, reinforcing its role as a complementary mechanism rather than a direct determinant. The identified structural equation model provides a practical framework for disaster risk reduction offices, emphasizing the need to prioritize risk perception and protective behavior while strategically integrating social media to support communication and coordination.

Overall, the study advances understanding of community disaster resilience by demonstrating that effective preparedness requires not only awareness but also confidence, action, and supportive communication systems. These findings offer valuable guidance for policymakers, local leaders, and disaster management practitioners seeking to design more holistic and sustainable disaster preparedness strategies.

Contributions of Authors

Both authors contributed equally to this study. Their responsibilities encompassed writing, editing, data analysis, and questionnaire preparation. Both authors played a key role in refining the study framework. Author 1 initially drafted the manuscript, while Author 2 focused on revisions and editing. Together, they collaboratively finalized and approved the manuscript for publication.

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Conflict of Interests

The authors declare no conflicts of interest, financial or non-financial, that could have influenced the conduct or outcomes of this research.

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