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The Mediating Role of Risk Perception in the Effect of Information Literacy on Students' Disaster Preparedness

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ABSTRACT
This study examines how information literacy influences students' disaster preparedness by incorporating risk perception as a mediating variable. Disaster-prone higher education environments require strong information comprehension skills to support readiness against potential hazards. The research involved 184 students from Merchant Marine Polytechnic of West Sumatra and STKIP Ahlussunnah, selected using purposive sampling. quantitative survey design approach was applied using SEM-PLS path analysis to evaluate direct and indirect effects. The results show that information literacy significantly influences disaster preparedness through an indirect effect mediated by risk perception (β = 0.205; p = 0.000). This finding highlights that risk perception strengthens the translation of information literacy into concrete preparedness actions. Practically, institutions should design information literacy programs that enhance not only access to technical data but als4o students' awareness and appraisal of disaster risks. This study is limited by its focus on two campuses in a specific geographic area, suggesting the need for broader comparative studies. Overall, the research confirms that incorporating psychological components such as risk perception is essential for optimizing disaster preparedness strategies among university students.

INTRODUCTION

Disaster mitigation is a crucial issue in risk management in various sectors, including the higher education environment (Gendeshmin et al., 2025; Skoulidas et al., 2024). Campuses, as gathering centers for thousands of students and educators, are vulnerable to the impacts of disasters if they lack adequate preparedness systems. One crucial element in building preparedness is disaster information literacy, the ability of individuals to access, understand, evaluate, and effectively use disaster-related information (Fatehpanah et al., 2023; Sultan et al., 2024; Takahashi et al., 2025). In the context of higher education, improving students' information literacy is considered key to creating a culture of risk awareness and responsiveness to potential disasters. Although the literature has extensively examined information literacy and risk perception separately, there is limited research empirically examining the mediating role of risk perception in the relationship between information literacy and preparedness, particularly among students on disaster-prone campuses. Most previous studies have focused on the general public or government institutions (Guo et al., 2025; Wolff et al., 2021). While the university environment as an institution that shapes the next generation has received little attention in the disaster mitigation literature. Therefore, an empirical study that integrates

these three variables is needed to address this research gap.

Contextually, students represent a group with significant potential in the information dissemination process, but they are also at high risk of being impacted by disasters if they are not equipped with adequate knowledge and understanding. While campus conditions in disaster-prone areas in Indonesia do require strong risk literacy and perception, this contextual description suffices to illustrate the urgency without the need for lengthy geographic explanations. Furthermore, advances in information technology present new challenges related to the accuracy and credibility of disaster information (Calle Müller et al., 2024; Erokhin & Komendantova, 2024; Seneviratne et al., 2024).

This study examines how information literacy influences students' disaster preparedness by including risk perception as a mediating factor. Students with good information literacy tend to be better at recognizing threats and making informed decisions when facing disasters (Goddard et al., 2018; Zhang et al., 2021). However, this literacy does not always directly encourage preparedness without adequate risk perception (Alison Hicks, 2025; Saifudin, 2023). Risk perception acts as a bridge because it is the basis for students to assess how serious the threat of a disaster that might occur is (Cai et al., 2023). In the campus context, trust in warning systems and past experiences help shape these risk perceptions (Patel et al., 2023). This focus addresses a gap in existing research, which rarely integrates these three variables in disaster-prone campus settings. Although previous studies highlight the importance of information literacy and risk perception, their combined role in shaping preparedness among students who differ psychologically and behaviorally from the general population remains underexplored.

This study shows that information literacy boosts disaster preparedness directly and through risk perception, reinforcing PMT by linking information exposure, threat appraisal, and preparedness actions (Botzen et al., 2019), explains how individuals are motivated to take protective action against threats through two main mechanisms: threat appraisal and coping appraisal (Faryabi et al., 2023; Tang & Feng, 2018).

Research shows that risk perception strengthens the relationship between information literacy and preparedness, especially on disaster-prone campuses (Morelli et al., 2022). Students with high information literacy but low risk perception are less likely to take concrete steps to prepare for disasters (Qiu et al., 2023; Wachinger et al., 2013). The combination of information literacy and appropriate risk perception supports actions such as developing evacuation plans and participating in simulations (Lillywhite & Wolbring, 2023). Disaster literacy programs on campus should be designed to improve both information literacy and student risk perception. This supports the mediation model of risk perception in the relationship between information literacy and preparedness, which is relevant for research.

Risk perception is shaped by a combination of cognitive (environmental values) and affective (negative emotions) factors, as well as social interactions (Fian et al., 2025) and is influenced by accident experience, geographic location, and trust in infrastructure (Huan et al., 2025). In the context of disasters, risk perception plays a crucial role in shaping preparedness attitudes and behaviors. Individuals with a high risk perception tend to be more prepared and responsive in emergency situations. Research shows that risk perception is also influenced by social environmental factors, education, and access to disaster information (Cai et al., 2023; Yildiz et al., 2024). Therefore, understanding risk perception is important in designing effective disaster mitigation programs.

According to Protection Motivation Theory (PMT), risk perception is part of the threat appraisal process, which includes an assessment of the severity and vulnerability to a threat (Bubeck et al., 2018). Risk perception mediates the relationship between information literacy and disaster

preparedness by triggering preventive action. It serves as a key bridge between cognitive understanding and preparedness behavior (Sobkow et al., 2020; Zhao et al., 2025). Thus, research on risk perception makes an important contribution to the development of education-based mitigation strategies in campus environments.

For students, preparedness includes preparing evacuation plans, participating in simulations, and mastering safety equipment (Hawsawi et al., 2025; Mirza & KM, 2023; Morelli et al., 2022). Information literacy plays an important role in improving preparedness because it helps students understand risks and mitigation strategies (Lillywhite & Wolbring, 2023). However, information literacy without adequate risk perception often fails to trigger real action (Wachinger et al., 2013). Risk perception is an important bridge connecting knowledge with preparedness action (Serondo & Bacatan, 2024). The right combination of literacy and risk perception can encourage students to actively participate in mitigation efforts. This demonstrates that preparedness is multidimensional, influenced by knowledge, attitudes, and beliefs about the effectiveness of actions.

A campus environment that supports a culture of safety also strengthens student preparedness. Regular training programs, effective risk communication, and participation in simulations have been shown to improve rapid response during emergencies (Doumi et al., 2024; Goddard et al., 2018). Student self-efficacy strengthens the link between risk perception and preparedness actions, highlighting the need for universities to integrate risk literacy and preparedness training into the curriculum. This approach enhances both individual readiness and campus emergency response through the synergy of knowledge, perception, and action.

RESEARCH METHODS

This study employed a quantitative survey design to examine the mediating role of risk perception in the effect of information literacy on students' disaster preparedness. Participants were selected through purposive sampling, and data were collected using Likert-scale questionnaires measuring information literacy, risk perception, and disaster preparedness. Data were analyzed using path analysis or SEM to assess both direct and indirect relationships among the variables. All research procedures adhered to ethical standards, including informed consent and data confidentiality.

Instrument

Each research variable in this study, information literacy, risk perception, and disaster preparedness, was measured using an instrument that has been widely used in previous literature. All items were scored using a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). The instrument was then modified and adapted to the cultural context of Indonesian students to reduce potential bias in understanding the statement items. In accordance with recommendations (Edunov et al., 2018). The adaptation process was carried out using the back-translation method, which involved translating the instrument into Indonesian and reviewing the translation before distributing the questionnaire to respondents. The information literacy instrument was developed based on indicators from UNESCO's disaster literacy literature (2017) (Novarita & Zumrotin, 2023). Risk perception was measured using a scale adapted from (Mızrak & Aslan, 2020), while disaster preparedness is measured using indicators from UNDRR 2015 (Goddard et al., 2018). The research subjects were students at the West Sumatra Maritime Polytechnic and the Ahlusunnah College in Bukittinggi, which are located in disaster-prone areas.

The sampling technique used was purposive sampling with the following criteria: (a) active students, (b) living in a disaster-prone campus environment, and (c) having participated in disaster response training. The sample size was set at a minimum of 5–10 respondents per indicator

(J. F. Hair et al., 2019), resulting in 184 respondents. Data were analyzed using SEM-PLS to test the direct and indirect effects of information literacy on disaster preparedness through risk perception, and instrument validity and reliability tests were conducted before hypothesis testing.

Table 1. Measurement Instruments

No.	Variables	Dimensions / Indicators	Source	Measurement Scale
1.	Information Literacy	1. Disaster resources Anxiety/Fear 2. Disaster information evaluation 3. Disaster information organization 4. Utilization of disaster information	(Novarita & Zumrotin, 2023)	Likert Scale 1–5
2	Risk Perception	1. Exposure Perception 2. Anxiety/Fear 3. Impact Perception 4. Uncontrolled Perception	(Breen et al., 2024)	Likert Scale 1–5
3	Disaster Preparedness	1. Preparation of a personal or family evacuation plan 2. Ownership of emergency tools or kits 3. Participation in preparedness training or simulations 4. Knowledge of the location of shelters or evacuation assembly points 5. Emergency communications readiness 6. Ownership of disaster information sources	(Goddard et al., 2018)	Likert Scale 1–5

(Source: Primary Data, 2025)

Samples and procedures

This study involved 184 students from two disaster-prone universities: the West Sumatra Maritime Polytechnic and Ahlussunnah Bukittinggi Teachers' Training College. Participants were selected through purposive sampling based on the following criteria: active student status, residence in a disaster-prone campus environment, and prior experience in disaster preparedness activities or training. The sample size met the minimum requirement of 5–10 respondents per indicator (J. F. Hair et al., 2019). Thus, a sample of 184 respondents was sufficient for the SEM-PLS analysis. Data were collected through an online questionnaire distributed via official institutional channels, ensuring anonymity, informed consent, and the option to withdraw. A pilot test was conducted beforehand to evaluate clarity, cultural relevance, and reliability, and necessary revisions were made. These procedures ensured high-quality data suitable for analyzing the direct and indirect effects of information literacy, risk perception, and disaster preparedness.

Table 2. Respondent Demographics

Characteristics	Category	Number (n)	Percentage (%)
Gender	Man	128	69.6%
	Woman	56	30.4%
Age	< 20 years	42	22.8%
	20–22 years	109	59.2%
	> 22 years	33	17.9%
Institution	West Sumatra Maritime Polytechnic	112	60.9%
	Ahlussunnah Teacher Training College Bukittinggi	72	39.1%
Force	Class of 2021	41	22.3%
	Class of 2022	78	42.4%
	Class of 2023	65	35.3%
Participating in Disaster Training	Once	131	71.2%
	Never	53	28.8%
Domicile in Disaster-Prone Areas	Yes	149	81.0%
	No	35	19.0%

(Source: Primary Data, 2025)

Pilot test

The aim of this study was to assess the effectiveness of the questionnaire as a medium for collecting information from respondents and to test the validity of the scale used to measure each construct (Fazli et al., 2021). The trial was conducted on 40 student respondents. All constructs demonstrated strong internal consistency, indicated by a Cronbach's Alpha value exceeding 0.80 based on the results of the reliability test at the trial stage (J. Hair & Alamer, 2022). The results of the reliability test at the pilot test stage showed that all research instruments met the internal consistency standards. The Disaster Preparedness (KB) variable had a Cronbach's alpha value of 0.87, indicating excellent reliability. The Information Literacy (LI) variable obtained a value of 0.739, which is in the reliable category. Meanwhile, the Risk Perception (PR) variable showed the highest reliability with a value of 0.926, indicating very strong internal consistency. Thus, all instruments are suitable for use in primary data collection because they meet the minimum reliability criteria ($\alpha > 0.70$).

Table 3. Pilot Test

	Cronbach's alpha
KB	0.87
LI	0.739
PR	0.926

(Source: Primary Data, 2025)

General Bias Method

Collecting data on endogenous and exogenous variables from the same respondents at one time when filling out the questionnaire has the potential to cause bias, which is common in survey research (Memon et al., 2023). Variance Inflation Factor (VIF) test, as recommended by (Kock, 2015), is used to check for potential common method bias through collinearity analysis between constructs in the model. The potential common method bias test was conducted using the Variance Inflation Factor (VIF) value in the inner model. The analysis results showed that all paths in the model had VIF values below the threshold

of 3.3, indicating no indication of common method bias. The LI → KB and PR → KB paths obtained VIF values of 2.147, while the LI → PR path obtained a VIF of 1.00. All of these values were well below the critical limit, so it can be concluded that the model is free from multicollinearity problems and common method variance does not pose a threat to the validity of the research results. Thus, the influence between variables can be interpreted accurately without distortion from the similarity of measurement sources. The results can be seen in Table 4.

Table 4. Common Bias Methods

	VIF
LI -> KB	2,147
LI -> PR	1
PR -> KB	2,147

(Source: Primary Data, 2025)

RESULTS AND DISCUSSION

Table 5 shows that all constructs, Disaster Preparedness, Information Literacy, and Risk Perception, meet the Fornell–Larcker discriminant validity criteria. The square root of each construct's AVE is higher than its correlations with other constructs. For example, the square root of the AVE for Disaster Preparedness (0.837) exceeds its correlation with Information Literacy (0.795) and Risk Perception (0.699). Information Literacy also satisfies the Fornell–Larcker criterion, with a square root of AVE of 0.823, higher than its correlations with Disaster Preparedness (0.795) and Risk Perception (0.655). Risk Perception shows the same pattern, with a square root of AVE of 0.761 exceeding its correlations with Disaster Preparedness (0.699) and Information Literacy (0.655). These results indicate that each construct is more strongly related to its own indicators than to other constructs, confirming a clear theoretical distinction and strong discriminant validity. Thus, all three constructs can be confidently used in the structural model without concern for conceptual overlap.

Table 5. Fornell-Larcker Criterion

	Disaster Preparedness	Information Literacy	Risk Perception
Disaster Preparedness	0.837		
Information Literacy	0.795	0.823	
Risk Perception	0.699	0.655	0.761

(Source: Primary Data, 2025)

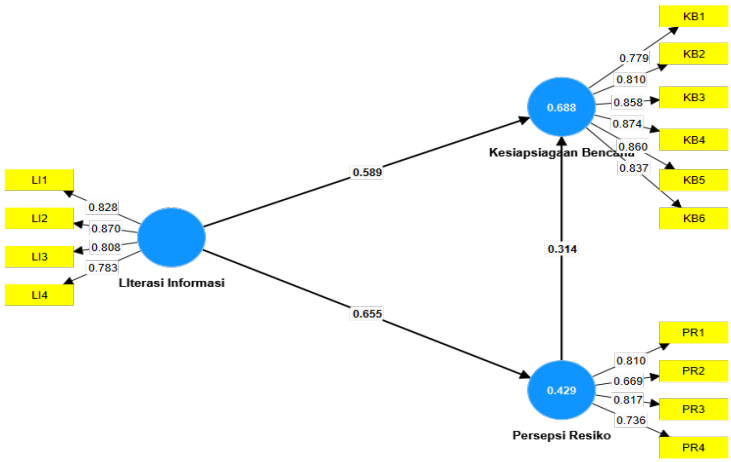

Figure 1: Structural Model Result (Source: Primary Data, 2025)

Figure 1 shows that information literacy positively influences risk perception (0.655) and disaster preparedness (0.589). Risk perception also positively affects disaster preparedness (0.314). These results indicate that individuals with higher information literacy tend to perceive disaster risks more accurately and demonstrate stronger preparedness. Overall, the model highlights that information literacy enhances disaster preparedness both directly and indirectly through its effect on risk perception, making both factors essential for achieving optimal preparedness

Table 6. Outer Loading

	Disaster Preparedness	Information Literacy	Risk Perception
KB1	0.779		
KB2	0.810		
KB3	0.858		
KB4	0.874		
KB5	0.860		
KB6	0.837		
LI1		0.828	
LI2		0.870	
LI3		0.808	
LI4		0.783	
PR1			0.810
PR2			0.669
PR3			0.817
PR4			0.736

(Source: Primary Data, 2025)

Table 6 shows that all indicators for Disaster Preparedness (0.779–0.874) and Information Literacy (0.783–0.870) have loadings above 0.70, indicating strong validity. Risk Perception indicators also perform well (0.736–0.817), with the exception of PR2 (0.669), which is slightly below the ideal threshold but still acceptable for exploratory models. Overall, the measurement model meets the criteria for convergent validity. The stable loading pattern confirms that the indicators effectively represent their respective constructs, contribute to higher AVE and reliability values, and do not indicate misspecification. Therefore, all indicators can be retained, as each provides meaningful support for the reliability and validity of the model.

Table 7. Composite Reliability

	Composite reliability (rho_c)
Disaster Preparedness	0.933
Literacy Information	0.893
Perception Risk	0.845

(Source: Primary Data, 2025)

Table 7 shows that all constructs demonstrate strong internal consistency based on Composite Reliability values exceeding the 0.70 threshold. Disaster Preparedness (0.933) and Information Literacy (0.893) exhibit very high reliability, while Risk Perception (0.845) also falls within an excellent range for behavioral research.

Table 8. R-square

	R-square	R-square adjusted
Disaster Preparedness	0.688	0.684
Risk Perception	0.429	0.426

(Source: Primary Data, 2025)

Table 8 shows that the R-square value for the Disaster Preparedness construct reached 0.688, indicating that 68.8% of the variance in student preparedness can be explained by two main predictors, namely Information Literacy and Risk Perception. This value is in the substantial category, thus reflecting the model's very strong predictive ability. The very small difference between the R-square and adjusted R-square for both constructs indicates that the model does not experience overfitting and has good predictive stability.

These results indicate that the indicators consistently measure their intended constructs and are not affected by significant measurement error. Overall, the reliability findings confirm that the measurement model is stable and suitable for further structural analysis, supporting the accuracy and validity of the study's conclusions.

The very small difference between the R-square and adjusted R-square for both constructs indicates that the model does not experience overfitting and has good predictive stability. Methodologically, these results confirm that information literacy plays a role not only as a direct predictor but also as a fundamental factor that shapes risk perception, which in turn contributes to student disaster preparedness. Thus, the relationship structure in the model has sufficient explanatory power and is reliable for testing the mediation mechanisms proposed in the study.

Table 9. Goodness of Fit (GoF)

	Saturated model	Estimated model
SRMR	0.087	0.087
d_ULS	0.795	0.795
d_G	0.285	0.285
Chi-square	297.81	297.81
NFI	0.821	0.821

(Source: Primary Data, 2025)

Table 9 shows that the model achieves an acceptable level of goodness of fit. The SRMR value for both the saturated and estimated models is 0.087, below the 0.10 threshold, indicating a small difference between observed and predicted covariance and confirming that the model represents the data well. The NFI value of 0.821 also exceeds the commonly accepted minimum of 0.80, supporting adequate model fit. Overall, these indices indicate that the model fits the data well, allowing the relationships among information literacy, risk perception, and disaster preparedness to be interpreted with confidence.

Table 10. Effect Size

	Disaster Preparedness	Information Literacy	Risk Perception
Disaster Preparedness	-	-	-
Information Literacy	0.635	-	0.750
Risk Perception	0.180	-	

(Source: Primary Data, 2025)

Table 10 shows that Information Literacy has an effect size of 0.635 on Disaster Preparedness, which is categorized as large according to Cohen's (1988) guidelines ($f^2 > 0.35$). This indicates that Information Literacy makes a strong contribution in explaining variations in disaster preparedness. Furthermore, Risk Perception has an effect size of 0.180 on Disaster Preparedness, which is categorized as medium (f^2 between 0.15–0.35), meaning that Risk Perception also contributes quite significantly to preparedness. In addition, Information Literacy on Risk Perception has an effect size of 0.750, which is very large, indicating that Information Literacy is a major predictor in shaping Risk Perception. In addition to showing the strength of the contribution of each construct, the pattern of effect sizes also confirms the theoretical structure of the proposed model. The very large f^2 value of the relationship between Information Literacy and Risk Perception (0.750) shows that students' risk perception is largely shaped by the quality of their information literacy, making this variable the main foundation in the mechanism of forming preparedness. On the other hand, the direct contribution of Risk Perception to Disaster Preparedness, which is in the moderate category, indicates that risk perception functions as a cognitive mechanism that strengthens student preparedness, although the most dominant influence still comes from information literacy. The combination of consistent effect size values between the direct and indirect paths provides empirical support for the mediation role proposed in the study, and strengthens the assumption of Protection Motivation Theory (PMT) that threat assessment and the capacity to understand information are the main drivers of protective behavior in the context of disasters.

The t-statistic value generated by the internal model was examined to test the direct effect hypothesis. The results of the direct effect hypothesis test are presented in Table 11, which shows that the research hypothesis is accepted if the t-statistic is greater than 1.96. Simulation is used in PLS research to evaluate hypothetical relationships. The bootstrap method was applied to the research sample to mitigate the problem of unusual research data.

Table 11. Inner Model

	Original Sample (O)	Sample Mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Information Literacy -> Disaster Preparedness	0.589	0.586	0.062	9,515	0.000
Information Literacy -> Risk Perception	0.655	0.661	0.037	17,795	0.000
Risk Perception -> Disaster Preparedness	0.314	0.319	0.061	5,150	0.000

(Source: Primary Data, 2025)

The results of the inner model from Table 11 show that Information Literacy has a significant effect on Disaster Preparedness, with a path coefficient of 0.589, a t-statistic of 9.515, and a p-value of 0.000. This indicates that information literacy provides a strong and significant contribution to improving preparedness. Furthermore, Information Literacy also has a significant effect on Risk Perception, with a coefficient of 0.655, a t-statistic of 17.795, and a p-value of 0.000, indicating that information literacy is very important in shaping individual risk perceptions towards disasters. Finally, Risk Perception has a significant effect on Disaster Preparedness, with a coefficient of 0.314, a t-statistic of 5.150, and a p-value of 0.000, indicating that good risk perceptions also strengthen disaster preparedness.

Overall, the relationship patterns in the inner model show strong consistency

with the theoretical foundation of Protection Motivation Theory (PMT). The significant influence of information literacy on risk perception and disaster preparedness indicates that information comprehension is not merely passive knowledge, but functions as a cognitive trigger that influences how students assess threats and formulate protective actions. Furthermore, the significant contribution of risk perception to preparedness confirms that the threat assessment process plays a crucial role in transforming information literacy into preparedness behavior. Thus, these findings not only strengthen the empirical argument that information literacy is a fundamental predictor but also confirm that risk perception functions as a psychological mechanism that bridges this relationship.

This suggests that effective disaster mitigation interventions must simultaneously enhance information literacy capacity and foster realistic risk perceptions to encourage optimal preparedness actions.

Table 12. Indirect Effect

	Original sample (O)	Sample Mean (M)	(STDEV)	T stat.	P values
Information Literacy -> Risk Perception -> Disaster Preparedness	0.205	0.210	0.041	5,027	0.000

(Source: Primary Data, 2025)

The results in Table 12 of the Indirect Effect show that Information Literacy has an indirect effect on Disaster Preparedness through Risk Perception, with a coefficient of 0.205, a t-statistic of 5.027, and a p-value of 0.000. This means that this indirect effect is significant at the 95% confidence level, so it can be concluded that Risk Perception plays a significant mediating role in the relationship between Information Literacy and Disaster Preparedness.

This means that information literacy not only improves preparedness directly, but also through increased risk perception, which then encourages better preparedness. This finding provides empirical evidence that increased information literacy does not automatically result in optimal preparedness, but requires the activation of risk perception as a cognitive process that encourages students to transform information into protective actions.

Theoretically, these results are in line with the Protection Motivation Theory (PMT) framework, which emphasizes that threat appraisal plays a crucial role in eliciting protective responses. Thus, these findings strengthen the argument that effective disaster mitigation strategies must not only focus on improving access and quality of information but also on establishing realistic risk perceptions so that information literacy can drive optimal preparedness.

The results of this study indicate that Information Literacy has a significant indirect effect on Disaster Preparedness through Risk Perception, with a mediation coefficient of 0.205 and a p-value of 0.000. This indicates that Risk Perception plays an important mediator in strengthening the relationship between information literacy and disaster preparedness. This finding supports the theory that information literacy not only enriches knowledge but also builds a sharper perception of risk, thus motivating better preparedness actions. This result is consistent with previous literature (Gülsoy et al., 2025; Ng, 2023), which emphasizes the importance of risk perception as a link between understanding information and preparedness actions.

Practically, the findings suggest that enhancing disaster preparedness, especially in disciplined maritime higher education settings, requires information literacy strategies that not only provide technical knowledge but also strengthen

risk awareness. This dual function helps build both understanding and vigilance. However, the study has limitations, including its focus on a single institutional type in one region and the exclusive use of quantitative methods, which may limit generalizability and overlook deeper psychological or social dynamics. Future research should test the model across different types of educational institutions and cultural contexts to improve generalizability.

Incorporating additional psychological variables such as self-efficacy, resilience, or decision-making style may also provide richer insights. Qualitative or mixed-methods approaches are recommended to capture more nuanced experiences and perceptions related to disaster preparedness.

CONCLUSION

This study concludes that information literacy directly and indirectly enhances disaster preparedness, with risk perception acting as an important mediator. Students with higher information literacy develop stronger risk perceptions, which lead to better preparedness actions, particularly in discipline-oriented settings such as maritime colleges. The findings emphasize that disaster preparedness should focus not only on providing information but also on strengthening risk perception through education, training, and practical experience. Overall, information literacy and risk perception together form a critical foundation for effective and context-appropriate preparedness.

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