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Key personal factors and moderation effect of belief on shaping the willingness for early ASD detection in Jordan: A SEM Analysis

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Abstract

Background: Autism Spectrum Disorder (ASD) prevalence increases healthcare utilisation, underscoring healthcare providers' vital role in early detection. This growing prominence underscores the pivotal roles of healthcare providers in the early detection of ASD. Understanding the influence of their factors, Knowledge, Awareness, Experience, Preparedness, and Beliefs impact providers' Willingness for early ASD detection. This study explores these factors comprehensively, contributing to a nuanced understanding and assessing the effect of Beliefs on healthcare providers' Willingness for early ASD detection, examining their influence on Awareness, Knowledge, Experience, and perceived Preparedness.

Methodology: In the Al-Mafraq region of Jordan, this study surveyed 202 participants from various healthcare facilities using structural equation modelling (SEM) to analyse the connection between Beliefs and healthcare providers' Awareness, Knowledge, Experience, perceived Preparedness, and Willingness for early ASD detection.

Result: Belief moderated the path from Preparedness towards Willingness. This means that the higher the value of Belief, the greater the effect of healthcare providers' Preparedness for early ASD detection.

Conclusion: The study uncovers significant associations between healthcare providers' Knowledge, Experience, and perceived Preparedness and their Willingness for early ASD detection. Belief emerges as a pivotal moderator, emphasising its influential role in shaping the connection between Preparedness and Willingness.

Keywords: Autism Spectrum Disorder (ASD); Early Detection; healthcare provider; Moderate relationship; Structural Equation Modeling (SEM)

1. Introduction

Autism Spectrum Disorder (ASD) encompasses a range of neurodevelopmental conditions characterised by challenges in social interaction, communication, and behaviour (APA, 2013). The variability within this spectrum presents considerable challenges in daily activities for affected individuals (Kern et al., 2016; Tao et al., 2016). The complexity of ASD is compounded by co-occurring conditions, including emotional, behavioural, and chronic medical issues, significantly complicating the management and manifestation of ASD-related symptoms (Fava & Strauss, 2014). Prevalent chronic medical concerns among children with ASD, such as gastrointestinal symptoms and epilepsy, substantially impact their growth and overall well-being (Garcia-Pastor et al., 2019).

Globally, ASD has a high prevalence, estimated at 1 case per 160 children, with 62 out of every 10,000 children affected worldwide (World Health Organization, 2019). The complexity of the disorder poses a significant challenge to

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healthcare systems worldwide. However, research on ASD in Arab countries remains limited and underdeveloped. Collaboration among researchers in these countries is essential to align with global advancements in the early detection and understanding of ASD causes, treatments, and prevention (Abualhoul & Amayrah, 2022). The increasing prevalence of ASD has led to heightened healthcare utilisation among affected individuals, paralleling the health concerns encountered by the ageing population with ASD (Henry et al., 2011; Smith et al., 2010). This growing prominence underscores the pivotal roles of healthcare providers in the early detection of ASD. Understanding the influence of their factors—Knowledge, Awareness, Experience, Preparedness, and Beliefs—on their Willingness to engage in early ASD detection is crucial.

Previous research has highlighted correlations between some factors, such as the positive link between awareness and healthcare providers' Willingness to engage with individuals affected by ASD (Shawahna et al., 2021). Nevertheless, investigations exploring the relationship between Knowledge and Willingness have yielded mixed findings across healthcare contexts. While some studies revealed a positive correlation between Knowledge and Willingness (Cidav et al., 2017), others found no significant association (Yazel-Smith et al., 2020). Moreover, healthcare providers' Experiences have consistently been associated with early ASD recognition (Ozonoff et al., 2015; Al Sabei et al., 2019). The impact of Experience on Willingness has shown variability across different contexts (Othman et al., 2014). Insights from studies exploring the relationship between Preparedness and Willingness emphasise the critical role of Preparedness in motivating individuals to engage in disaster response efforts (Lindell et al., 2012). Regardless, the correlation between these factors and the impact of Belief as a mediator is yet to be explored, and there is a need to address existing research gaps. Therefore, this study aims to thoroughly examine and comprehend the intricate connections among healthcare providers' personal factors and their influence on the Willingness to engage in early ASD detection. Additionally, it seeks to investigate how Beliefs regarding ASD moderate the relationship between these personal factors.

2. Methodology

2.1. Research Design and Context

This study employed a cross-sectional research design within Jordan's Al-Mafraq region, gathering data from prominent healthcare facilities. A sample size of 202 participants was determined using proportionate stratified random sampling. The selection process considered the proportion of eligible healthcare professionals at Al Mafraq Hospital and Al Mafraq health centres to fit inclusion and exclusion criteria.

2.2. Instrument and Analysis

The research utilized a meticulously developed questionnaire validated through content assessment and exploratory and confirmatory factor analyses. Structural Equation Modeling (SEM) through AMOS 24.0 software was employed to investigate the relationships between Awareness, Knowledge, Experience, perceived Preparedness, and Willingness via Path Analysis. The study also examined how Beliefs moderate the relationship between these personal factors.

2.3. Data Collection and Moderation Analysis

Multi-Group Confirmatory Factor Analysis was applied to systematically explore how Beliefs moderated the connections. The assessment of moderation existence involved a structured evaluation of unstandardized coefficients (β), critical ratios (CR), and p-values to understand interaction effects among variables linked to the dependent variable (Willingness). Researchers navigated through stages, evaluating coefficients' impact, significance, reliability, and accuracy, ultimately identifying statistically significant moderation effects.

2.4. Research Hypotheses

- H1: ASD Awareness significantly affects perceived Willingness for early ASD detection among healthcare providers.
- H2: ASD Knowledge significantly affects the perceived Willingness for early ASD detection among healthcare providers.
- H3: ASD-related Experience has a significant effect on perceived Willingness for early ASD detection among healthcare providers.
- H4: There is a significant effect of perceived Preparedness on perceived Willingness for early ASD detection among healthcare providers.
- H5: The Belief of ASD moderates the relationship between ASD Awareness and perceived Willingness for early ASD detection among healthcare providers.

- H6: The Beliefs on ASD moderate the relationship between ASD Knowledge and perceived Willingness for early ASD detection among healthcare providers.
- H7: The Belief in ASD moderates the relationship between ASD-related Experience and perceived Willingness for early ASD detection among healthcare providers.
- H8: The Belief in ASD moderates the relationship between perceived Preparedness and perceived Willingness for early ASD detection among healthcare providers.

3. Results

3.1. Interrelationships between constructs using SEM

The examination of the multivariate normality assumption revealed that the data did not align with the criteria for utilizing maximum likelihood (ML) estimations due to the high Mardia kurtosis (91.627) and a significantly elevated Critical Ratio (23.050). Consequently, an alternative estimation method, the Bollen-Stine bootstrap, was employed for the analysis.

The Fit Indices for the Structural Path indicated in Figures 1-3 demonstrated the fit of three models: Model 1 (Initial all structural model), Model 2 (Pooled measurement model with parcelling of selected latent constructs), and the Final Path Model, outlined in Table 1. Of note, the final path model exhibited superior goodness-of-fit indices compared to the other models. Consequently, the structural relationships between the constructs were deemed valid based on this model's data.

Utilizing the Bollen-Stine bootstrap method allowed for a robust analysis despite the deviation from normality assumptions, ensuring a reliable understanding of the interrelationships between the constructs within the final path model.

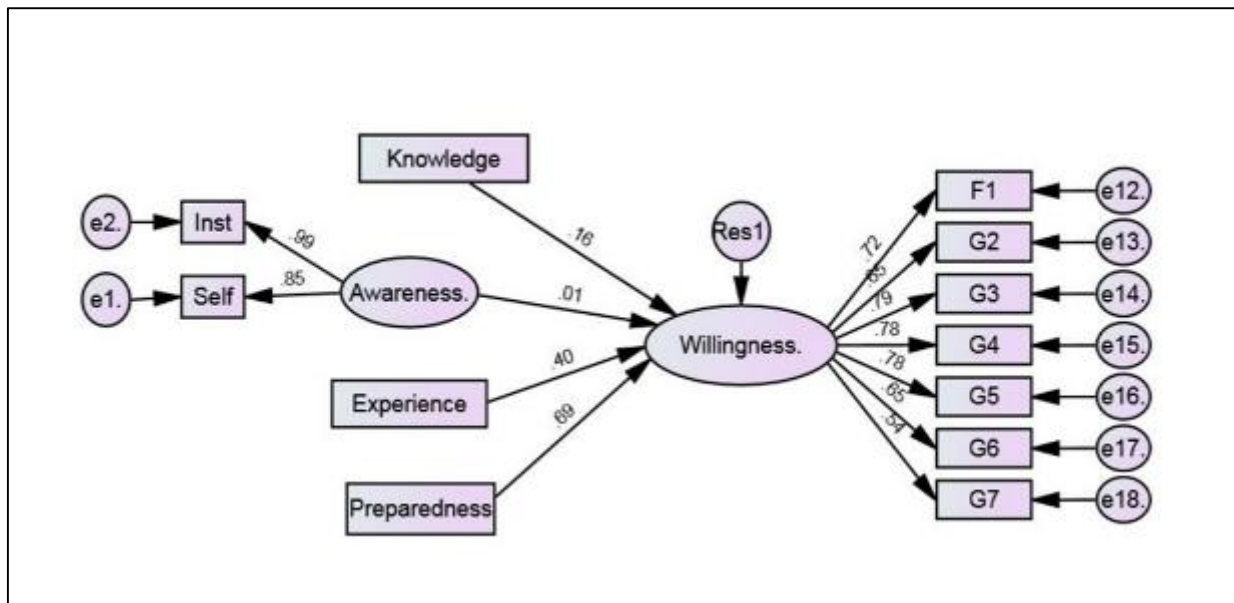


Figure 1 Model 1 (Initial All Structural Model)

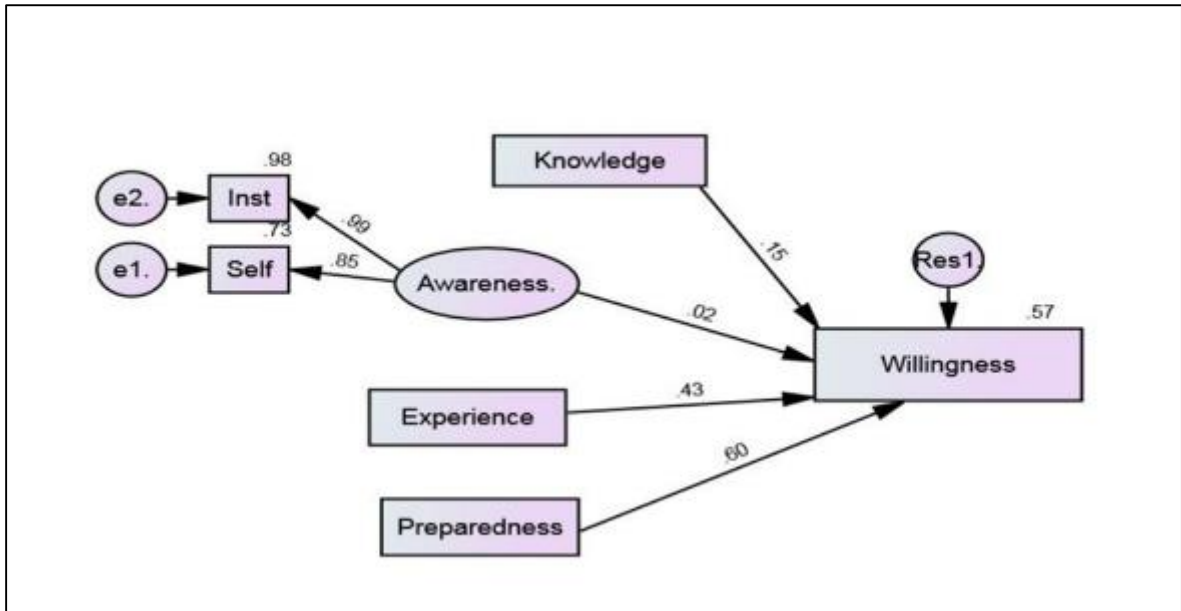


Figure 2 Model 2 (Pooled Measurement Model with Parcelling of Selected Latent Constructs)

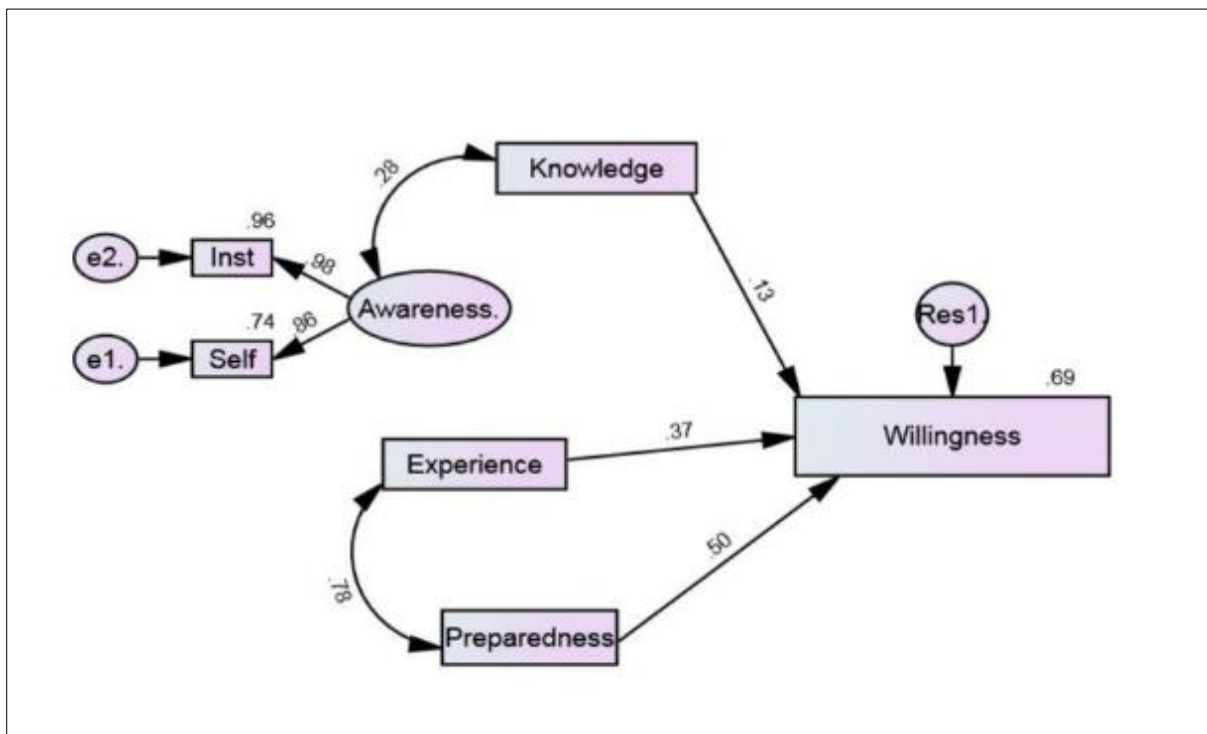


Figure 3 Final Path Model

Table 1 Summary of Fit Indices of the Structural Path Model

Model Indices	Fit	Acceptable level	Model 1 (Initial structural model)	Model 2 (pooled measurement model with parcelling of selected latent constructs)	Final path model	Comment Final path model
Chi-square(df), p-value		non-significant value	817.587 (150), <0.001	214.347 (10), <0.001	8.406 (9), 0.494	Fit
Goodness-of-Fit (GFI)		0 (no fit) to 1 (perfect fit)	0.746	0.803	0.987	Fit
Tucker-Lewis Index (TLI)		0 (no fit) to 1 (perfect fit)	0.727	0.551	1.00	Fit
Comparative Fit Index (CFI)		0 (no fit) to 1 (perfect fit)	0.760	0.701	1.00	Fit
SRMR		< 0.08	0.230	0.213	0.0467	Fit
RMSEA		< 0.08	0.149	0.319	<0.001	Fit
Akaike Information Criterion (AIC)		Smaller value, better fitting	897.587	236.347	32.406	Fit
Expected cross-validation index (ECVI)		Smaller value, better fitting	4.466 (4.038, 4.930)	1.176 (0.957, 1.431)	0.161 (0.164, 0.216)	Fit
Bollen-Stine value		p-value not significant	0.002	0.002	0.531	Fit

Bollen-Stine bootstrap p-value is not significant; the model fits the data

3.2. The Path Relationships of the Structural Equation Model (Final Path Model)

The Structural Equation Model (SEM) investigated relationships among Awareness, Knowledge, Experience, Preparedness, and Willingness. The link between Awareness and Willingness needed more support and was excluded. However, positing connections between Knowledge, Experience, Preparedness, and Willingness were strongly supported ($p < 0.001$), indicating positive associations between these variables.

Critical interpretations from the SEM results are:

A significant positive association exists between Knowledge and Willingness, even when accounting for Experience and Preparedness. Similarly, a notable positive link between expertise and Willingness holds while controlling for Knowledge and Preparedness. Moreover, a meaningful positive relationship persists between Preparedness and Willingness, considering the influences of Knowledge and Experience.

Additionally, the results highlighted positive relationships between Knowledge and Awareness and between Preparedness and Experience.

3.3. Moderation Effect of Willingness

The moderation effects of Belief on the exogenous variables towards Willingness:

Relationship (Belief*Awareness-Willingness), (Belief*Knowledge-Willingness), and (Belief*Experience- Willingness) demonstrated non-significant moderation effects ($p > 0.05$), while (Belief*Preparedness- Willingness) demonstrates a significant moderation effect ($p < 0.001$) between Belief and Preparedness on Willingness. The unstandardized β coefficient of 0.090 signifies a notable impact, with a critical ratio (CR) of 12.217, indicating vital statistical significance.

Overall, the final path model revealed significant moderation between Belief and Preparedness, indicating that Belief plays a crucial role in shaping Willingness, particularly in conjunction with Preparedness (Figure 4)

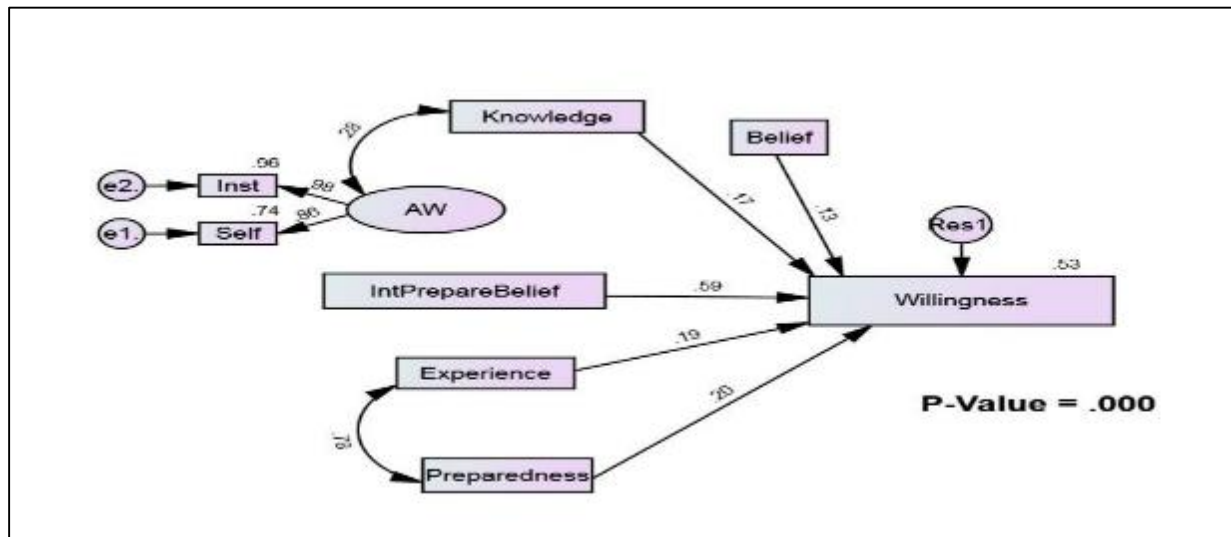


Figure 4 Final Path Model with A Significant Interaction Term (Belief and Preparedness)

4. Discussion

The study revealed significant connections between healthcare providers' Knowledge, Experience, and perceived Preparedness and their Willingness for early ASD detection. Increased Awareness and education about ASD can significantly aid early identification and intervention (Kilicaslan et al., 2022). Surprisingly, no direct link was found between Awareness and Willingness, aligning with previous research by Li et al. (2021) that also reported a lack of association between Awareness and behaviour. It suggests that factors beyond mere Awareness play a more influential role in shaping healthcare providers' Willingness regarding ASD detection.

Healthcare providers are more willing to provide care services despite Knowledge gaps (Al-Hamdan et al., 2022). However, in the context of early detection of ASD, the relationship between healthcare providers' Knowledge and Willingness appears notably different. Studies such as Coyle et al. (2013) demonstrated a significant positive association between Knowledge and Willingness. Specifically, more excellent Knowledge about ASD correlates with an increased Willingness to engage in early detection efforts.

Moreover, multiple studies, such as those by Crane et al. (2019), consistently support a strong association between healthcare professionals' Knowledge levels, self-efficacy, and Willingness. This pattern emphasizes the importance of Knowledge in shaping healthcare providers' confidence and inclination to provide adequate care, underscoring its pivotal role in their readiness to engage with individuals, particularly those with ASD.

Furthermore, Experience emerges as a crucial determinant shaping the impact and effectiveness of healthcare providers, especially concerning their service provision for individuals with specific needs, such as ASD. Studies like Matson et al. (2008) highlight that more seasoned healthcare providers demonstrate enhanced capabilities in recognizing and categorizing problematic behaviours associated with ASD. It underscores the invaluable role Experience plays in honing healthcare professionals' abilities to navigate complex scenarios related to ASD. The insights from Hsieh et al. (2021) further emphasize the significance of prior Experiences in influencing healthcare practitioners' readiness, specifically among preregistered nurses in geriatric long-term care settings. The positive correlation identified between a nurse's Willingness and their accumulated personal life encounters and practical training Experiences underscores how diverse Experiences contribute to readiness within specific care domains.

Moreover, Välimäki et al.'s (2010) research elucidates a similar trend, indicating that nursing and midwifery students' attitudes toward caring variations are shaped by their age and prior nursing Experience. It suggests that cumulative Experiences, whether through clinical practice, training, or personal encounters, significantly contribute to healthcare providers' depth of understanding and responsiveness when dealing with conditions like ASD.

This study's relationship between Preparedness and Willingness underscores a significant positive association. This linkage has been a subject of comprehensive exploration across various domains within the healthcare field, revealing its critical importance (Brugha et al., 2011; Sanchack & Thomas, 2016). Similarly, outcomes delved into the connection between Preparedness among dental care practitioners and their Willingness to assist patients with special needs (Alumran et al., 2018).

The investigation into Belief's moderation effect revealed intriguing nuances regarding its impact on healthcare providers' Willingness, particularly in the context of Preparedness and response actions. The findings notably highlight Belief as a significant moderator, exerting a substantial influence on the relationship between Preparedness and Willingness. It underscores the pivotal role of individuals' Belief systems in shaping their inclination to engage in specific actions, especially when adequately prepared.

However, it is crucial to highlight that Belief significantly influenced the relationship between Preparedness and Willingness. Nevertheless, the statistical analysis revealed no notable moderation effects regarding Awareness, Knowledge, and Experience about Willingness. Belief exhibited a relatively weaker influence in these aspects or was statistically insignificant. This selective impact of Belief underscores its nuanced moderating role within the research framework. While Belief may not influence all aspects of Willingness, its significance in Preparedness remains noteworthy.

Furthermore, these findings bear substantial practical implications, particularly for interventions and educational initiatives that promote active participation in Preparedness and disaster response efforts. Recognizing and addressing Belief-related factors is imperative in motivating individuals to engage actively, especially when adequately prepared. Leveraging the impact of Belief could serve as a crucial focal point in designing more effective strategies to encourage proactive engagement.

Healthcare organizations and policymakers in Jordan would take heed of the noteworthy insights from this study when formulating targeted interventions to nurture healthcare providers' enthusiasm for early ASD detection. This outcome, in turn, holds the potential to significantly enhance the overall quality of life for individuals with ASD. Additionally, the study emphasizes promoting and supporting collaborations among healthcare providers, families, and researchers. It underscores the critical importance of early ASD diagnosis and advocates for designing specific interventions to address the variables influencing this practice.

5. Conclusion

This study offers valuable insights into Belief's role as a moderator within this context. It underscores the significance of Belief in shaping the relationship between Preparedness and Willingness. These findings can guide policymakers, practitioners, and researchers in devising more effective strategies to promote Preparedness and encourage active participation in response efforts. Further research holds promise for a deeper understanding of the interplay between Belief and Preparedness across diverse contexts.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest to be disclosed.

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