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Development and validation of Preschool Psychosocial Resilience Indicators Test for Natural Disasters (PRINDS)

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ABSTRACT

This study was aimed to develop the Preschool Psychosocial Resilience Indicators Test for Natural Disasters (PRINDS), a test designed to assess the psychological resilience of preschool children in the context of disasters. The study was conducted from March 2024 to July 2025 in four kindergartens across two provinces in Turkey, involving 218 children aged between 4 and 6 years. During the process of developing the test, studies were performed on item formulation and content, developmental, face, and construct validity. This study employed both expert opinions and the 'think-aloud' method. The analyses yielded a four-factor structure (67.78% variance): disaster knowledge, first aid, emotional awareness, and coping. The Cronbach's alpha values ranged from 0.78 to 0.83, with a total scale score of 0.87. PRINDS study was determined to be both valid and reliable. The PRINDS offers a comprehensive assessment tool that may contribute to early identification of resilience strengths and development of disaster preparedness strategies.

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KEYWORDS

Natural disasters; preschool education; psychological resilience; scale development; first aid knowledge

1. Introduction

The preschool period is a critical developmental stage characterised by rapid cognitive, social and emotional development and high sensitivity to environmental influences (Likhar, Baghel, and Patil 2022). Young children are among the most vulnerable groups to the negative impacts of disasters due to their limited coping skills, still developing cognitive and emotional regulation processes, and high need for environmental support (Powell, Wegmann, and Backcode 2021). This vulnerability has the potential to engender feelings of insecurity, exerts a detrimental effect on attachment relationships and gives rise to disruptions in learning processes (Masten 2018). However, some children have been observed to demonstrate the capacity to adapt and maintain functionality in the face of highly stressful life events. This capacity is observed through both physical and psychological indicators. Physical indicators include the ability to sustain or swiftly re-establish habitual

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daily routines (e.g. sleep, feeding, and play patterns), accompanied by a gradual decline in stress-related somatic symptoms (e.g. abdominal pain and restlessness) (Zhou et al. 2022). Psychological indicators include age-appropriate emotional expression, regulation skills, seeking caregiver support and returning to play and social interaction after trauma, reflecting key resilience capacities in preschool children (Masten 2021).

Psychological resilience is defined as an individual's capacity to adapt to stress, challenges, and traumatic life events, thereby enabling them to maintain their psychological and social functioning without being affected by negative experiences or by minimising their impact (Zhou et al. 2022). In children, the development of psychological resilience is theorised to emerge from the interplay between individual internal factors and environmental protective factors (Masten 2021). Internal factors encompass characteristics such as self-regulation skills, problem-solving abilities, emotional awareness, and optimism (Mesman, Vreeker, and Hillegers 2021), while environmental protective factors include secure attachment relationships, parental and caregiver support, and school, peer, and community-based social support networks (Masten 2018). A paucity of research exists on the assessment of psychological resilience to disasters, especially in the preschool period. Most extant measurement tools are developed for older age groups and do not adequately reflect the developmental characteristics of young children (Liebenberg, Ungar, and Leblanc 2013; Zuo et al. 2023). Furthermore, there is an increasing need for tools that can assess disaster perception in this age group in a play-based and developmentally appropriate manner (Prasanna et al. 2024). This study aims to develop a visual and game-based, age-appropriate tool to assess psychological resilience in preschool children during disasters, supporting early intervention, risk assessment, and preventive mental health practices (Powell, Wegmann, and Backode 2021).

The term 'disasters' is a broad concept that encompasses natural events which cause sudden and destructive effects, such as earthquakes, floods, fires and hurricanes. In addition to this, it also encompasses human-caused disasters (for example, fires and accidents) and technologically driven disasters (for example, industrial accidents and infrastructure failures). Consequently, disasters represent substantial stressors in children's lives, exerting a significant physical and psychological impact. This study examined the concept of 'disaster', with a primary focus on natural disasters (e.g. earthquakes, floods, fires, avalanches and landslides) that have a significant impact on children's daily lives and engender considerable levels of stress. In consideration of the context of the study, the following five categories of natural disasters are frequently observed in regions such as Turkey. In this context, the psychological resilience of preschool children in the context of disasters is influenced by both individual characteristics and the support systems provided by family, school, and community (Masten 2021). Psychosocial resilience to disasters is defined as the level at which children are able to maintain their well-being, preserve their sense of security, and continue their daily life functions after traumatic events (Satapathy et al. 2022). Consequently, in initiatives focused on enhancing psychological resilience, fostering secure attachment relationships, providing effective parental guidance, and fortifying social support networks, these factors assume paramount importance. This process should be complemented by cultivating children's self-regulation and problem-solving skills (Masten 2018). In conclusion, it can be posited that the capacities of children to adapt to the aftermath of a disaster can be enhanced by

a comprehensive approach to the identification and utilisation of individual and environmental resources (Cadamuro et al. 2021).

In the context of assessing children's knowledge, awareness, and psychosocial resilience regarding disasters, it is evident that various measurement tools have been developed in different countries. However, it is noteworthy that a significant proportion of these scales either prioritize elementary school and older age groups or encompass only specific dimensions (e.g. knowledge level or emotional responses) (Shi et al. 2021). The tools employed in preschool child assessment are predominantly informed by parent or teacher reports, rather than reflecting children's individual perceptions (Liebenberg, Ungar, and Leblanc 2013; Shi et al. 2021; Zuo et al. 2023). Self-report assessments are regarded as the 'gold standard' in research methodology due to their ability to elicit direct expressions of experiences, thoughts, and feelings from the subject, thereby ensuring the accuracy of the results obtained (Lipscomb, Mergulief, and Phelps 2025). The assessment of a complex and abstract concept, such as psychological resilience in preschool children, necessitates methods that are appropriate for children's developmental level, visually supported, and interactive (Guo et al. 2023). This approach facilitates children's articulation of their personal experiences and their capacity for psychological resilience in a comprehensible manner. Additionally, it enables researchers to access valid and reliable data (Quaranta et al. 2025). This study was conducted to develop a 'Preschool Psychosocial Resilience Indicators Test for Natural Disasters (PRINDS)' supported by visual instructions and based on self-reporting, in order to assess the psychological resilience of preschool children in the context of disasters.

2. Methods

2.1. Design

This study was conducted in accordance with the scientific standards of the test development process, with the objective of revealing the psychometric structure of PRINDS. This study is comprised of three stages: item creation, content validity assessment and construct validity and reliability assessment (DeVellis and Thorpe 2021).

2.2. Participants

This study was conducted with children in two different provinces and four different preschool education institutions in Turkey between March 2024 and July 2025. According to the prevailing consensus in the literature on test development, the sample size is recommended to be 5 to 10 times the number of items in the scale (Kennedy 2022). The test's development involved a sample of 218 preschool-aged children.

The study sample consisted of a total of 218 children who were randomly selected from the 4, 5, and 6-year-old age groups. Of these children, 70 were aged 4 years, 77 were aged 5 years and 71 were aged 6 years. The sample comprised 112 (51.4%) female participants and 106 (48.6%) male participants. The children included in the study had no prior experience with disasters. Moreover, the pilot study was conducted with a total of 85 children, and the test-retest reliability analysis was performed with a sample of 30 children (Table 1).

Table 1. Demographic characteristics of participants.

Characteristics	n	%
Age		
4	70	32.1
5	77	35.3
6	71	32.6
Gender		
Female	112	51.4
Male	106	48.6
Total	218	100.0

Note: The pilot study ($n = 85$) and test-retest group ($n = 30$) are described separately in the methods section, independently of the main sample.

2.3. Test development

The test development process was carried out in accordance with the stages of test item creation, content and validity analysis (DeVellis and Thorpe 2021) (Figure 1).

2.3.1. Stage 1: item generation

Step 1 – Literature review: Prior to the development of the test items, a comprehensive national and international literature review (First, Yu, and Houston 2021; Mavhura, Manyangadze, and Aryal 2021) was conducted in accordance with the research objective. During this process, theoretical approaches addressing psychological resilience, early childhood development and disaster education and psychosocial interventions in children were examined. Masten's (2018, 2021) resilience theory was considered particularly fundamental in this study, as it emphasises that adaptation in children develops through the interaction of individual and environmental protective factors. Furthermore, Grotberg's resilience model provided a theoretical basis for emotional coping and social support processes in children (Grotberg 1995). The identification of key areas supporting adaptation to disasters in children was informed by these theoretical frameworks and previous studies. The literature on disaster education identifies the indicators 'disaster awareness' and 'basic first aid knowledge in disasters' as important cognitive-behavioral components for children to learn basic safety behaviors in emergencies and develop awareness of simple first aid practices (Johnson et al. 2014). School-based disaster education programs have been shown to enhance children's fundamental first aid awareness and their capacity to respond appropriately in emergency situations. Social and emotional learning approaches and the literature on emotion regulation in early childhood form the basis of the concepts of 'recognising and responding appropriately to the emotions of others' and 'emotional coping skills' (Denham and Denham 2006; Eisenberg, Spinrad, and Eggum 2010). In this context, these indicators are regarded as a holistic structure encompassing not only children's knowledge level but also their emotional and social adaptation skills in disaster situations.

Step 2 – Story Creation: The test was developed by researchers as a narrative structure, with questions created for each story. The narrative focuses on a group of five friends and their teacher who are enrolled in a preschool. The teacher is represented by a rabbit character, and the children by different animal characters. Each character is depicted in a different disaster scenario. The characters are as

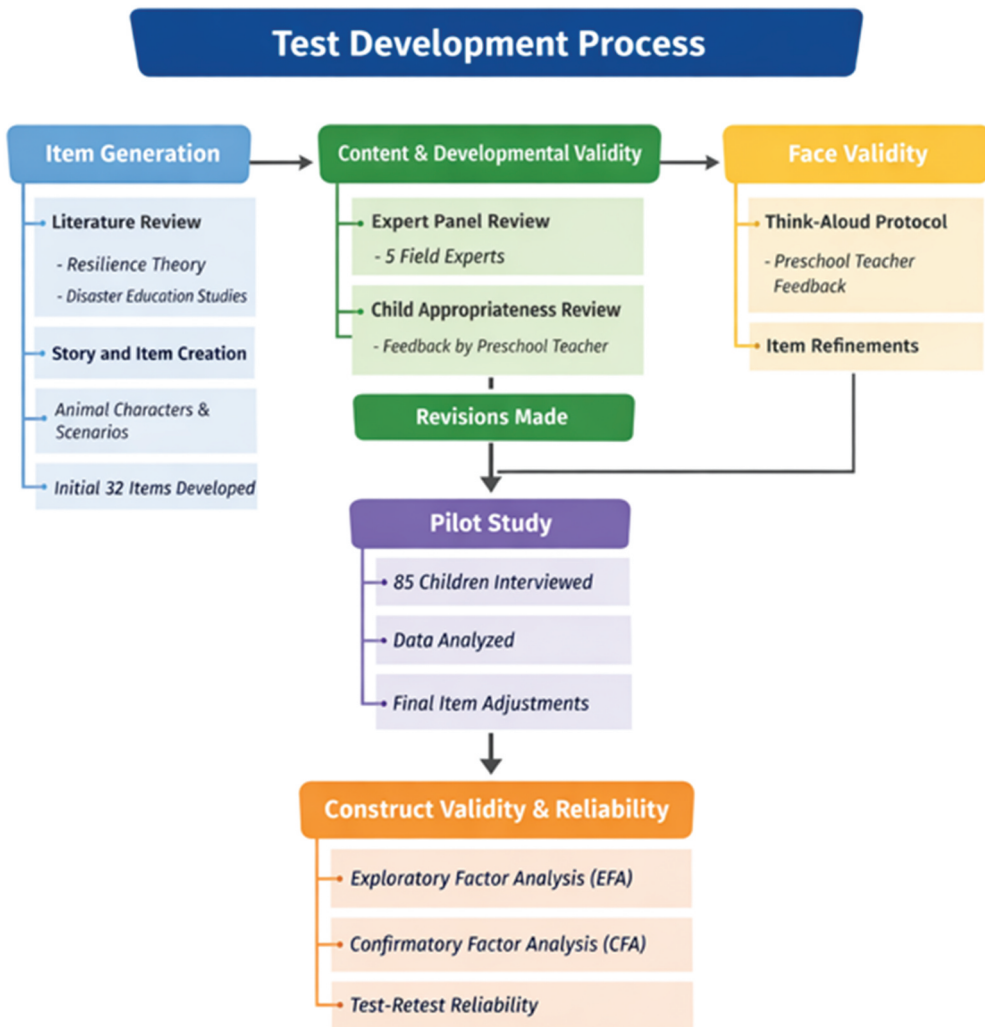


Figure 1. Test development process flowchart.

follows: Pamuksis, which is associated with the 2011 Van earthquake; Sülünsu, which is representative of the 2022 Bartın flood; Tospa, which is representative of a fire; Köpük, which is representative of an avalanche; and Kıtır, which is representative of a landslide. The inclusion of the Kuvak character in the flood scenario is presented without a separate narrative flow in order to assess the children's attention span.

The images concentrate on first aid, while images four through nine are dedicated to earthquake, flood, fire, avalanche, and landslide scenarios in a classroom setting. Each image comprises four questions: firstly, what course of action should the character adopt in a disaster; secondly, an assessment of the character's emotions; thirdly, their post-disaster behaviour; and fourthly, what measures can be implemented to assist the character in feeling better. The test images were prepared by two art teachers under the guidance of a faculty member from the Department of Fine Arts Education, and were

revised a total of five times during the process. In its final form, the test consists of 32 items; the number of items remains constant, with only the wording having been revised.

2.3.2. Stage 2: content, developmental and face validity

Among the types of validity, content validity, criterion validity, and construct validity are regarded as the fundamental types (Almanasreh, Moles, and Chen 2019). Furthermore, while face validity provides evidence for the internal validity of the research, the generalizability of the results is evaluated in terms of external validity (Findley, Kikuta, and Denly 2015).

Step 1: Expert Panel Review: Content validity is defined as the extent to which the items in a measurement instrument represent the target domain (Almanasreh, Moles, and Chen 2019). To this end, a panel of five experts was convened; expert opinions were obtained in the fields of psychological resilience, first aid, disaster education, and measurement and evaluation. In accordance with the recommendations proffered by experts in the field, a series of adjustments were implemented to the test prior to the implementation of the think-aloud protocol. For instance, an expert in the field of psychological counselling has asserted that the phrase 'disasters are natural events' is inappropriate and has been revised to 'disasters are events that can be encountered at any time and that preparation is necessary to mitigate their effects'. Following psychological counselling expert feedback, the sixth visual was revised and added to the fifth version.

Step 2 – Child Appropriateness Review: Developmental validity is defined as the appropriateness of the test to the developmental level of the age group to which it is administered, as well as the comprehensibility of the items by children (Woolley, Benjamin, and Woolley 2004). In this context, two faculty members specialising in Preschool Education/Child Development were consulted for their opinions. A team of experts conducted a thorough examination of the developmental appropriateness of the test, subsequently proposing a range of recommendations for consideration. For instance, it was observed that the phrase 'life-saving measures ...' in the third image was abstract for children and was revised to 'First aid is measures taken in accident situations'. Following a series of revisions, the experts reached a consensus that the test was developmentally appropriate.

Step 3 – Think- Aloud Protocol and Item Refinements: Face validity is a methodological principle that aims to assess whether test items are comprehensible to the target audience (Ahmed and Ishtiaq 2021). To this end, an online think-aloud protocol was conducted with a preschool teacher who had 5 years of experience in preschool teaching and 9 years of volunteer work in civil society organizations in the field of education for disadvantaged children. In the think-aloud protocol, the teacher rephrased the test items according to her own understanding and provided immediate feedback on questions related to each visual (Long and Bourg 1996). The feedback obtained from this process was used to review the test items prior to the pilot test.

2.3.3. Stage 3: construct validity and reliability

Step 1: Exploratory Factor Analysis: At the EFA stage, the adequacy of the sample for analysis was evaluated using the Kaiser–Meyer–Olkin (KMO) ≥ 0.70 (Kaiser 1970) and Bartlett's sphericity test with $p < 0.05$ (Bartlett 1950). In order to examine the potential factor structure of PRINDS, Principal Component Analysis (PCA) with varimax rotation was

performed based on the data from the first subsample. PCA is a widely utilised technique in the field of scale development studies. It is employed to summarise the structure between variables and to reveal the initial factor structure. In this study, the method was employed to ascertain the underlying dimensions of the items.

Step 2 – Confirmatory Factor Analysis: Confirmatory factor analysis (CFA) procedure was implemented to ascertain the viability of the structure derived from Exploratory factor analysis (EFA). In this study, the fit indices of CFA were examined (Marsh et al. 2020).

In this study, a combination of EFA and CFA was employed on a single sample. Ideally, these analyses would be performed on independent samples; however, this distinction could not be made in this study due to the limited sample size.

Step 3 – Internal Consistency and Test–Retest Reliability: The internal consistency of PRINDS was examined using Cronbach’s alpha coefficients and corrected item-subscale correlations. The relationships between the factors of the test were examined using Pearson correlation analysis. To ascertain the test’s consistency over time, a test–retest reliability analysis was conducted. In this context, the correlation coefficients between the scores obtained from the tests administered to 30 participants 8 weeks apart were calculated.

2.4. Pilot study

As part of the pilot study, face-to-face interviews were conducted with a total of 85 children from a variety of schools after obtaining parental and child consent. Prior to the commencement of the research, the school principals and teachers were informed, and then the research content was explained to the parents, and their written consent was obtained. The interviews were conducted in environments that were both quiet and suitable, as provided by the educational institutions. The data presented herein were collected through individual interviews conducted by two field experts and one preschool teacher. The recordings were then subjected to analysis by the two experts. The final version of the test was created based on the results. In the course of the interviews, it was noted that the children followed the narratives and visual materials with great care, readily identifying with the characters and responding to the questions with a high level of interest. The analysis demonstrated that the items were answered correctly and consistently. Consequently, the pilot application was continued with 32 items, and the number of items was not altered.

2.5. Analysis

In this study, responses obtained from children through open-ended questions were collected as qualitative data. The responses were then subjected to thematic analysis in accordance with the pre-established analysis protocol (Table 2). In this process, the children’s statements were coded under two main categories: The two key competencies are ‘First Aid/Disaster Awareness’ and ‘Recognising the Feelings of Others and Responding Empathetically’.

Table 2. Thematic analysis protocol.

Element/Task	Criteria	2 Points	1 Point	0 Points
First Aid/ Disaster Awareness	Knows the multi-step behaviors necessary for first aid/disaster awareness	Correct multi-step basic behaviors	Partially correct basic behaviors	No inappropriate behavior/response
Identifying and Responding to Others' Emotions	Accurately naming the emotions felt by others and responding empathetically	Correctly naming the emotions felt by others and responding empathetically	Partially correct emotion labeling and less empathetic responses	No mislabeling of emotions and no empathetic response

During the coding process, each response was assigned a score of 2, 1, or 0 according to the established criteria. A total of two points was awarded for responses that were both correct and multi-stage/appropriate. A total of one point was awarded for responses that were partially correct. No points were awarded for responses that were inadequate or inappropriate. Consequently, the qualitative data were systematically quantified and transformed into a dataset suitable for quantitative analysis.

The validity and reliability of the test were analysed using EFA, CFA, and internal consistency analyses, based on the obtained scores. In this approach, content analysis was used solely as a coding process that provided a structured scoring of open-ended responses; the final analyses were conducted entirely using quantitative methods.

2.6. Ethics

Prior to the commencement of the research, ethical approval was obtained from the Bartın University Social and Human Sciences Ethics Committee (Protocol No: 2023-SBB-0307; Date: 28 April 2023), and the necessary permissions were obtained from the Provincial Directorate of National Education (No: 73 357 114; Date: 29 March 2023). The research process was founded on the principles of voluntariness, confidentiality, and the protection of participant rights. In this context, written informed consent was obtained from parents, and the research was explained to the children using language appropriate to their age and level of understanding (e.g. 'We will talk about some pictures; you can say if you do not want to participate'), and their verbal consent was obtained. The children were informed that they were at liberty to depart from the study at any time; their verbal and non-verbal responses were monitored during the data collection process, and the participation of children exhibiting signs of unwillingness or discomfort was terminated.

The scenarios and visual materials employed in the research were meticulously prepared to align with the developmental level of the participants, with particular attention given to the potential for adverse emotional responses. The emotional responses of the children participating in the study were closely monitored throughout the application process. In the event that the children indicated feelings of discomfort, the application was promptly halted and they were provided with a supportive explanation. In instances where the well-being of the children was at risk, collaboration with teaching staff was ensured in order to protect said well-being. All data were collected anonymously and used exclusively for scientific purposes.

3. Results

3.1. Validity

In the initial phase of the EFA, the KMO value was determined to be 0.769, and the Bartlett’s sphericity test yielded a significant result ($\chi^2 = 4729.379$, $p < 0.001$). The results suggest that the dataset is appropriate for factor analysis and that there is a sufficient level of relationship between the variables. In the analysis conducted with data from 218 participants, PCA method was employed; factors were obtained using Varimax rotation and Kaiser normalization. The four-factor structure with eigenvalues greater than 1 accounts for 67.784% of the total variance (Figure 2). This rate fulfils the criterion of explained variance in excess of 50%, which is accepted in the field of social sciences, thereby demonstrating that PRINDS possesses a robust structural foundation.

An examination of the factor loadings revealed that all items exhibited eigenvalues greater than 0.50, with a range extending from 0.501 to 0.862. The factor loadings for the items under the first factor (Disaster Knowledge) ranged from 0.561 to 0.776; for the second factor (First Aid), from 0.501 to 0.793; for the third factor (Emotional Awareness), from 0.509 to 0.862; and for the fourth factor (Emotional Coping), from 0.575 to 0.775. It is evident that the values indicated herein demonstrate that each item is a suitable representative of its respective factor, thereby ensuring the consistency of the factor structure. In particular, loading values of 0.70 and above indicate a strong correlation, revealing a high level of item-factor fit in some sub-dimensions of PRINDS (Table 3).

The results of the confirmatory factor analysis demonstrate that the model fit is at an acceptable level. The chi-square/degrees of freedom (χ^2/df) ratio of 2.425 indicates a good fit (i.e. <3). An RMSEA value of 0.09 indicates that the model exhibits an acceptable, albeit borderline, fit. This finding suggests that the model displays a reasonable degree of alignment with the data, though it is acknowledged that further refinement is possible.

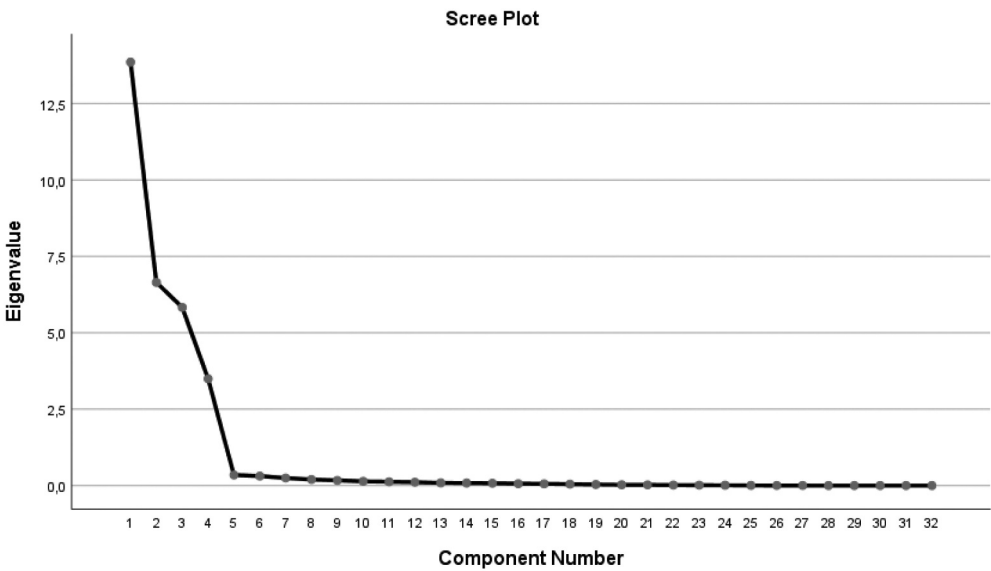


Figure 2. Slope of the slope graph showing that the test has a factor with an eigenvalue > 1 .

Table 3. Results of exploratory factor analysis ($n = 218$).

Item	Factors			
	Disaster Awareness	First Aid	Emotional Awareness	Emotional Coping
i3.2	0.561			
i3.3	0.656			
i4.1	0.755			
i5.1	0.672			
i6.1	0.563			
i7.1	0.571			
i8.1	0.654			
i9.1	0.762			
i9.2	0.776			
i2.1		0.608		
i2.2		0.793		
i3.1		0.783		
i4.3		0.637		
i5.3		0.501		
i6.3		0.765		
i7.3		0.607		
i8.3		0.760		
i2.3			0.712	
i3.4			0.857	
i4.2			0.635	
i5.2			0.827	
i6.2			0.735	
i7.2			0.509	
i8.2			0.623	
i9.3			0.862	
i2.4				0.654
i4.4				0.775
i5.4				0.575
i6.4				0.674
i7.4				0.758
i8.4				0.659
i9.4				0.652

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization.

The CFI (0.91) and AGFI (0.91) values, which are above 0.90, provide evidence that the model fits the data adequately. A GFI value of 0.96 is indicative of a high overall fit of the model. Conversely, a low NFI value suggests that certain aspects of the model may require refinement. However, the generally acceptable fit indices indicate that the model exhibits a sufficient overall fit (Figure 3).

When the results are considered as a whole, it can be concluded that PRINDS has been shown to possess construct validity. The items are grouped into a meaningful way under the relevant factors, the factor loadings are at a sufficient level, and the confirmatory factor analysis results show a generally acceptable fit. This reveals that the developed measurement instrument presents a valid and multidimensional structure.

3.2. Reliability

As illustrated in Table 4, the mean, standard deviation, item-total score correlations, and Cronbach's Alpha values for the items are presented. Item-total score correlations ranging from 0.403 to 0.743 indicate that all items are consistent with PRINDS as a whole and that their discrimination levels are sufficient (≥ 0.30 is acceptable).

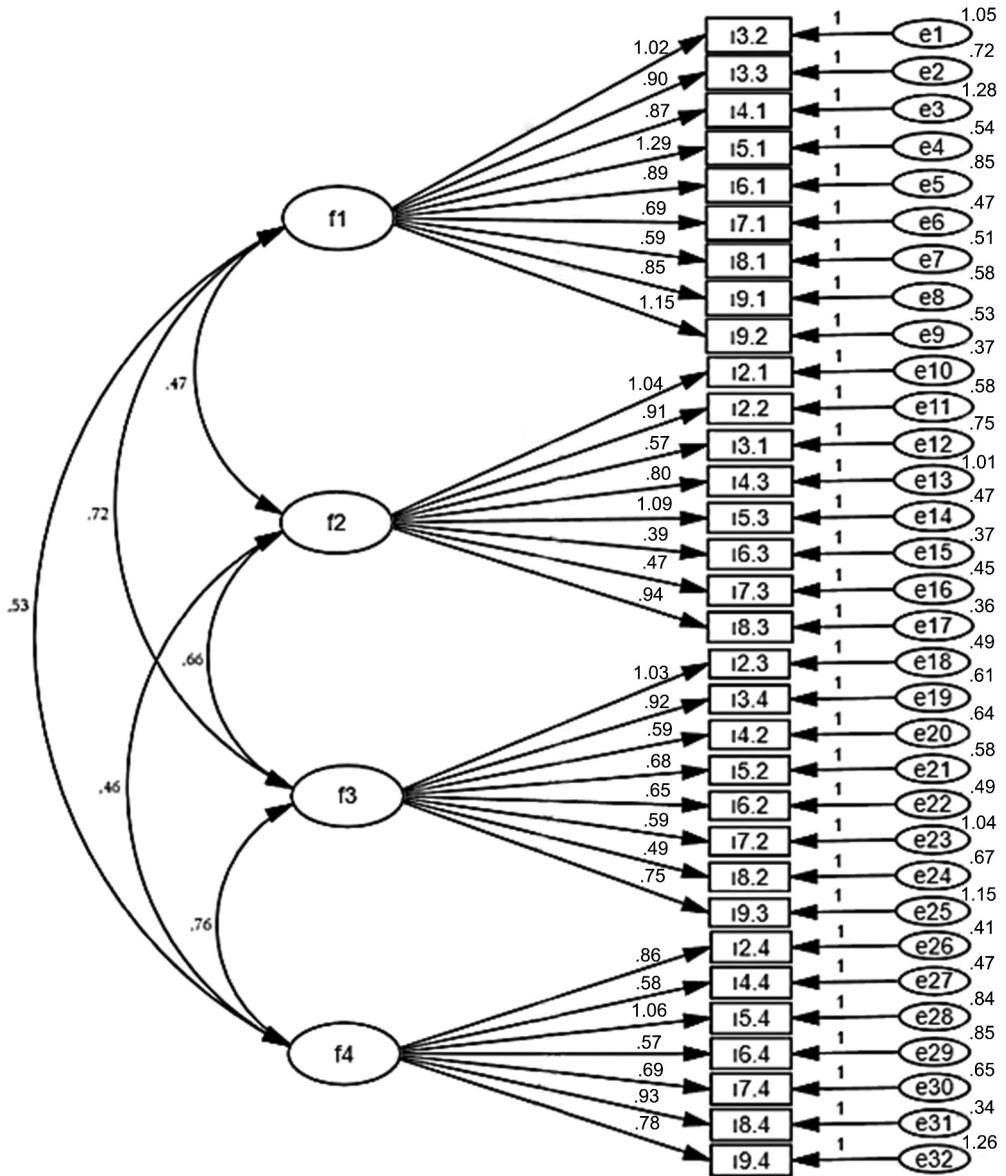


Figure 3. Standardized values for the test.

The sub-dimensions are defined as disaster knowledge, first aid, emotional awareness, and emotional coping. The disaster knowledge dimension measures children's cognitive levels regarding types of disasters and basic protection information; the first aid dimension measures their basic intervention knowledge in disaster situations; the emotional awareness dimension measures their ability to recognise and express emotions related to disasters; and the emotional coping dimension measures their ability to cope with stressful situations and emotional regulation skills. Each factor represents the primary indicators that the measurement instrument is designed to evaluate (Table 4).

Table 4. Reliability analysis results ($n = 218$).

Factors	Items	Mean	Standart Deviation	Item Total Score Correlations	Cronbach's Alpha (Factor)	Cronbach's Alpha (Total)
Disaster Awareness	i3.2	1.08	0.96	0.638	0.83	0.87
	i3.3	1.06	0.95	0.432		
	i4.1	1.08	0.95	0.720		
	i5.1	1.09	0.96	0.539		
	i6.1	1.07	0.96	0.434		
	i7.1	1.09	0.97	0.445		
	i8.1	1.06	0.96	0.422		
	i9.1	1.07	0.96	0.619		
First Aid	i9.2	1.10	0.96	0.743	0.79	
	i2.1	1.60	0.65	0.509		
	i2.2	1.59	0.65	0.478		
	i3.1	1.59	0.65	0.496		
	i4.3	1.60	0.65	0.493		
	i5.3	1.59	0.65	0.503		
	i6.3	1.64	0.61	0.551		
	i7.3	1.60	0.65	0.557		
Emotional Awareness	i8.3	1.62	0.62	0.546	0.81	
	i2.3	1.65	0.69	0.422		
	i3.4	1.62	0.71	0.418		
	i4.2	1.68	0.66	0.503		
	i5.2	1.61	0.71	0.600		
	i6.2	1.68	0.66	0.403		
	i7.2	1.65	0.69	0.680		
	i8.2	1.65	0.67	0.688		
Emotional Coping	i9.3	1.60	0.72	0.640	0.78	
	i2.4	0.95	0.82	0.545		
	i4.4	0.94	0.80	0.442		
	i5.4	0.96	0.81	0.442		
	i6.4	0.97	0.82	0.546		
	i7.4	0.96	0.83	0.520		
	i8.4	0.95	0.81	0.457		
	i9.4	0.95	0.88	0.566		

The sub-dimensions of PRINDS are defined as disaster knowledge, first aid, emotional awareness, and emotional coping. The dimensions of PRINDS have been determined to measure children's cognitive disaster knowledge, basic first aid knowledge, ability to recognise and express emotions and stress coping skills, respectively. In factor-based reliability analyses, Cronbach's Alpha coefficients were found to be 0.83, 0.79, 0.81, and 0.78, respectively. These values indicate that the internal consistency of the sub-dimensions is above acceptable and largely high (≥ 0.70 acceptable, ≥ 0.80 high). The total Cronbach's Alpha coefficient of 0.87 indicates that all items consistently measure the same construct and that PRINDS as a whole is highly reliable. Upon examination of the interfactor correlations, it was found that all sub-dimensions exhibited positive and significant relationships. The moderate level of these relationships indicates that the sub-dimensions are related but conceptually distinguishable constructs. Furthermore, the high and significant correlations between the sub-dimensions and the total score ($r = 0.579\text{--}0.771$) support the hypothesis that each sub-dimension makes a significant contribution to the overall construct being measured (Table 5).

In the test-retest analysis, the high correlation coefficients obtained for the sub-dimensions ($r = 0.806\text{--}0.846$) and $r = 0.884$ value found for the total score indicate that

Table 5. Factor scores and correlations between factors ($n = 218$).

Factor	Disaster Awareness	First Aid	Emotional Awareness	Emotional Coping	Total
Disaster Awareness	1				
First Aid	0.278**	1			
Emotional Awareness	0.337**	0.372**	1		
Emotional Coping	0.196*	0.371**	0.392**	1	
Total	0.771**	0.579**	0.733**	0.588**	1

* $p < 0.05$, ** $p < 0.001$.

Table 6. Test–retest analysis results ($n = 30$).

Test Re-test	Disaster Awareness	First Aid	Emotional Awareness	Emotional Coping	Total
Disaster Awareness	0.846**				
First Aid	0.683**	0.816**			
Emotional Awareness	0.665**	0.706**	0.835**		
Emotional Coping	0.680*	0.669**	0.721**	0.806**	
Total	0.772**	0.793**	0.826**	0.783**	0.884**

* $p < 0.05$, ** $p < 0.001$.

PRINDS provides consistent measurements over time. The results demonstrate that the measurement instrument is reliable in two respects: in terms of internal consistency, and in terms of stability over time (Table 6).

4. Discussion

The results demonstrated that PRINDS, developed to assess psychosocial resilience indicators related to natural disasters in preschool children, is a valid and reliable measurement tool. The results obtained provide substantial evidence regarding PRINDS's construct validity and reliability. The results indicated that PRINDS is a valuable tool that can be used to assess cognitive and affective indicators in the context of disasters in preschool children.

The results demonstrated that PRINDS possesses a four-factor structure, comprising disaster knowledge, first aid, emotional awareness, and emotional coping. In the pre-school period, there is evidence to suggest that children's cognitive and affective development levels show a limited but developing structure in terms of knowledge and skills related to disasters. In this developmental stage, children's learning is primarily characterised by the acquisition of concrete experiences, as opposed to the conceptual understanding of abstract concepts that is typically expected at later stages of development (Piaget and Inhelder 2008). Consequently, disaster knowledge, first aid, and coping should be evaluated as 'early awareness and basic orientations' rather than 'full competence'. Masten (2018) emphasises that resilience in early childhood is a continuous developmental process shaped by environmental factors. In this context, PRINDS evaluates fundamental cognitive and affective indicators associated with disasters, taking into account the developmental limitations of preschool children.

The four-factor structure of PRINDS was found to be consistent with indicators of cognitive, affective, and behavioural psychosocial resilience in children in a disaster context (Mavhura, Manyangadze, and Aryal 2021). While the knowledge and skills of preschool children regarding disasters are developmentally limited, it is possible for

them to learn basic safety rules, recognise emotions, and develop simple coping strategies during this period. Masten (2018) underscores the significance of emotional regulation and secure attachment experiences during early childhood in establishing the foundation for resilience in later life. Proulx and Aboud (2019) asserts that visual, play-based, and emotionally aware approaches are more effective in disaster education for this age group. Consequently, the dimensions incorporated within PRINDS are structured in a manner commensurate with children's developmental capacity. Consequently, these dimensions should be evaluated as early developmental indicators as opposed to clinical skill levels. Moreover, the approach of examining disaster awareness and first aid as discrete factors underscores the necessity to evaluate not only cognitive preparedness but also fundamental practical awareness (Widowati, Istiono, and Husodo 2021). In a similar vein, the correlation between emotional awareness and emotional coping mechanisms underscores the significance of recognising and regulating emotions in the context of post-disaster adaptation processes (Bonanno, Romero, and Klein 2015). The scale's scenario and visual-based structure offer a measurement approach suitable for the cognitive and language development levels of preschool children (Guo et al. 2023), and the literature supports the fact that such materials provide more reliable data (Prasanna et al. 2024). In this respect, PRINDS contributes to the limited tools that assess psychosocial indicators in the context of disasters in the preschool period (Masten 2021) and has the potential to be used in educational settings (AlAli et al. 2024).

A plethora of scales assessing disaster awareness and psychosocial resilience have been documented in the extant literature. The Resilience Scale utilised in adolescents (Shi et al. 2021) assesses general aspects of psychological resilience, including personal competence and life acceptance. Concurrently, the Child and Youth Resilience Measure and the Resilience Scale were developed to assess general psychosocial resilience in children and adolescents (Liebenberg, Ungar, and Leblanc 2013; Zuo et al. 2023). The capacity of these instruments to address cognitive and affective indicators specific to the disaster context is limited. The ARDT-Q37, a tool designed for use among adolescents, has been developed for the purpose of directly measuring resilience in a disaster context. It should be noted that the tool does not include the preschool group. PRINDS is a multidimensional instrument that assesses both cognitive and affective indicators, such as disaster knowledge, first aid, emotional awareness, and emotional coping. PRINDS's distinguishing feature is its exclusive focus on the preschool period, incorporating a comprehensive set of psychosocial indicators that are particularly pertinent to disaster contexts.

The future application of PRINDS is not envisaged as being limited to a single type of disaster, but rather as a potential instrument for the evaluation of children's psychosocial preparedness levels in a variety of disaster contexts (e.g. earthquake, flood and fire). The extant literature on disaster risk management demonstrates that education on disaster preparedness, imparted from an early age, can enhance the overall capacity to contend with diverse forms of disasters (Adams et al. 2022). The generalisability of PRINDS may be enhanced through retesting in diverse cultural and risk contexts. PRINDS offers an assessment framework that can be adapted to multiple disaster scenarios in the future.

In the early stages of childhood, resilience is understood to be a dynamic process that is shaped by environmental support, education and experiences. This perspective contrasts with the notion of resilience as an individual trait. Consequently, as opposed to the

direct measurement of resilience, PRINDS unveils cognitive and affective indicators that form the basis for its development (Shi et al. 2021). It has been reported that the initiation of disaster education and psychosocial support programs at an early age can contribute to children's capacity to cope with stress in later life (AlAli et al. 2024). In this regard, PRINDS can be regarded as a complementary instrument that can facilitate early assessment and educational planning in the preschool period.

4.1. Limitations

The present study is not without its limitations. Due to the absence of alternative tools that would allow for the measurement of disaster resilience in terms of criterion validity, no comparative analyses were conducted. In the future, cross-validation studies employing diverse criteria will offer a more comprehensive assessment of the test's measurement capabilities. It is important to note that the test was developed and administered exclusively to participants in preschool children who had not experienced a natural disaster. Consequently, the validity and sensitivity of the test in children exposed to post-disaster conditions remain uncertain. Consequently, future research should involve a comparison of children who have and have not experienced a disaster. This will facilitate a more comprehensive evaluation of the impact of disaster experiences on children's health, behavior, and adaptation processes.

5. Conclusion

This study has demonstrated that PRINDS, a tool designed to evaluate psychosocial resilience indicators associated with natural disasters in preschool children, is a valid and reliable measurement instrument. PRINDS's scenario- and visual-based structure was found to be effective in attracting children's attention and understanding the items, and it was also deemed developmentally appropriate by expert opinions. Reliability analyses indicated that PRINDS demonstrated adequate internal consistency, and the eight-week test-retest results exhibited acceptable stability over time.

The results suggest that PRINDS is a promising tool for assessing psychosocial indicators related to disasters in preschool children. However, given that the study was conducted with a sample of children who had not experienced a real disaster and that the criterion validity of PRINDS had not been examined, caution should be exercised when using PRINDS to identify at-risk children or in post-disaster clinical intervention processes. It is recommended that future studies be conducted to test PRINDS in different samples and cultural contexts and to conduct criterion and predictive validity studies. Such studies will serve to strengthen PRINDS's application value in disaster education and child development.

5.1. Implications for practice

PRINDS, which was developed through this study, enables a comprehensive evaluation of preschool children's disaster awareness, first aid knowledge, and psychological resilience. PRINDS has been developed to assist social workers operating within disaster-prone regions in the early identification of children's resilience levels, thereby facilitating the

implementation of more effective intervention programs for children who are at risk. PRINDS can be utilised as a tool in the development of disaster education curricula in preschool institutions, thereby assisting teachers in more accurately identifying children's specific needs. The results of this study have the potential to inform the development of information, counselling and parent education programs, with the aim of enhancing children's disaster coping skills. The emotional awareness and coping subscales facilitate the identification of children's emotional needs in post-disaster psychosocial support practices by social workers. PRINDS can be used as an important tool in the development of early disaster preparedness, protective and preventive practices, and psychosocial support services in the social work field.

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Data availability statement

The data that support the results of this study are available from the corresponding author upon reasonable request.

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