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Research Article

Development of a Scale to Address Perceptions of Pre-service Teachers Regarding Online Risks for Children*

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Abstract

Children's ever-increasing and autonomous engagement with the internet exposes them to online risks, especially when parental supervision is limited. Furthermore, media coverage highlighting negative online experiences increases adults' risk perceptions, which in turn jeopardize children's sustainable and beneficial engagement with the internet. This picture suggests stakeholders' perceived risks regarding children's internet safety is a significant factor and research topic. The aim of the current study is to report on the validity and reliability studies of the Perceived Online Risks Scale for Pre-service Teachers. Development studies began with a literature review of online risks frameworks and perceived risk measurement forms. Findings of the literature review were evaluated through an expert panel with scholars and key stakeholders related to children's internet safety, which supported the content validity. Face validity was tested through expert reviews and pilot examinations. An initial form was prepared and gradually reviewed through consultations with teachers, teacher educators, and scholars. Final evaluation of face validity was performed with 40 pre-service primary school teachers. Construct validity of the scale was tested through factor analyses. Reliability of the form was investigated with internal consistency coefficient and test-retest stability methods. Analyses resulted in a 20-item form with six factors and findings indicate that the form is a valid and reliable instrument.

Keywords

Pre-service teacher • Perceived risk • Internet safety for children • Online risks • Primary school teacher

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High penetration rates and rapid integration of Information and Communication Technologies [ICTs] into our daily lives have promoted them as a layer of our individual and social life spheres (Odabaşı, Kabakçı, & Çoklar, 2007). Gaining momentum from fast, easy, and affordable access via broadband and mobile internet services, the internet is now readily available for children within households and schools (Chou & Peng, 2011). Recent studies suggest the internet is second nature to children and that their access is both mobile and autonomous (Livingstone, Haddon, Görzig, & Olafsson, 2011). Despite the number of terms (e.g., digital native, millennials, network generation) signaling children's fluency with the internet and digital technologies, their experiences with the internet are challenged (Valcke, Bonte, De Wever, & Rots, 2010). Children's online experiences include both opportunities (e.g., online learning and digital citizenship) and risks (e.g., cyberbullying and internet addiction) (Chang, 2010; Gasser, Maclay, & Palfrey, 2010; Smahel et al., 2012). Several studies have reported the problems encountered by children while engaged with the internet (Jones, Mitchell, & Finkelhor, 2012; Livingstone, Davidson, Bryce, Hargrave, & Grove-Hills, 2012; Valcke, De Wever, Van Keer, & Schellens, 2011; Walrave, n.d.). For example, a recent report from research conducted across the European Union [EU] suggested that one out of every four Turkish children (25%) had encountered online risks and the EU average was as high as 33% (Kaşıkçı, Çağıltay, Karakuş, Kurşun, & Ogan, 2014). Furthermore, the same study reported that EU children experienced a variety of online risks, which included under-age social network membership (33%), sharing sensitive information (85%), encountering inappropriate sexual content (13%), sending (4%) and receiving (12%) sexual messages, cyberbullying (3%), making online friends (14%), and meeting online friends face-to-face (2%). Such reports emphasized that children who lack the required *e-literacies* are more vulnerable to online risks.

Several studies have sought to identify and classify online risks. In an early attempt, Jantz and McMurray (1998, as cited in Chou & Peng, 2011) classified online risks under the broad themes of content-related and communication-related. Aftab (2000) took a more elaborative approach and classified online risks under six themes: inappropriate and harmful content, cyber-stalking, online harassment, disclosure of sensitive information, cyber-grooming, and online-purchase frauds. Poftak (2002) used a similar classification with pornography, hacking, copyright issues, cyberbullying, and inappropriate relationships with adults. DeMoor et al. (2008, as cited in Valcke et al., 2011) adopted a structural approach and categorized online risks under content, contact, and commercial risks themes. Content risks covered exposure to provocative content and incorrect information. Contact risks were elaborated under online and offline themes, where online risks covered cyberbullying, sexual solicitation, and privacy risks. Commercial exploitation and unwanted collection of personal data were included within the commercial risks category. Organization for Economic Co-operation and Development (OECD, 2011) created a comprehensive categorization with three themes. In this categorization, internet technology risks covered content (e.g., illegal content) and contact (e.g., cyberbullying) risks. Consumer-related risks were related to online marketing (e.g., buying illegal or age-restricted products), overspending, and fraudulent transactions. The final theme covered information security (e.g., spywares) and information privacy (e.g., over-sharing personal information) risks. Hasebrink, Livingstone, Haddon, and Olafsson (2009) analyzed online risks under commercial interests, aggression, sexuality, and values/ideology themes. Notably, this categorization was unique as it considered the role of the child. The commercial interests theme covered risks related to commercial exploitation of children and copyright infringement acts with a focus on the child. The aggression theme involved encounters with violent web content, cyberbullying victimization, and cyberbullying acts. The sexuality theme dealt with children's problematic interaction with sexual content and contacts (e.g., sexual content, pornographic web sites, and grooming). Lastly, the values and ideology theme elaborated upon the risks of biased information, racism, and misinformation. In sum, these reports highlight the wide repertoire of online risks and their transformative nature with respect to development of internet technologies.

Technology-induced risks are major topics of interests within scientific, industrial, and public policy arenas (Fischhoff, Watson, & Hope, 1984). Since risks and affordances of any technology are firmly connected, risk reduction endeavors may result in the loss of affordances, which raise social dilemmas (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978). Societies frequently demand policy-makers to weigh the risks and affordances of recent technologies and manage social integration processes. Whether on the individual or societal level, perceived risk is a very important factor in technology-related decision processes (Morgan, 1990). Perceived risk has been researched across several domains, including environment, nuclear energy, technology, marketing, social policy, medicine, and informatics (Belanche, Casaló, & Guinalíu, 2012; Dowling & Staelin, 1994; Slovic, 1993; Sweeney, Soutar, & Johnson, 1999). Despite this widespread repertoire, perceived risk remains an unclear term that is defined by one's perception of the probability of realization and seriousness of consequences (Sjöberg, 2000). Perceived risk is increased when the probability of the event increases and expected consequences grow worse (Sjöberg, 1999). There are several identified antecedents of perceived risk, such as perceived probability, seriousness of consequences, direct or indirect risk experience, risk target, perceived control, possible loss types, and voluntary or involuntary exposure to risk (Dowling, 1986; Sjöberg, 2000; Starr, 1969).

Common approaches like filtering software, law enforcement, or limiting children's access to the internet generally fail to protect children from online risks. This problem requires collaborative efforts from all stakeholders, including children themselves, peers, parents, teachers, and industry and government agencies (Chang, 2010; Duerager & Livingstone, 2012; Livingstone et al., 2012). Several studies have assumed teachers as influential stakeholders for the protection of children from online risks. For example, Livingstone et al. (2011) asserted that the school system and teachers are influential social stakeholders. Furthermore, Palfrey and Gasser (2013) regarded family, peers, and teachers as powerful references for children concerning internet safety. In addition, many studies have documented teachers' roles in the protection of children from online risks. For instance, Livingstone et al. (2012) reported 24% of sexually abused children consulted their teachers. Berson, Berson, and Berson (2002) highlighted that supervision and discussion concerning online activities with significant adults (parents and teachers) reduced children's risk taking (e.g., making online friends or meeting them face-to-face) rates. These findings place teachers into crucial roles for saving children from online risks, especially when parents and peers lack the adequate protective, supervisory, or proactive skills. Therefore, teachers must have the skills and vision to supervise children regarding online risks (Akbulut, 2011; Berson et al., 2002; Byron, 2008). Perceived risk is a very important factor for individual actions and vision (e.g., information searching, taking precautions, or intervening) towards a phenomenon (Burger, Strohmeier, Spröber, Bauman, & Rigby, 2015; Griffin, Dunwoody, & Neuwirth, 1999; Rogers & Prentice-Dunn, 1997). However, related literature is rather scarce concerning teachers' perceived risk about online risks that threaten children. Thus, the aim of the current study is to increase the breadth of this topic by reporting the validity and reliability studies of the *Perceived Online Risks Scale for Pre-service Teachers*.

Methodology

Figure 1 depicts stages, aims, and procedures undertaken for this scale development study. The first five stages exerted literature reviews and expert consultations to ensure content and face validity. The following stages covered data collection through survey methodology. Participants of these surveys were pre-service primary school teachers who were studying at various Turkish state universities. Data were collected until meeting the suggested minimum criteria for the chosen analyses. Sample sizes for the pilot study, Exploratory Factor Analysis [EFA] and Confirmatory Factor Analysis [CFA] stages were 40, 392, and 272, respectively. Data gathered for the CFA were also used for reliability analysis. Researchers administered the final form of the scale to 50 pre-service teachers for investigating test-retest reliability on a bi-monthly schedule. Further information on procedures and data collection is detailed under the associated stage within the Findings section.

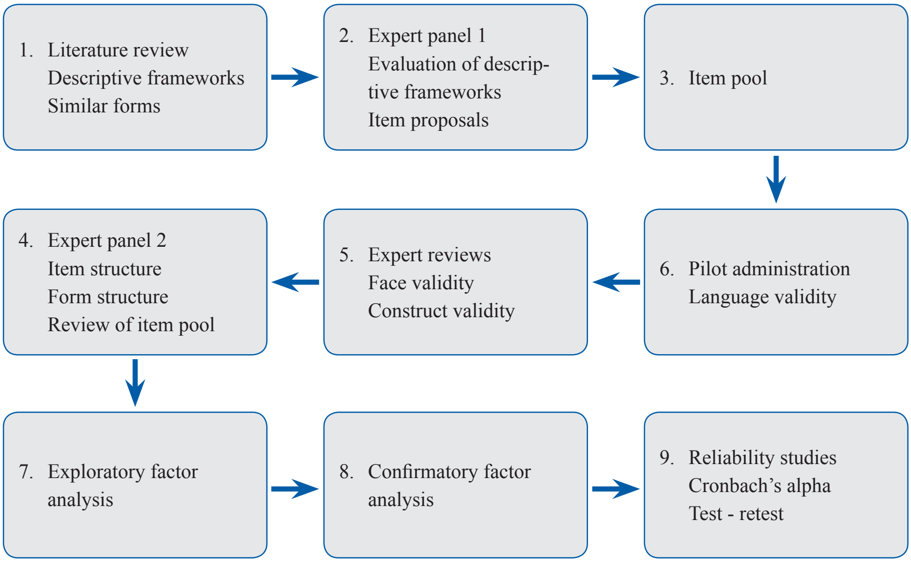

Figure 1. Stages of the scale development.

Findings

Literature Review

The aim of the literature review was to identify a descriptive framework for writing items. Researchers employed Hasebrink et al.'s (2009) online risks classification for its coverage, breadth, and definition quality of online risks. Within this framework, online risk was cross-tabulated concerning motives (themes) and the accent role of the child. Vertical accent referred to the child's communicative roles with online risks, which are comprised of content, contact, and actor. The content role covered the child's recipient role (e.g., advertisements, violent content) on his/her online activities and the contact role detailed the child's participant role (e.g., being misinformed, being groomed) during online communication. Last, the conduct role is concerned with the child's actor role (e.g., cyberbullying others, copyright infringement) within his/her online activities. Horizontal accent covered the motives that included risk clusters converging on commercial interest (e.g., exploitation of child's personal information), aggression (e.g., violent web content), sexuality (e.g., problematic sexual web content), and values/ideology (e.g., racist web content) themes. Cross-tabulation of these motives and roles resulted in 12 risk focuses. As an example, the sexuality theme produced the following focuses:

Sexuality/Content: Child inadvertently meets problematic sexual web content (e.g., porn site advertisements).

Sexuality/Contact: Child receives unwanted sexual messages (e.g., arranging offline meetings) during online communications.

Sexuality/Actor: Child consciously searches and uses problematic sexual content (e.g., sexting, pornography).

Expert Panel – 1

The descriptive framework was evaluated by an expert panel titled *Identifying Online Risks Observed in Turkey* on September 26, 2012. Participants of the panel were specialists from the Information and Communication Technologies Authority[6] and concerned scholars from the Computer Education and Information Technology Department. Experts were asked to rate risk focuses for observability within the Turkish context on a 7-point scale (1. Little observed–7. Highly observed). Results suggested that averages for each focus were above the mid-point on a 7-point scale (Table 1). Therefore, researchers decided to include all 12 risk focuses on item pool creation. These studies augmented the scale's content validity.

Table 1
Average Points for Online Risks Focuses

	Commercial interests	Aggression	Sexuality	Values/ideology
Content	6.00	6.43	6.46	5.85
Contact	6.15	6.46	6.08	6.31
Conduct	5.54	5.85	4.17	5.23

Following the review of focuses, experts were asked to provide observed cases for each focus. This episode of the panel was recorded via camera and audio-recorder. These recordings were then analyzed for initial items. These initial items were classified under the concerned risk focus within the item pool.

Item Pool

Researchers investigated instructions and item structures of perceived risk forms within the literature review stage. Furthermore, forms related to online risks and internet safety were examined for candidate items. Selected items from these investigations joined with suggested items from the first expert panel to form the item pool. At the end of this stage, 44 items were collected within the item pool.

6 ICTA is the responsible authority for IT sector regulations in Turkey.

Expert Panel – 2

A second expert panel gathered on September 04, 2013, with participation from eight scholars (one Professor, four Associate Professors, two Assistant Professors, and one PhD candidate) who had prior scale development experience. The panel began with an introduction of the descriptive framework and the nature of the study. Next, the experts were asked for the item structure, response structure, and instruction form. The panel decided on a direct instruction form: "Please rate how hazardous the following items are for children." The items were supplied as cases threatening the child: "Child inadvertently meets sexual content." Finally, the panel decided on a 6-point Likert response type ranging from "1- Not hazardous at all" to "6- Extremely hazardous." No labels were provided for mid-points to ensure ratio measurement level. The 6-point Likert level was deliberately chosen to improve the sensitivity, reliability, and validity of the form (Chang, 1994; Cummins & Gullone, 2000). That is, even numbers (six) of items prevented participants to go for the midpoint, which generally does not inform about the participant's position or opinion about the given item (Chomeya, 2010; Garland, 1991).

Next, experts were asked to review the items for identified risk focuses. Experts were first requested to classify the candidate items under risk focuses and suggest modifications for items where needed. At the end of this stage, items with consensus were categorized under relevant risk focuses. The panel suggested a new risk focus of "sharing sensitive personal information." The panel ended with 48 items gathered under 13 risk focuses.

Expert Reviews

The pilot form went through a gradual optimization process via expert reviews from various fields. The form was edited after each consultation and the updated form was subsequently presented to the next expert. Institutions, fields, and titles of these experts are provided in Table 2.

This cycle ensured the language and face validity of the form. The layout and wording of the form was edited along with select items to ensure readability, comprehensibility, and clarity. Furthermore, the total number of items was reduced by merging overlapping items. At the end of this stage, the form consisted of 39 items under 13 focuses.

Table 2
Participants of Second Expert Review Cycle

Institution	Field	Title
Turkish Ministry of Education	Elementary Education	Classroom teacher
Turkish Ministry of Education	Elementary Education	Classroom teacher
Ege University	Elementary Education	Instructor
Ege University	CEIT	Assistant Professor Dr.
Ege University	CEIT	Assistant Professor Dr.
Ege University	CEIT	Ph.D.
Anadolu University	Elementary Education	Associate Professor Dr.
Anadolu University	CEIT	Professor Dr.
Anadolu University	CEIT	Associate Professor Dr.
Anadolu University	CEIT	Associate Professor Dr.
Anadolu University	CEIT	Associate Professor Dr.
Anadolu University	CEIT	Associate Professor Dr.
Anadolu University	CEIT	Assistant Professor Dr.
Anadolu University	CEIT	Assistant Professor Dr.
Anadolu University	Educational Sciences – Counseling	Professor Dr.
Anadolu University	Educational Sciences – Counseling	Professor Dr.
Anadolu University	Educational Sciences – Counseling	Assistant Professor Dr.
Anadolu University	Educational Sciences – Counseling	Ph.D.
Anadolu University	Educational Sciences – Administration	Assistant Professor Dr.
Gaziosmanpaşa University	CEIT	Assistant Professor Dr.

Pilot Administration

Face and language validity of the form was further tested with pre-service primary school teachers from Ege University (n = 27) and Anadolu University (n = 13). This administration suggested some items needed elaboration, at which time they were further clarified by supplying examples to the cases.

Construct Validity Studies

Two factor analysis methods exist for investigating construct validity. Exploratory Factor Analysis [EFA] reveals latent variables and relationships among these variables by investigating observed variables (data), whereas Confirmatory Factor Analysis [CFA] tests formerly identified relationships among latent and observed variables (Akbulut, 2010). EFA and CFA methods were consecutively employed in this study.

EFA. Participants of the EFA consisted of 392 pre-service primary school teachers who were studying at five Turkish state universities. Even though 393 forms were collected, one form was left out due to missing data. Researchers used convenience cluster sampling methodology until reaching the desired number of participants. Universities, grades, and genders of participants are summarized in Table 3.

Table 3
Participants of EFA

University	3rd year				4th year				Total	
	Female		Male		Female		Male			
	N	%	N	%	N	%	N	%	N	%
Balıkesir University	35	8.9	18	4.6	37	9.4	7	1.8	97	24.7
Dicle University	23	5.9	23	5.9	24	6.1	25	6.4	95	24.2
Çanakkale 18 Mart University	61	15.6	14	3.6	22	5.6	7	1.8	104	26.5
Erciyes University	21	5.4	15	3.8	8	2.0	1	0.3	46	11.7
Gazi University	16	4.1	8	2.0	18	4.6	6	1.5	50	12.8
	156	39.8	78	19.9	109	27.8	46	11.7	392	100

The following section reports EFA procedures undertaken within six stages as suggested by Huck (2012).

Checking the suitability of data for a factor analysis. Like many other statistical methods, factor analysis requires a data set to meet certain basic requirements. The first requirement is sample size. Statistical authorities have identified several criteria for examining sample size adequacy (Table 4).

Table 4
Suggested Minimum Sample Sizes for AFA

Citation	Suggested criteria
Catell (1966)	3 to 6 participants for each item
Kass and Tinsley (1979)	Minimum 300 or 10 participants for each item up to 300
Comrey and Lee (1992)	100 participants: Poor 200 participants: Fair 300 participants: Good 500 participants: Very good 1000 participants: Excellent
Tabachnick and Fidell (1996)	Minimum 300 participants
Field (2009)	Minimum 300 participants
Huck (2012)	10 participants for each item

Some resources have identified an absolute number of cases, whereas others have suggested subject-to-item ratios. The sample size of 392 fairly meets all the suggested criteria within Table 4 for 39 variables.

Another method examines sample size through the analysis of data. Researchers calculated the Kaiser-Mayer-Olkin [KMO] measure of sampling adequacy coefficient, inspected the determinant of the correlation matrix, and applied Bartlett's test of sphericity.

Table 5
KMO and Bartlett's Sphericity Test Results

Measure		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.906
Bartlett's Test of Sphericity	Approx. Chi-Square	5430,067
	df	741
	Sig.	.000

Several resources have offered cut-point criteria for interpreting the KMO results. Kaiser (1974) suggested 0.5 as an acceptable cut-point, whereas Pallant (2001) demanded at least 0.6. Further, Hutcheson and Sofroniou (1999) identified ranges: 0.5–0.7 (normal), 0.71–0.8 (good), 0.81–0.9 (very good), 0.91–1 (excellent). Table 5 suggested the KMO coefficient fell within the excellent range. Furthermore, Bartlett's test of sphericity was significant ($p < .000$). However, the determinant of the correlation matrix was negative, which could reflect multicollinearity or singularity problems among variables (Field, 2009). Authorities suggested further data collection for eliminating problematic variables (Field, 2009; Huck, 2012) as viable solutions. Since all other criteria have been met, no further data were collected. Singularity and multicollinearity problems were addressed during further stages.

Selecting a method of factor extraction. Huck (2012) suggested using maximum likelihood factor extraction only if all assumptions of the factor analysis are met. Otherwise, researchers should choose principal axis analysis or principal components analysis [PCA] methods. Researchers used PCA as the factor extraction method. PCA is mathematically simple and psychometrically strong technique that can easily handle potential factor ambiguities (Stevens, 1996). Büyüköztürk (2010) underlined PCA as one of the most frequently used factor extraction methods, which is relatively easy to interpret.

Deciding how to rotate factors. Factors can be conceptualized as theoretical axes where variables converge. Thus, initial factor analysis may result in a cloud where variables represent loadings (convergence) on different axes. This is a common problem with factor analysis, which complicates interpretation of the results. Ideally, a variable should represent high factor loading for only one factor. Factor rotation attempts to achieve this by moving factors over variable clusters (Field, 2009). Since selected conceptual framework did not suggest relationships among risk focuses, researchers employed the orthogonal rotation technique. In line with suggestions within highly cited references, varimax rotation was selected (Akbulut, 2010; Büyüköztürk, 2010; Field, 2009; Hair, Black, Babin, & Anderson, 2005; Huck, 2012).

Determining the number of useful factors. Factor analysis results in as many factors as variables. Since not all of the factors are useful, determining those that are useful is a critical part of factor analysis. Therefore, a number of determination criteria were suggested. The value of a factor is determined by the amount of variance that can be attributed to the variables. This concept is termed the factor's eigenvalue (Büyüköztürk, 2010). Eigenvalue is considered a useful metric for determining a factor's value where factors surpassing a cut-point are kept in the scale structure. Kaiser (1960) suggested 1 as the cut-point, whereas Jolliffe (2002) recommended a value as low as 0.7. Table 6 reports eigenvalues and variances of factors whose eigenvalues are above 1.

Table 6
Eigenvalues and Explained Variances of Factors

Total Explained Variance				
Factor	Eigenvalue	Cumulative eigenvalue	Variance (%)	Cumulative variance (%)
1	10.206	10.206	26.169	26.169
2	2.167	12.373	5.556	31.725
3	1.911	14.284	4.901	36.626
4	1.585	15.869	4.063	40.690
5	1.473	17.342	3.778	44.468
6	1.366	18.708	3.501	47.969
7	1.224	19.932	3.138	51.108
8	1.133	21.065	2.905	54.012
9	1.078	22.143	2.764	56.776
10	1.025	23.168	2.629	59.406

Field (2009, p. 662) asserts, "[Kaiser] criterion is accurate when there are less than 30 variables and communalities after extraction are greater than 0.7 or when the sample size exceeds 250 and the average communality is greater than 0.6." Analyses suggested average communality was 0.594. Since these two conditions were not met, and solutions with more than 10 factors were not practical, the Kaiser and Jolliffe criteria were not applicable.

Another strategy for identifying useful factors is the five percent rule. This rule dictates that a factor should remain as long as its eigenvalue exceeds five percent of preceding factors' cumulative eigenvalue (Huck, 2012). Table 6 suggests 10th. factors eigenvalue (1.025) is less than 5% of the preceding factors' cumulative eigenvalue (22.143). However, variable make-up of this structure was not found to be theoretically meaningful. Moreover, Field (2009) suggested using the scree plot strategy when there are more than 200 participants. A scree plot is composed by connecting adjacent eigenvalue points with line segments on a 2D plane. Axes of the scree plot are variables and eigenvalues. Points of inflexion on the scree-plot imply meaningful factorial structures. The number of points falling to the left of the inflexion points suggests meaningful solutions. The scree plot illustrated in Figure 2 represents three inflexion points (3, 6, and 14). Rigorous examinations of these solutions indicated the six-factor structure was theoretically the best.

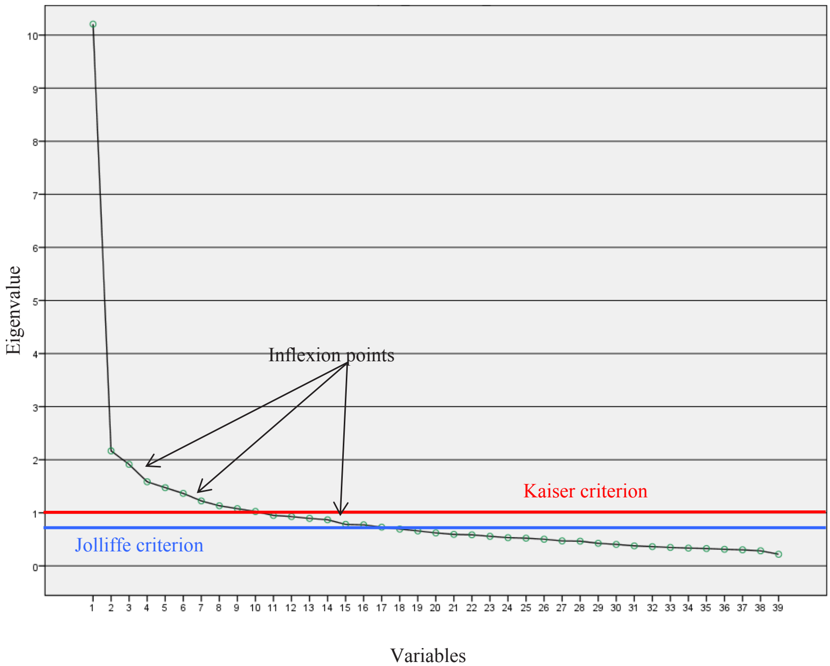

Figure 2. Scree plot.

Determining the variable make-up of each factor. The variable make-up of the factors was determined by interpreting the factor loadings and communalities of items within each factor. Factor loadings are correlation coefficients between factors and items (Kline, 1999). Every item has a factor loading on each factor. However, optimally an item should heavily load on one factor that reflects the item's membership to this factor. Pallant (2001) suggested retaining variables with factor loadings of more than 0.3 on a factor. This value suggests the item explains 9% of that factor's total variance. Nevertheless, Akbulut (2010) recognized this value was liberal and suggested the adoption of higher factor loading thresholds for factor membership. Therefore, researchers established 0.5 as the factor membership threshold. Another consideration for determining the variable make-up of factors is removing complex items. An item can have significant (beyond the identified membership threshold) factor loadings on more than one factor. These items are termed complex items and researchers should eliminate this complexity by removing one of the items from the form. Items with cross-loadings of less than 0.10 difference were considered complex and removed from the form by rigorous examinations. The final variable make-up of the factors is presented in Table 7. The EFA resulted in a 20-item form with a six-factor structure. Items' factor loadings ranged between 0.822 and 0.537. Communalities, which are relative values of variables to the total factor structure (Huck, 2012), ranged between 0.728 and 0.422. Thus, this factor structure could explain 61.62% of total variance.

Table 7
The Factor Loading Matrix of the Scale

	Factor						
	1	2	3	4	5	6	Communality
Item_22	**.822**	.018	.101	.068	.006	.124	.706
Item_32	**.772**	.290	.107	.143	.112	.056	.728
Item_27	**.755**	.248	.057	.062	.266	-.019	.709
Item_36	**.745**	.099	.255	.213	.079	.092	.689
Item_16	**.615**	-.206	.080	.210	-.119	.387	.635
Item_28	.119	**.675**	.155	-.088	.205	.147	.565
Item_24	.250	**.662**	.224	.193	.007	.030	.590
Item_25	.015	**.555**	.195	.213	.230	.225	.495
Item_35	.021	.082	**.725**	.004	.172	.173	.593
Item_37	.231	.306	**.716**	.129	.079	.144	.704
Item_38	.206	.135	**.701**	.174	.042	.041	.586
Item_3	.033	-.083	.128	**.748**	.275	.035	.661
Item_6	.233	.148	.144	**.737**	-.029	.126	.657
Item_7	.329	.320	.011	**.611**	.076	.005	.589
Item_4	.059	.022	.138	.111	**.747**	.310	.690
Item_26	.007	.316	.132	.030	**.657**	.015	.550
Item_8	.391	.089	.035	.222	**.587**	-.066	.560
Item_15	.033	.029	.157	.005	.072	**.716**	.545
Item_18	.055	.468	-.021	.159	.045	**.635**	.652
Item_19	.256	.158	.158	.033	.129	**.537**	.422
Eigenvalue	5.915	1.904	1.282	1.148	1.072	1.004	
% of variance	29.573	9.520	6.410	5.741	5.360	5.020	
Cumulative variance	29.573	39.093	45.503	51.244	56.604	61.623	

Naming factors. Researchers interpreted the salient characteristics of the items within each factor and named the factors. Factor 1 corresponded to risks related to sexuality (e.g., encountering advertisements with sexual content). Factor 2 covered risks related to online accounts (e.g., opening mail attachments from unknown senders). Factor 3 covered risks related to harmful content (e.g., accessing web sites without reading the warnings about content). The fourth factor covered the well-known cyberbullying theme (e.g., insulting other group members in social media). Factor 5 focused on risks related to harmful communication (e.g., sharing personal information with online friends). Finally, the last factor covered risks related to disclosure of confidential information (e.g., using nicknames reflecting confidential information in online games). Since this factor structure was coherent with the descriptive framework and researchers' observations, researchers believe the form represented good construct validity.

CFA. CFA tests previously identified factor structures. CFA uses Structural Equation Modeling [SEM] technique to test the item-factor relationships. Tabachnick and Fidell (1996) identified SEM as a set of statistical techniques that test relationships among different types of variables. CFA tests the relationships among observed (items) and latent (factors) variables and confirms the proposed measurement models.

Participants of the CFA consisted of 272 pre-service primary school teachers who were studying at four Turkish state universities. Researchers did not employ a sampling technique, but rather collected data from convenient populations until a reasonable sample size was reached. Universities, genders, and classes of these participants are summarized in Table 8.

Table 8
Participants of the CFA Study

	3rd Class				4th Class					
	Female		Male		Female		Male		Total	
University	n	%	n	%	n	%	n	%	n	%
Akdeniz University	7	2.57	0	0	22	8.09	21	7.72	50	18.38
Zonguldak Karaelmas University	0	0	0	0	39	14.34	11	4.04	50	18.38
Pamukkale University	26	9.56	1	0.37	0	0	0	0	27	9.93
Çanakkale 18 Mart University	0	0	0	0	110	40.44	35	12.87	145	53.31
Total	33	12.13	1	0.37	171	62.87	67	24.63	272	100

Collected data were examined for missing data prior to analyses after which, missing data was replaced via the linear interpolation technique. The measurement model was tested with SPSS Amos 21 software. Table 9 summarizes fit indexes of the measurement model. Since all the indexes fell between the acceptable good fit ranges, the measurement model was confirmed. Furthermore, the path diagram of the model is presented in *Figure 3*. Fit indices from the CFA.

Table 9
Fit Indices from the CFA

Index	Good Fit	Computed	Reference
χ^2	$0 \leq \chi^2 \leq 2.5df$	$0 < 365.458 < 377.5$	Kline (2005), McDonald and Ho (2002)
χ^2/df	$0 \leq \chi^2/df \leq 3$	2.420	Gefen, Karahanna, and Straub (2003)
SRMR	$0 \leq SRMR \leq 0.08$	0.0557	Hu and Bentler (1999)
RMSEA	$0 \leq RMSEA \leq 0.08$	0.065	Sümer (2000)
GFI	$0.90 \leq TLI \leq 1.00$	0.904	Sümer (2000)
CFI	$0.90 \leq TLI \leq 1.00$	0.932	Klem (2000), Sümer (2000)
TLI	$0.90 \leq TLI < 1.00$	0.914	Klem (2000), McDonald and Ho (2002)

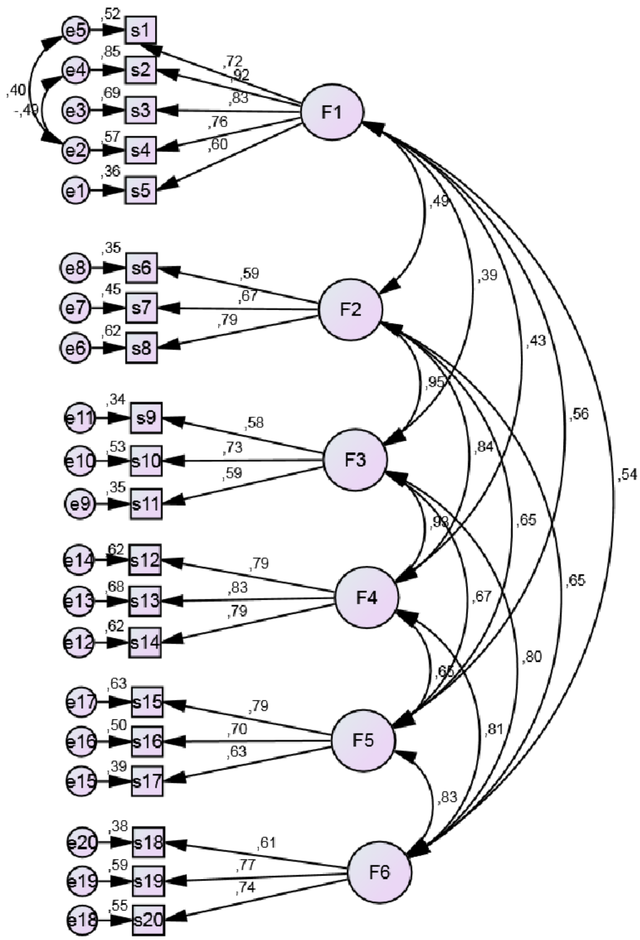

Figure 3. Path diagram of the measurement model.

Reliability Analyses

Reliability of the form was tested by investigating its internal consistency (Cronbach's α) and stability over time (test-retest correlation). The internal consistency coefficient is an indicator of consistency across the items, which means all the items serve to measure the same construct. Researchers calculated Cronbach's α internal consistency coefficient for the overall form and individual factors (Table 10).

Table 10
Statistics for Items, Factors and the Form

Items and factors	Explained variance	Mean	SD	Item total correlation	Factor loading
Sexuality (α = 0.84)					
Item 1		5.39	1.07	0.50	0.61
Item 2		5.56	0.93	0.70	0.82
Item 3	29.573	5.64	0.78	0.66	0.75
Item 4		5.46	0.96	0.71	0.77
Item 5		5.54	0.88	0.70	0.74
Online accounts (α = 0.60)					
Item 6		5.30	0.98	0.44	0.66
Item 7	9.520	4.82	1.26	0.42	0.55
Item 8		4.65	1.33	0.38	0.67
Harmful content (α = 0.67)					
Item 9		4.67	1.34	0.43	0.72
Item 10	6.410	5.06	1.15	0.58	0.71
Item 11		5.40	0.96	0.45	0.70
Cyber bullying (α = 0.65)					
Item 12		5.13	1.19	0.41	0.74
Item 13	5.741	5.10	1.15	0.51	0.73
Item 14		5.18	1.19	0.45	0.61
Harmful communications (α = 0.56)					
Item 15		5.26	1.20	0.40	0.74
Item 16	5.360	5.66	0.78	0.37	0.58
Item 17		4.86	1.33	0.38	0.65
Disclosure of confidential information (α = 0.53)					
Item 18		4.29	1.61	0.30	0.71
Item 19	5.020	4.20	1.48	0.39	0.63
Item 20		4.86	1.39	0.33	0.53
Overall (α = 0.85)	61.62	5.10	0.60		

The overall form (α = 0.85) and the sexuality (α = 0.84) dimension had high reliability (Field, 2009). Furthermore, online accounts (α = 0.60), harmful content (α = 0.67), cyberbullying (α = 0.65), harmful communications (α = 0.56), and disclosure of confidential information (α = 0.53) subscales had relatively low reliabilities. Since Cronbach's α is sensitive to item count, Akbulut (2010) suggested calculating inter-item-correlations for factors with low item-count. Examination of inter-item correlations resulted in coefficients well over 0.20, which is the suggested cut-point. Therefore, researchers deduced the form had acceptable internal consistency.

Researchers also tested the reliability by investigating the form's stability over time (Erkuş, 2005). The form was administered bi-monthly (09.04.2015–13.06.2014) to 50 pre-service teachers who were studying at Anadolu University in the Faculty of Education. The reliability of the form was tested by calculating Pearson productmoment correlation coefficient. Results suggested high consistency over two administrations (r = 0.675; $p < .01$), which indicated the form had high reliability.

Discussion

Findings suggested that the *Perceived Online Risks Scale for Pre-service Teachers* is a valid and reliable instrument. The first expert panel verified that the conceptual framework (Hasebrink et al., 2009) was valid within the Turkish context. Content validity of the item pool was testified by several experts from various domains of educational sciences and primary school teachers. Furthermore, face validity of the form was tested through pilot administrations to pre-service teachers. Construct validity of the scale was investigated through EFA and CFA. Reliability of the scale was tested by calculating internal consistency coefficients and test-retest techniques. Both analyses proved that the scale had high reliability concerning coherence and stability over time.

This scale was specifically prepared for pre-service primary school teachers in consideration of their critical roles in protecting children from online risks. However, the first expert panel suggested information technologies teachers and school counselors are as critical as primary school teachers in this regard. Therefore, the scale's structural validity and reliability should be investigated with these populations. Since the scale was developed with pre-service teachers, it is believed that the scale holds potential for administration to in-service teachers. Further research should administer the scale to in-service primary school teachers, information technology teachers, and school counselors.

Table 10 summarizes measures of central tendency along with internal consistency coefficients. These statistics indicate that collected data are highly skewed to right (X = 5.10; SD = 0.60). These values have important implications for interpreting collected data. Studies from the experimental psychology field suggested individuals are prone to misjudge (underestimate or overestimate) given statements when they lack comparable statistical data (Slovic, Fischhoff, & Lichtenstein, 1979). For example, Morgan (1990) reported participants' estimates of the mortality rate for a given cause ranged between $^1/_2$ and 1/5000 when the actual rate was 1/1000. Individuals tend to consult cognitive shortcuts called heuristics when they face complex problems with minimal data. Tversky and Kahneman (1974) asserted there are several types of heuristics, including availability, anchoring, adjustment, and representativeness, which are effective while evaluating risks. Sjöberg (2000) claimed media coverage distorts individual evaluation processes and causes overestimation for given risks. Furthermore, perceived control is negatively correlated with perceived risk. Since the items in the scale required participant to evaluate risks for children, participants' perceived risks might have been heightened by the lack of perceived control. Furthermore, the lack of evidence regarding children's online risk experiences may force participants to resort to cognitive heuristics. Further research should not overlook these points while evaluating scale data.

Perceived risk is a major determinant for technology acceptance and use. High-perceived risk results in risk aversion (e.g., no internet use) and conveying negative information about the technology. Studies have shown that teachers tend to avoid technology use when there is a high-perceived risk (Howard, 2013; Kluge & Riley, 2008). Therefore, this scale can be beneficial for studies investigating teachers' acceptance of technology regarding the internet and technology integration studies.

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