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[Original Research]

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Validity and Reliability of the First Aid Self-Efficacy Scale for School Emergencies

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Abstract

Background: Accidents and injuries are prevalent in childhood. Physical injuries are common reasons for call an ambulance from schools. Teachers and school nurses attempt to create a safe environment in schools. Teachers have not feel enough self-efficacy while they had first aid information. **Aims:** To develop a valid and reliable scale to evaluate the first aid self-efficacy perceptions of primary school teachers regarding emergency situations that are frequently encountered in schools. **Method:** A methodological, validity and reliability study was performed. This study that was carried out with 400 teachers. The total samples were randomly divided into exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The final version of the Teachers' First Aid Self-Efficacy Perceptions Scale (TFSP) scale contained 26 items. Twenty-one items were positive, and four items were negative. Data were analyzed using SPSS20 and LISREL8.7 programs. **Results:** The mean age of the total sample was 39.6±9.7. It was determined that 34.8% of teachers were female. The Cronbach's α coefficient value was 0.937. Kaiser Meyer-Olkin value was 0.922. According to the CFA result, the X2/df was determined to be 2.381. It was determined that the Root Mean Square Error of Approximation (RMSEA) value was 0.08, and the Comparative Fit Index (CFI) value was 0.94. **Conclusion:** The results obtained show that each structure is acceptable. The TFSP scale is a valid and reliable scale. Teachers' first aid self-efficiency level should be increased. The scale is recommended for use by school health nurses and other health professionals when conducting school-based first-aid training programs among primary school teachers. This scale can be used to determine the teacher's first aid self-efficiency regarding emergency situations that are frequently encountered in schools. Health professionals can use it. It is recommended that the scale items be adapted to other languages or cultures.

Keywords: first aid; self-efficacy; school health; emergency; school health nurse

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Introduction

Accidents and injuries are common (41%) in school-aged children (Faydali et. al., 2019). The reason for this was interpreted as the rapid physical and psychological development and rapid change in the school age and more loss of control (Dag, 2018; Lee & Oh, 2018; Misztal-Okoiska, et. al. 2018). Physical injuries (69.4%) are prevalent reasons for call an ambulance from schools (Aydin et al., 2011). Epistaxis, bleeding, fainting, fracture-dislocations, abdominal pain and vomiting are among the popular accidents in schools (Hosapatna et. al., 2020; Arabaci et al., 2010).

Teachers and school nurses attempt to create a safe environment in schools through first aid training (Dag, 2018; Faydali et. al., 2019; Şahin & Aslan, 2017).

According to a systematic review, many research require teachers to be trained about first aid (Reveruzzi et al., 2016). Many research show that teachers have insufficient knowledge about on first aid, majority of them not get any training on first aid. They are generally inappropriate response for common emergency (Dag, 2018; Lee & Oh, 2018; Adib-Hajbaghery, et al., 2019; Alkhotani et al., 2019). A study conducted by Sahin and Arslan (2017), state that 76.4% of the teachers could not intervene in an emergency related to chronic illness, and 80% of them needed education about first aid (Sahin & Aslan, 2017). According to another research teachers did not feel enough self-efficacy while they had first aid information (Faydali et. al., 2019).

People with low self-efficacy perception have high stress levels and show low performance. They give up easily against the difficulties (Dai & Sternberg, 2004, p. 13; Bandura, 1982, p. 122). Individuals with high personal abilities and low perception of self-efficacy may fail; Individuals with high self-efficacy perceptions are successful although their individual abilities are limited. In the literature, there are general self-efficacy scales or first aid scales but there is no specific first aid self-efficiency scale for primary school teachers (Arabaci et al., 2010; Erkan & Fügen, 2006; Tzimpoulas et al., 2020).

Researchers determined a gap in the literature about this specific and recommended issue. In this context, the aim of this study is to develop a valid and reliable scale to evaluate the first aid self-efficacy perceptions of teachers, related to emergencies that may occur in schools.

Methods

This study is a methodological, validity and reliability study designed to develop a scale to measure teachers' first aid self-efficacy perceptions regarding emergencies in schools.

1. Participants

This study was carried out with 400 teachers in Ankara, Turkey. Purposive sampling method was used in sample selection. Primary school teachers who have worked actively in the school for at least one year and volunteered to participate, were included in the study.

Exclusion criteria; not being a primary school teacher. Taking leave for a period longer than three months, such as maternity leave or unpaid leave. Not holding an administrative position at schools.

In the literature, it is stated that the sample size should be at least five times the size of the item to be factored (Yalcin & Tavsancil, 2014). Total samples were divided into two groups for EFA and CFA, randomly (Worthington and Whittaker, 2006, p. 38). Half of the data was used for EFA and Cronbach's alpha analysis (n=200) and the other half for CFA (n=200). There were no significant differences between two groups in terms of demographic characteristics and 40 items mean scores.

2. Procedure and interview form process

Development of the Item Pool Item development process was developed in three phases: the interview, item writing, expert committee.

Interview: Researchers conducted "structured interview form" for teachers to determine the scale items. This form contains 12 open-ended questions prepared with the help of literature to determine emergencies with a high rate of encountering in schools. For example, “What would you say about the self-efficacy of yourself and your colleagues when you need to performed first aid to an injured student?” This form was applied to 15 teachers, and the source was created in addition to the literature. Completing the interview form took approximately half an hour on average. For some participants, this took up to an hour. Participants were able to ask researchers questions in real time while completing the forms.

Item writing: The researchers created 68 items via structured interview form and the literature to measure teachers' self-efficacy perception regarding first aid. Researchers designed the in a 5-point Likert type in accordance with the expressions; strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1).

Validity and Expert committee: In the content validity context, 68 items were sent to ten academic experts, diverse professional backgrounds; nurses, school health nurses, medical doctors, primary school teacher and Turkish language expert. Researchers conducted “semi structured interview form” for expert committee to consult their opinion and suggestion. This form has 68 items with " appropriate", "inappropriate ", "explanations and suggestions" columns, and sent it via e-mail. After the expert opinion, 28 questions were removed from the item pool; four questions were inappropriate, 16 questions were inapprehensible, 8 questions could be misunderstood. The remaining 40 items were sent to the Turkish Language expert and replaced some words.

3. Data collection and analysis

Data were recruited from ten primary schools in Ankara, Turkiye between December 2018, and February 2019. The head teachers applied the scale in online via Google online forms, WhatsApp (n=215) or face to face in school (n=185) accordance with the permission of the Ministry of National Education. Form consisted of age, gender, work year and 40 scale items.

Data were analysed using IBM SPSS 20 and

LISREL 8.7 statistical programs. Descriptive statistical methods were mean, standard deviation, frequency, test of normality and percentage. After the Cronbach's alpha analysis, were carried out for the reliability, internal consistency analysis of the scale.

Table 1 Reliability Statistics of Teachers'First Aid Self-Efficacy Perceptions Scale

	Items	Mean ± Standard deviation	Item-Total Correlation	Cronbach's alpha if the item is deleted
1.	Item 1	3.89±0.91	0.564	0.935
2.	Item 4	3.87±0.94	0.502	0.936
3.	Item 5	3.56±0.94	0.582	0.935
4.	Item 6	3.07±1.06	0.607	0.935
5.	Item 7	3.49±1.06	0.529	0.936
6.	Item 9	3.95±0.79	0.507	0.936
7.	Item 10*	3.33±1.09	0.533	0.936
8.	Item 11	3.92±0.92	0.630	0.935
9.	Item 12	3.73±0.10	0.686	0.934
10.	Item 13	3.55±1.06	0.725	0.933
11.	Item 14	3.70±0.98	0.705	0.934
12.	Item 15*	3.46±1.06	0.590	0.935
13.	Item 16	3.84±0.79	0.472	0.937
14.	Item 17	3.54±0.93	0.775	0.933
15.	Item 18	3.83±0.90	0.517	0.936
16.	Item 20	3.87±0.88	0.602	0.935
17.	Item 22	2.88±1.03	0.530	0.936
18.	Item 25*	2.94±1.05	0.429	0.937
19.	Item 26*	3.36±1.08	0.573	0.935
20.	Item 28*	2.67±1.01	0.527	0.936
21.	Item 29	3.37±1.14	0.545	0.936
22.	Item 30	3.06±1.25	0.601	0.935
23.	Item 31	3.30±1.15	0.548	0.036
24.	Item 32	3.47±0.56	0.688	0.934
25.	Item 33	3.68±0.90	0.767	0.933
26.	Item 36	3.57±0.93	0.585	0.935

Note. *Negative item

Kaiser-Meyer Olkin (KMO) and Bartlett's Test of Sphericity tests were examined for data suitability for factor analysis. Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) were carried out for the construct validity of the scale. Item Correlation (IC) were carried out for the intent validity of the scale. Maximum-likelihood (ML) method was used without and rotation in the EFA then CFA was performed. Significance was evaluated as $p<0.05$. According to results of EFA, 14 items showed low inter-item correlations were removed. The final version of the TFSP scale contained 26 items. Twenty-one items were positive and 10th 15th 25th 26th 28th items were negative. The total score of the TFSP scale is between 26 and 130. The high score obtained from the TFSP scale indicates that the teachers' first aid self-efficacy perceptions is high.

4. Ethical statement and consent

Ethical approval was obtained from Gazi University Ethics Committee. Written consent was obtained from Turkish Ministry of National Education. Also, participants were informed consent and assurances of confidentiality or anonymity with questionnaire form (Approval number: 06.02.2020-E.19387).

Results

The descriptive data obtained in this study, the mean age of the total sample was 39.6±9.7 (range=24–63), mean work year was 15.9±10.4 (range=1-43). It was determined that 34.8% teachers were female. All participants work as primary school teachers. The data was collected from 35 primary schools. Seventy-five per cent of teachers are married.

1. Reliability

In the content reliability context, the Cronbach's α coefficient value was 0.937. The item-total correlation ranges from 0.429 to 0.775 (Table 1). The data structure has the one cleanest factor (Table 2; Figure 1; Figure 2).

2. Validity

In Principal Component Analysis, Kaiser Meyer-Olkin value was 0.922. Bartlett's Test of Sphericity Chi-square values were found to be statistically significant (X2=2552,3; df=325; p=0,000) in EFA (Figure 2). According to CFA result, the X2/df was determined to be 2.381 (X2=702.45, df=295, p=0.00). It was determined that the RMSEA value was 0.08, the CFI value was 0.94. Among the fit indices, the value of NFI was 0.90 and the value of NNFI was 0.93. Also, the RFI value was 0.89 and IFI values was 0.94 (Table 3).

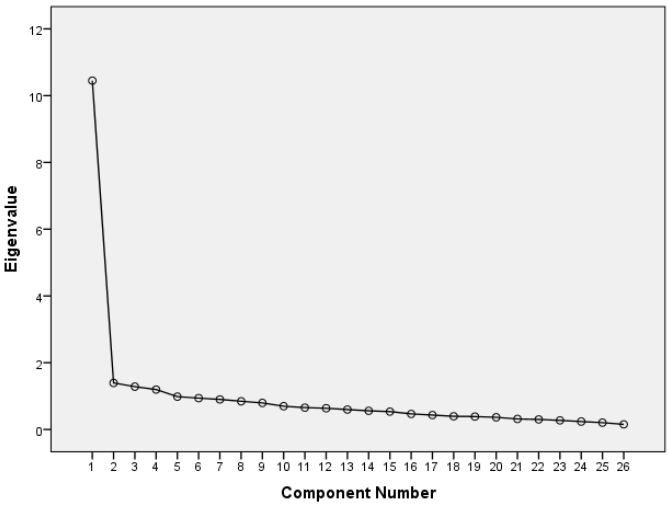

Figure 1 The Scree Plot Test, Eigenvalue and Factor Number.

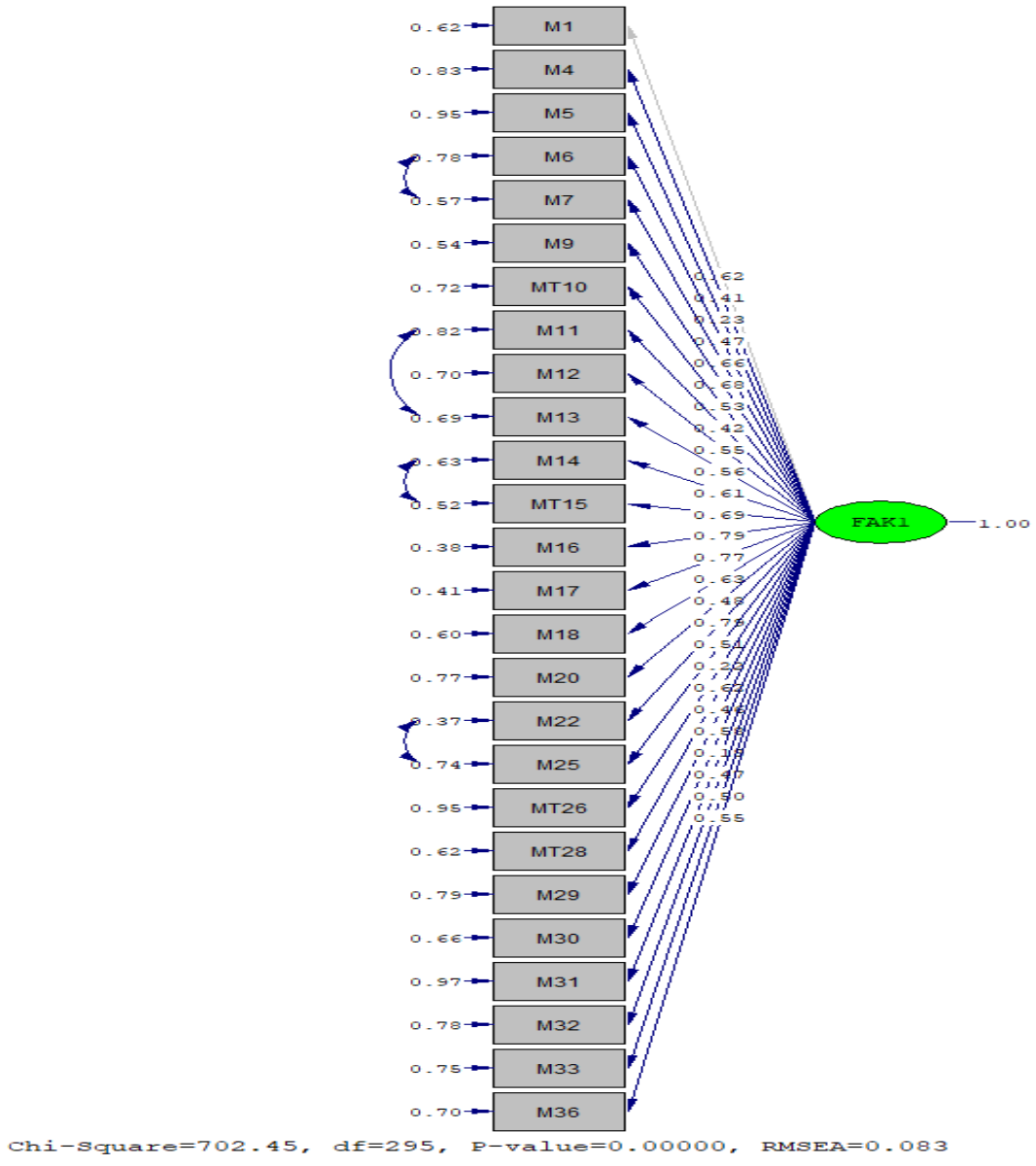

Figure 2 Path Diagram with Modifications

Table 2 Exploratory Factor Analysis Results of The Teachers' First Aid Self-Efficacy Perceptions Scale

	Item Numbers	Items	Total	% of Variance	Cumulative %
1.	Item 1	I can render first aid to injured students during an emergency calmly.	10.449	40.188	40.188
2.	Item 4	I know the difference between standard first aid and emergency first aid.	1.395	5.364	45.552
3.	Item 5	I can use the materials in the first aid kit.	1.284	4.937	50.489
4.	Item 6	I feel inadequate about first aid.	1.197	4.603	55.091
5.	Item 7	I can render first aid in emergencies that are serious within my authority.	0.984	3.785	58.876
6.	Item 9	I can assess the safety of the scene in emergencies.	0.939	3.612	62.488
7.	Item 10	I cannot check the casualty student's airway patency in emergencies.	0.901	3.466	65.955
8.	Item 11	I can feel the pulse of the casualty student in order to assess their blood circulation in an emergency.	0.845	3.249	69.203
9.	Item 12	I can evaluate the casualty student's breathing using the "look-listen-feel" method in an emergency.	0.796	3.060	72.264
10.	Item 13	I know how can I put the bleeding student into the recovery position.	0.697	2.681	74.945
11.	Item 14	I can apply pressure to the body pressure points to make the blood stop.	0.655	2.521	77.466
12.	Item 15	I do not know how to apply a tourniquet to the bleeding place.	0.635	2.444	79.910
13.	Item 16	I know that no food or drink will be given to the student at risk of internal bleeding.	0.598	2.299	82.209
14.	Item 17	I know the rules for bandaging a bleeding wound.	0.559	2.149	84.359
15.	Item 18	I can easily stop nosebleeds.	0.536	2.062	86.421
16.	Item 20	I can find body parts where I can check the pulse of the injured student in an emergency,	0.467	1.796	88.216
17.	Item 22	I think I am sufficient to render first aid in dental, mouth and jaw injuries.	0.432	1.662	89.878
18.	Item 25	I do not know how to do first aid in injuries to the head and nose.	0.394	1.517	91.396
19.	Item 26	My knees knock together and get tangled in bleeding injuries.	0.387	1.488	92.883
20.	Item 28	I do not know how to bandage for abdominal injuries.	0.365	1.404	94.288
21.	Item 29	I can make a splint for fractures and dislocation.	0.315	1.212	95.500
22.	Item 30	I can carry the severed finger (limbs) according to the rules	0.302	1.161	96.661
23.	Item 31	I know how long the severed finger (limb) should be delivered to the health institution.	0.273	1.050	97.710
24.	Item 32	I know what I must do for a fainted, wounded student to recover.	0.238	0.915	98.625
25.	Item 33	I know in which position to keep the injured until health professionals arrive.	0.205	0.788	99.413
26.	Item 36	I know how to render first aid in the burned area.	0.153	0.587	100.000

$\chi 2$=chi-square, df=Degrees of Freedom, RMSEA=Root Mean Square Error of Approximation, CFI=Comparative Fit Index, NFI=Normed Fit Index, NNFI=Non-Normed Fit Index, RFI=Relative Fit Index, IFI=Incremental Fit Index

Discussion

Internal consistency comprises inter-item correlation (> 0.30), item-to-total correlation (> 0.50) and Cronbach's coefficient alpha (> 0.70) (Hair et al., 1998). This study data has acceptable internal consistency values. The X2/df value should be below 3 in the CFA fit indices, it shows that there is perfect fit (Akman and Güven, 2015).

This study results determine perfect fit index. If the RMSEA value less than 0.08, it indicates good fit (Sumer, 2000). This study RMSEA value shows good fit index. NFI, NNFI and CFI values above 0.90 corresponds to

good fit (Sumer, 2000, p. 49-74; Tabachnick et. al., 2007). According to the CFA result, it was determined that the one-factor structure of the school first aid self-efficacy scale was confirmed.

Table 3 Fit index

Fit Indexes	Before modification	After modification	Acceptable Fit Value Range
$\chi 2/df$	822.55/299	702.45/295	$2 \geq \chi 2/df \leq 3$
RMSEA	0.09	0.08	0.05≤RMSEA≤0.95
CFI	0.92	0.94	0.90≤CFI≤0.95
NFI	0.88	0.90	0.90≤NFI≤0.95
NNFI	0.91	0.93	0.90≤NNFI≤0.95
RFI	0.87	0.89	0.90≤RFI≤0.95
IFI	0.92	0.94	0.90≤IFI≤0.95

In our study, it was determined that the RFI value was not within the expected range. Alan yazında bizim çalışmamız gibi bulunan RFI değerleri mevcuttur (Smith. et. al., 2008; Wang et. al., 2025). In the study, the RFI value was found to be 0.89, the same as in our study. It has been interpreted that the RFI value indicates that the adaptation index is not good. This can also be interpreted in the same way in our study. An important finding that should not be overlooked in our study is that our NFI value prior to modification also had a poor fit index. Researchers who will use our scale or adapt it culturally are advised to carefully examine these values.

In the literature, there are many studies that measure the level of first aid knowledge of teachers and are designed to increase this knowledge (Brito et al., 2020; Adib-Hajbaghery et al., 2019; Li et al., 2020). A study shows that teachers need first-aid training programs. Also, teachers' first aid knowledge was insufficient, and they did not join any training on first aid (Adib-Hajbaghery eta l., 2019). Current study emphasizes that measuring the level of knowledge may be insufficient for first aid application. Knowledge gains value with the perception of self-efficacy.

The TFSP scale may be a guideline and measurement tool for proposed, planned first aid and training programs. In another study, pediatric first-aid training was given using three different training models. The interactive training methods are the best training outcome, but none of the training methods affected the teachers' first aid knowledge retention at nine months or four years later (Li et al., 2020). Self-efficacy level can also be measured in order for the level of knowledge to be permanent. Self-efficacy initiatives can be added to programs.

The limitation of the study is that it can only be generalised to the participating teachers. The validity and reliability of the scale items can be established for different age and occupational groups.

Conclusion

After the EFA, a one-dimensional model was created. CFA was conducted in order to contribute to the structure obtained by EFA. The results obtained show that each structure is acceptable. It is determined that the TFSP scale is a valid and reliable scale. This scale can be used to determine the teacher's first aid self-efficiency regarding emergency situations that are frequently encountered in schools. The range of use of this self-efficacy scale is extensive. It can be used by health professionals to measure self-efficacy by any professional working in school health.

Teachers are key people in intervention first-aid training programs because their first-aid knowledge is generally needed. Teachers' first aid self-efficiency level should be increased. The scale is recommended for use by school health nurses and other health professionals when conducting school-based first-aid training programs among primary school teachers.

These scale items have been structured according to accidents commonly seen in schools in Turkey. It is recommended that the scale items be adapted to other languages or cultures.

Declaration of Conflicting Interest

No conflict of interest to declare.

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Author's Contribution

FA: Conceptualization; Data curation, Formal analysis; Investigation; Methodology; Resources; Validation; Visualization; Roles/Writing – original draft; Language translation İK: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Resources; Supervision; Validation; Visualization; Roles/Writing – original draft; Writing – review and editing.

Data Availability Statement

The dataset generated during and analyzed during the current study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Academic Writing

The author used Grammarly for proofreading in the

writing process to improve readability and remove grammatical errors. However, he took full responsibility for the content.

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