



A New Scale for Evaluating Home Accidents: Home Accidents Awareness Scale for Mothers with 0-3-Year-Old Children

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Abstract

Aim: There have been no national and international assessment tools for home accidents, and the majority of the studies evaluating the awareness of home accidents have been conducted using questionnaires.

Methods: The study was conducted methodologically. A Home Accidents Awareness Scale for Mothers was developed by taking expert opinions in the item pool study, and a validity-reliability study was conducted after the preliminary application. The data were collected at Karaagac Family Health Centers in Turkey between July and October 2019. The population consisted of mothers who met the inclusion criteria and came to the family health center for any reason. The data were collected using a Demographic Information Form and the Home Accidents Awareness Scale for Mothers. Validity and reliability analyses were used to assess the data.

Results: The home Accidents Awareness Scale for Mothers contains 55 items and four subscales (awareness of falls, burns, drowning and poisoning, cutting and drilling tool injuries). Items are rated using a 5-point Likert scale. The scale had an acceptable and high level of validity (alpha coefficient 0.968, item total correlation values; $r=0.383-0.645$) and reliability (discrimination; $p=0.000<0.001$, test-retest; $r=0.990$).

Conclusion: This is a valid and reliable scale that can be used to evaluate the awareness of mothers with children aged 0-3 living in Turkish society about home accidents.

Keywords: Child, family health, home accidents, mother

Introduction

A child is the most vulnerable human being and needs the most care and affection when considering their age. The well-being of children in every aspect is crucial for developing their society. Children, in particular, who are exposed to injuries as a result of various accidents, pose a significant problem for both the child and public health (1). While the accidents affect the children in all aspects, they also damage the family and environment significantly (2-4). Home accidents vary according to age periods and from country to country and account for a quarter of accidents during childhood. Accidents are the third leading cause of death and morbidity in children aged 1-4 years in Turkey. The studies have reported that

the accidents experienced by children vary based on their age and development period (5,6).

Mothers are mostly responsible for raising children in Turkish society (7), and it is critical to raise their awareness about home accidents and to increase their knowledge about behaviors that may cause accidents to reduce accidents (4-6).

There have been no national and international assessment tools for home accidents, and the majority of the studies evaluating the awareness of home accidents have been conducted using questionnaires. There is a need for a standard assessment tool to determine and evaluate mothers' awareness of home accidents in order to improve this awareness.

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The study aims to develop a Home Accidents Awareness Scale for Mothers with 0-3-year-old children and conduct a validity-reliability study.

Materials and Methods

Compliance with Ethical Standards

Written permission was obtained from the related outpatient clinics and related FHCs, and an approval (date: 29.11.2018, no: B.30.2.ATA.0.01.00/306) was obtained from the Ataturk University Medical Faculty Clinical Trials Ethics Committee Presidency for the study. After the parents included in the study were informed about the purpose and method of the study, their verbal and written consent was obtained.

In the study, ethical principles were met.

Study Design

The research was carried out methodically at the Karaagac Family Health Center in Turkey between January and June 2019 (7). The study was conducted with mothers (n=400) who were 15-49 years old, had 0-3-year-old children, applied to the family health center for any reason between the aforementioned dates, and stated that they and their children were healthy. In scale validity and reliability studies, it is desirable to work with individuals who represent 5-10 times the total number of items on the scale.

The data were collected using a Demographic Information Form and the Home Accidents Awareness Scale for Mothers.

Demographic Information Form: The form was prepared by the researcher upon the literature review and includes 13 questions about the descriptive characteristics of the mothers, such as age, marital status, family type, income status, educational background, occupation, number of 0-3-year-old children, history of home accidents, and children's hospitalizations (1-5,7-9).

Home Accidents Awareness Scale for Mothers: This scale was developed to evaluate the awareness of mothers with 0-3-year-old children about home accidents. The scale consists of 55 items assessing whether mothers agree with statements about home accidents. These items are rated using a five-point Likert type scale ranging from one point to five points (5: Strongly Agree, 4: Agree, 3: Uncertain, 2: Disagree, 1: Strongly Disagree). (Appendix 1). On the scale, there were no reverse items. The scale is divided into four subscales: fall awareness, burn awareness, poisoning and drowning awareness, and cutting and drilling tool injury awareness. The factor and overall awareness scores were calculated by summing the item values and dividing the total value into item numbers. Higher total and subscale scores signify that mothers are

more aware of home accidents. The four-point width in the score obtained from the scale is separated into five equal parts ($4/5=0.8$). 4.20-5.00 points indicate a very high level, 3.40-4.19 points for a high level, 2.60-3.39 points for a moderate level, 1.80-2.59 points for a low level, and 1.00-1.79 points for a very low level. The alpha coefficient of the scale was found to be 0.968.

Item Pool: A total of 114 candidate statements were determined because of the literature review on home accidents, the examination of pre-prepared assessment tools (9,10) on this subject, and the analysis of the content.

Content Validity: The statements chosen from the item pool specified by the researcher and the assistant professor who was his or her thesis advisor were determined, and those that needed revision were revised. Candidate items on the scale put into the final form were presented to the field experts (15 experts). To prove the item's validity via numerical data and evaluate the opinions obtained from the experts significantly, the Lawshe's (1975) technique was used (10,11). The content validity ratio (CVR) was determined by subtracting one from the ratio of the number of experts saying "necessary" concerning an item, to the total number of experts expressing an opinion for the item (10-13).

Reliability and Item Analysis: A reliability analysis was conducted to determine the internal consistency of the scale. The Alpha coefficient of the Home Accidents Awareness Scale for Mothers was determined to be 0.968, with a minimum value of 0.60 (14).

Exploratory Factor Analysis: The exploratory factor analysis method was used to reveal the construct validity of the scale.

Confirmatory Factor Analysis: For this analysis, the fit indices in the literature were discussed, and the factor structure of the scale was tested depending on these fit indices.

Test-retest Reliability: The test-retest reliability of the scale was reapplied to 50 mothers among the participants three weeks after the first test and was determined based on the correlation between the scores. The alpha coefficient of the scale was found to be 0.990.

Distinctiveness: For the distinctiveness of the scale, it was tested whether or not there was a difference between the upper 27% and lower 27% groups of the mothers' scale scores.

Statistical Analysis

Face and content, construct validity, and reliability analyses were used in data assessment. The Statistical Package for Social Sciences (22.0) and AMOS (21) programs were used to analyze the data.

Results

Validity

In the study in which the scale was developed and then its validity and reliability study was conducted, 55 scale items among 114 candidate statements were used in line with expert opinions. Because we received opinions from 15 experts via Lawshe's technique, the content validity criterion was found to be minimal. Forty-nine (15,16) The total content validity index of all items in the scale was determined to be 0.653 (Table 1).

Reliability

The Alpha coefficient of the scale was found to be 0.968. It was seen that none of the total item correlation values of the scale remained under 0.3. When examining the reliability coefficient (α) values after the total correlation and items were deleted, it was determined that there were no items that would decrease the internal consistency value.

Because of Bartlett's test, it was determined that there was a significant correlation between the variables (chi-square=13233.151; SD=540; $p=0.000<0.05$). The Bartlett's test [Kaiser-Meyer-Olkin (KMO)=0.928>0.60] indicated that the sample size was appropriate for factor analysis. With factor analysis, the items were collected under four factors, whose total variance explained was 47.882%. Twenty-one items were omitted from the scale because their factor load remained under 0.4 and was loaded in multiple factors (co-loading). After omitting the items, the general reliability of the scale was found to be $\alpha=0.957$ (Table 2).

It was found that the predetermined factor structure of the scale (Figure 1) was compatible with the confirmatory factor analysis structure ($p<0.001$).

There was a strong relationship between the scale's subscales and the overall score test-retest. In other words, the answers given did not vary based on time ($r>0.8$, $p>0.5$)

The home accident awareness total scores ($\bar{x}=4.883$) of the upper 27% group were higher than the scores

of the lower 27% group ($\bar{x}=3.695$) ($t_{(215)}=-32.914$; $p=0.000>0.05$). It was determined that the scores of awareness of falls ($\bar{x}=4.850$), home appliances and electrical vehicles ($\bar{x}=4.899$), hygiene and oral injuries ($\bar{x}=4.889$) and cutting and drilling tool injuries ($\bar{x}=4.931$) were higher in the upper 27% group, compared to the scores of awareness of falls ($\bar{x}=3.617$) ($t_{(215)}=-25.486$; $p=0.000>0.05$), home appliances and electrical vehicles ($t_{(215)}=-24.417$; $p=0.000>0.05$), ($\bar{x}=3.722$), hygiene and oral injuries ($t_{(215)}=-24.713$; $p=0.000>0.05$) ($\bar{x}=3.692$) and cutting and drilling tool injuries ($t_{(215)}=-16.921$; $p=0.000>0.05$) ($\bar{x}=3.874$) in the lower 27% group (Table 3).

Discussion

In this study in which a Home Accidents Awareness Scale for mothers with 0-3-year-old children was developed and its validity-reliability study was conducted, the hypothesis "the Home Accidents Awareness Scale for Mothers with 0-3-year-old children was developed as a valid and reliable scale" was tested. To develop the scale, the item pool, content validity, reliability and item analysis, exploratory factor, confirmatory factor analysis, test-retest reliability, and distinctiveness applications were performed.

The scale items in the study were composed of 55 of 114 candidate items presented to specialized lecturers. When developing a scale, it is primarily required to review the related literature. Following the review, the subjects to be evaluated should be taken into consideration (16). Each item created should be paid attention to be clear and comprehensible (17,18). Following this procedure, the item pool consisting of statements should be presented to the field experts for their opinions (16). Interpretations of the experts allow conducting content and face validity (19).

Content validity is applied for evaluating the scale and every item in the scale, the status of containing the concepts to be measured and different concepts, and the capacity of including the qualities to be measured (20-23). In the study, because we obtained opinions from 15 experts, the content validity criterion of the scale was found to be 0.49. The total content validity index

Table 1. Examples of expert evaluation results

Items	Necessary	Should be rearranged	Removed	SVC	Decision
Item 1	11	4	0	+0.466	Accepted
Item 2	13	2	0	+0.733	Accepted
Item 3	10	4	1	+0.333	Accepted
Item 4	11	4	0	+0.466	Accepted
Item 5	14	1	0	+0.866	Accepted
Scope validity criterion	0.49				
Scope validity index	0.653				
Number of experts making evaluation	15				

for all items was found to be 0.653 (12,24). According to Lawshe's technique, the scale can be applied in the presence of at least five experts (12). CVRs are calculated by subtracting one from the ratio of experts who say "necessary" about an item to the total number of experts who have an opinion about the item (10,20).

"Reliability" refers to the determination of the measurement or consistency in repetitions when performing a measurement. Consistency indicates that

Table 2. Factor structure of the Home Accidents Awareness Scale for Mothers	
Subscale	Factor load
Awareness of falls (eigenvalue=17,263; variance explained=15,862; alpha=0.930)	
T7	0.733
T8	0.726
T1	0.701
T6	0.693
T22	0.692
T5	0.688
T21	0.683
T4	0.653
T11	0.638
T3	0.625
T12	0.613
T14	0.608
T15	0.604
T2	0.563
T13	0.517
T23	0.482
T24	0.464
T20	0.458
T17	0.449
T19	0.441
Awareness of burns (eigenvalue=5,312; variance explained=14,363; alpha=0.917)	
T61	0.738
T66	0.717
T58	0.701
T62	0.642
T60	0.629
T68	0.625
T65	0.602
T59	0.575
T57	0.575
T67	0.540
T63	0.540
T69	0.511
T56	0.504

the agreement of items on a scale among themselves and with the scale and state of participants to understand the scale items is the same (24). The internal consistency (reliability) of the scale is measured with the Cronbach's alpha coefficient (25). The alpha coefficient of the scale was found to be 0.968. None of the total item correlation values on the scale remained under 0.3. After removing the total item correlation and items, it was determined that none of the items decreased the Cronbach's alpha internal consistency value. On the scale, the Cronbach's alpha coefficient is evaluated as follows: " $0.80 \leq \alpha < 1.00$; highly reliable", " $0.60 \leq \alpha < 0.80$; quite reliable", " $0.40 \leq \alpha < 0.60$; slightly reliable", and " $0.00 \leq \alpha < 0.40$; unreliable" (14). In this study, it was observed that the Home Accidents Awareness Scale for Mothers was highly reliable.

Exploratory factor analysis evaluates the construct validity of the scale. Factor analysis, in general terms, is used for determining which components constitute a whole, decreasing the variable number, and arraying the observations (26). To decide whether the factor analysis should be performed before the exploratory factor analysis, the KMO and Bartlett's preliminary assumption analyses were performed. The adequacy of the sample size for factor analysis is indicated by the KMO test. If the KMO result is greater than 0.5, this indicates that it is appropriate. If the KMO result is greater than 0.90, it indicates excellent sample adequacy; if it is between 0.80-0.90, it indicates good sample adequacy; and if it is between 0.70-0.80, it indicates moderate sample adequacy (16,27). When doing the factor analysis, the Bartlett's test value indicating the connection between the variables should be $p < 0.05$ (24). In the study, the Bartlett's test demonstrated that there was a connection between the variables included in the factor analysis. In the analysis ($KMO=0.928 > 0.60$), it was found that the sample size was adequate for factor analysis. Because of the factor analysis, the variables were collected under four factors, whose total variance explained was 47.882%. Twenty-one items were omitted from the scale because their factor load remained under 0.4 and was loaded in multiple factors (co-loading). In the factor analysis, the anti-image matrix (r) values comprising correlations related to the items were found to be 0.903 and above. It was determined that the scattering plot of the factors showed diffraction after factor four in the scale. The factor load value indicating the correlation between the items and factors is expected to be 0.45 and above (23). After omitting the items, the general reliability of the scale was found to be very high ($\alpha=0.957$).

"Confirmatory Factor Analysis" checks the state of having the same structure on the scale with a definite factor structure. In this analysis, each factor has its own

subscales formed by variables with a high correlation, and whether or not there is a correlation between subscales should be taken into consideration (14). After the confirmatory factor analysis, the goodness-of-fit indices were examined (28). The prespecified factor structure of the scale was examined via confirmatory factor analysis. It was determined that there was a significant agreement between the prespecified factor structure of the scale and the fit statistics tested by the confirmatory factor analysis. When examining the standardized coefficients, it was observed that the standard error values were low, the R2 values and the factor loads were high, and the t values were significant. In the study, the most commonly used goodness-of-fit indices in the literature were used (28,29). Discriminant validity, which indicates that each factor is

different from the others, must be met. Additionally, factor loads and explanatory values should be higher, and the variance should be lower (27). The scale was developed as a valid and reliable scale according to the alpha, variance value, and factor loads.

Because of the study, it was determined that there was no difference between the two measurements in the subscales and the total score according to the test-retest findings. There was a high correlation between the two measurements; in other words, the answers given did not vary based on time. When there is a positive correlation between the results obtained by reapplying the test instrument to previous participants at the end of a specified time period, this is referred to as "test-retest reliability" (26). The results indicated that the answers

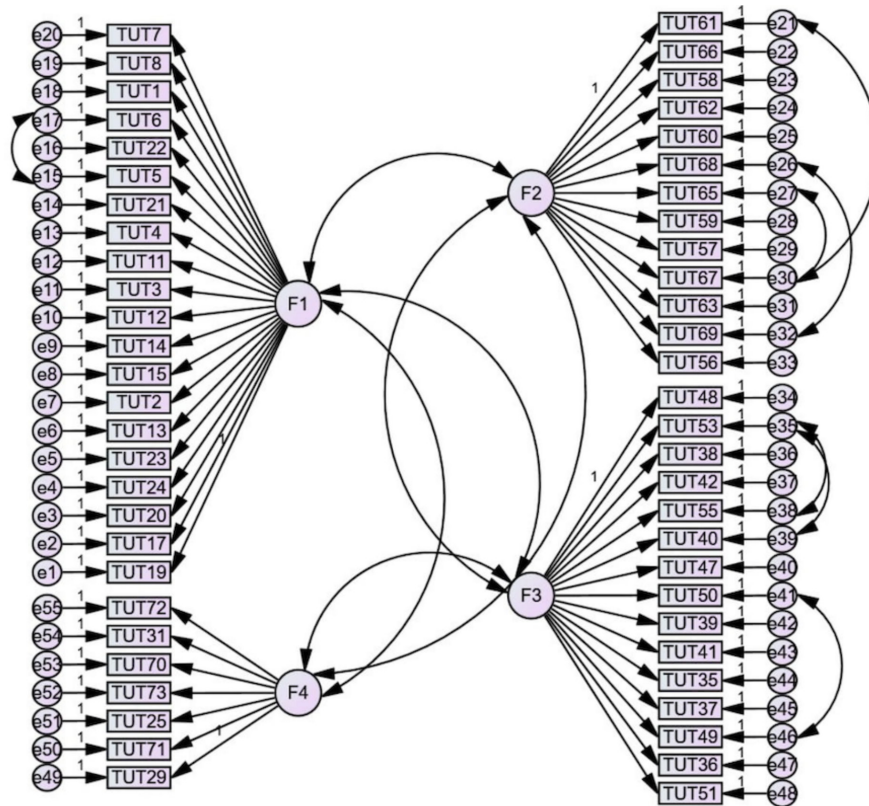


Figure 1. Factor structure of the scale

Overall and Subscale Scores	Lower 27% (n=108)		Upper 27% (n=109)		t	p
	Mean	SD	Mean	SD		
Awareness of falls	3.617	0.477	4.850	0.164	25.486	0.000
Awareness of burns	3.722	0.475	4.899	0.167	24.417	0.000
Awareness of drowning and poisoning	3.692	0.486	4.889	0.140	24.713	0.000
Awareness of cutting and drilling tool injuries	3.874	0.638	4.931	0.131	-16.921	0.000
Overall Home Accidents Awareness Scale for Mothers	3.695	0.365	4.883	0.095	-32.914	0.000

SD: Standard deviation

given by the participants to the scale did not vary based on time, and their trust in the scale increased (15). The results of this study revealed that the answers and statements on the Home Accidents Awareness Scale for Mothers did not change over time.

In the comparison made between the upper 27% and lower 27% values of the scale mean scores, it was determined that the scale performed a precise measurement that could discern differences in a wide area. The absence of difference between the two groups indicates that the highest and lowest score intervals are smaller, and the scale cannot distinguish differences (10). When the studies and analyses were examined, it was seen that the results were as expected. All of these findings supported the hypothesis that "the Home Accidents Awareness Scale for Mothers with children aged 0 to 3 years has been developed as a valid and reliable scale".

Study Limitations

There are some limitations to this study. The most important limitation is that the sample group was selected from schools located only in one province. This will require the consideration of cultural and environmental differences when generalizing the findings of the study in other settings.

Conclusion

This scale was developed as a five-point Likert scale comprising 55 items and four subscales (awareness of burns, falls, drowning, and poisoning, and awareness of cutting and drilling tool injuries) with highly acceptable validity and reliability criteria. Thus, the Home Accidents Awareness Scale for Mothers can be used to evaluate the awareness of mothers with 0-3-year-old children about home accidents in Turkish society in a valid and reliable way and can be adapted to different cultures. Additionally, home accidents are very common in pediatric emergency clinics, and it is crucial for nurses to take initiatives to raise mothers' awareness of home accidents to minimize them.

Ethics

Ethics Committee Approval: Before the study, ethics committee approval dated 29/11/2018 and numbered B.30.2.ATA.0.01.00/306 was obtained from the outpatient clinics and FHC where the study would be conducted and approval dated 29/11/2018 and numbered B.30.2.ATA.0.01.00/306 was obtained from Ataturk University Medical Faculty Clinical Trials Ethics Committee Presidency in the study.

Informed Consent: Consent was obtained from the mothers.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: E.G., Design: E.G., F.G.T., Data Collection or Processing: E.G., F.G.T., Analysis or Interpretation: E.G., F.G.T., Literature Search: E.G., Writing: E.G.

Conflict of Interest: No conflict of interest was declared by the authors.

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Appendix 1. Home Accidents Awareness Scale for Mothers

The Home Accidents Awareness Scale for Mothers was developed to evaluate the home accidents awareness of mothers with 0-3-year-old children. The scale is determined by a series of statements (5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree, 1-Strongly Disagree) rated from 1 to 5 points. Please mark the answer that best fits you after reading the statements.

Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Appendix 1. Continued

The Home Accidents Awareness Scale for Mothers was developed to evaluate the home accidents awareness of mothers with 0-3-year-old children. The scale is determined by a series of statements (5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree, 1-Strongly Disagree) rated from 1 to 5 points. Please mark the answer that best fits you after reading the statements.

Statements		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
17	I don't keep furniture near windows or kitchen counters.					
18	I pay attention to room lighting to avoid possible falls.					
19	I pay attention to the safety of stair entrances and exits.					
Statements		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
20	I ensure that my child's bed faces away from the window.					
21	I ensure that no cables are lying in the middle of the room.					
22	I do not give my child a pacifier, necklace, safety pin, or anything like that.					
23	At home, I keep the doors of machines such as the oven, washing machine, and a dishwasher closed.					
24	I pay attention to close the caps of the medicine bottles tightly.					
25	I place cleaning supplies out of reach of children.					
26	I keep the pesticides in the locker.					
27	When buying toys for my child, I ensure that they are not made of harmful substances.					
28	I ensure that the shelf life of the foods in the house is not exceeded.					
29	I pay attention not to keep poisonous plants in the house.					
30	I do not tell my child that drugs are sugar.					
31	I store medicines and cleaning supplies in their original bottles.					
32	I observe when my child eats or drinks.					
33	I do not give my baby a bottle while she/he is sleeping.					
34	I do not give my child small grain foods such as corn and snacks.					
35	I do not allow my child to play with small objects.					
36	When I choose toys for my child, I ensure that they do not contain small pieces.					
37	I ensure that my child does not speak when she has food in her mouth.					
38	I do not eat fish without removing the bones thoroughly.					
39	Protectors that provide safety are used for sockets that are not used at home.					
40	I put objects such as matches and lighters out of my child's reach.					
41	I keep my child away from hot food and drinks.					
42	I ensure that electrical appliances are not plugged into the socket.					
Statements		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
43	When carrying my child in my arms, I am careful not to carry hot liquids.					
44	While eating on the floor, I pay attention not to bring hot dishes or tea to the table.					
45	I do not leave my child alone in the kitchen while the oven and stove are in use.					
46	I place pots and pans out of my child's reach.					
47	I ensure sure to choose my child's toys made of nonflammable substances.					
48	I do not use electric blankets in the nursery.					
49	I pay attention to choosing fabrics such as drapes from non-flammable fabrics.					
50	I pay attention not to use a portable heater at home.					
51	When I use a thermofoil for a child, I use it carefully and close the lid tightly.					
52	I do not allow my child to pick up cutting tools such as scissors and knives.					
53	I keep my child away from breakable tools such as glass and glasses.					
54	I keep my child away from sharp objects such as pencils and nails.					
55	I do not buy sharp-edged toys for my child.					