Research Article

RADIATION RISK AWARENESS SCALE: A METHODOLOGICAL STUDY

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Abstract

Aim: The aim of this research was to develop a tool to measure people's awareness of the potential risks of radiation in their environment or in the areas where they operate. The developed scale provides a comprehensive tool for assessing people's level of awareness and knowledge of the radiation sources they encounter in their daily lives.

Method: In the study, the survey method was applied and data were obtained by convenience sampling method in accordance with the quantitative research design. For the research data, 1370 adult individuals were included in the study. "Personal Information Form" and "Radiation Risk Awareness Scale" were used to obtain the data. Reliability and construct validity analyses of the developed scale were conducted.

Findings: As a result of the analyses, it was determined that the radiation-related risk awareness scale consists of 24 items and 3 dimensions and has good and acceptable fit values [X2/Sd: 1223.86; GFI: 0.925; AGFI: 0.909; CFI: 0.938; RMSEA: 0.054; RMR: 0.035]. The fact that the Cronbach Alpha values of the radiation-related risk awareness scale and its sub-dimensions are between 0.80-1.00 indicates that the scale has a high degree of reliability.

Results: As a result of the research, the radiation-related risk awareness scale can be used in research to determine the level of awareness that people have against the potential risks of radiation in their environment or in the areas where they operate.

Keywords: Awareness, Scale Development, Radiation, Radiation-Related Risk, Health.

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Radyasyona Bağlı Risk Farkındalığı Ölçeği: Metodolojik Bir Çalışma

Öz

Amaç: Bu araştırma, insanların çevrelerinde veya faaliyet gösterdikleri alanlarda radyasyonun potansiyel risklerine karşı sahip oldukları farkındalık düzeyini ölçebilecek bir araç geliştirmek amacıyla yapılmıştır. Geliştirilen ölçek, insanların günlük yaşamlarında karşılaştıkları radyasyon kaynaklarına karşı bilinç ve bilgi düzeylerini değerlendirme konusunda kapsamlı bir araç sunmaktadır.

Yöntem: Araştırmada anket yöntemi uygulanarak nicel araştırma desenine uygun şekilde, kolayda örneklem yöntemiyle veriler elde edilmiştir. Araştırma verileri için 1370 yetişkin birey araştırmaya dâhil edilmiştir. Araştırmanın verilerinin elde edilmesinde "Kişisel Bilgi Formu" ve "Radyasyona Bağlı Risk Farkındalığı Ölçeği" kullanılmıştır. Geliştirilen ölçeğin güvenirlik ve yapı geçerliliği analizleri yapılmıştır.

Bulgular: Analizler sonucunda radyasyona bağlı risk farkındalığı ölçeğinin 24 madde ve 3 boyuttan oluşmakta ve yapı geçerliliği sonucunda iyi ve kabul edilebilir uyum değerlerine [X^2/Sd: 1223,86; GFI: 0,925; AGFI: 0,909; CFI:0,938; RMSEA:0,054; RMR:0,035] sahip olduğu tespit edilmiştir. Radyasyona bağlı risk farkındalığı ölçeği ve alt boyutlarının Cronbach Alpha değerlerinin 0.80-1.00 arasında yer alması ölçeğin yüksek derecede güvenirliğe sahip olduğunu göstermektedir.

Sonuç: Yapılan araştırma sonucunda radyasyona bağlı risk farkındalığı ölçeğinin insanların çevrelerinde veya faaliyet gösterdikleri alanlarda radyasyonun potansiyel risklerine karşı sahip oldukları farkındalık düzeyini belirlemek için araştırmalarda kullanılabilir.

Anahtar Kelimeler: Farkındalık, Ölçek Geliştirme, Radyasyon, Radyasyona Bağlı Risk, Sağlık.

1. INTRODUCTION

Radiation is a type of energy that has an important place in the lives of modern societies and is used in a wide range of fields. It is used for imaging and treatment in the health sector, quality control and energy production in industry, and product sterilization in agriculture. However, the widespread use of radiation brings with it various health and environmental risks. In this context, it is of great importance for individuals to be aware of radiation and to have knowledge about radiation protection (Hudzietzová & Sabol, 2014; Ribeiro et al., 2020).

Radiation is energy emitted or transmitted in the form of waves or particles that can penetrate matter and humans (Shafiq & Mehmood, 2024). It is also an important component of the human physical environment. Radiation is divided into two main groups according to its effects on matter: Ionizing and non-ionizing radiation (Bhanudas et al., 2024; Ghanbari et al., 2024; Shafiq & Mehmood, 2024). Both ionizing and non-ionizing radiation are widely used in daily practice (Bhanudas et al., 2024). Ionizing radiation can cause damage to cells and DNA due to its high energy, which can cause serious health problems such as cancer. Non-ionizing radiation is of lower energy. It is the type of radiation usually emitted from electronic devices. It is known that this type of radiation, which we are frequently exposed to in daily life, can also have negative effects on health in the long term. The negative effects of radiation on the environment also pose significant threats to ecosystems (Ghanbari et al., 2024; Shafiq & Mehmood, 2024).

In recent years, ionizing radiation has become increasingly important for the diagnosis and treatment of different medical conditions (Allam et al., 2024; Elnari et al., 2016). Most medical imaging modalities (radiography, fluoroscopy, computed tomography (CT) and nuclear medicine) involve ionizing radiation. These modalities can guide radiation therapy, enabling diagnosis and management of medical care, and can also replace surgical interventions with minimally invasive image-guided procedures (Abuzaid et al., 2024; Frush et al., 2024). The effects of ionizing radiation on public health are divided into stochastic and deterministic. Stochastic effects can occur at any dose without a dose threshold and harmful effects can be seen after 10-20 years. Deterministic effects, on the other hand, intensify as the dose increases and have a specific dose threshold. When the radiation dose is exceeded, serious and irreversible damage occurs in exposed people. Ionizing radiation alters molecules in biological tissues, causing genetic and DNA damage. This produces a wide range of biological reactions, from immediate symptoms (nausea, vomiting, fatigue) to long-term effects (various cancers and genetic abnormalities) (Ghanbari et al., 2024; Shafiq & Mehmood, 2024).

While 82% of the world's radiation comes from natural sources, the second largest radiation exposure of humans comes from medical sources (Abuzaid et al., 2024; Anad Mishal et al., 2024). Although advances in medical imaging technologies have led to more accurate diagnoses, overuse of these modalities is a concern in terms of radiation exposure and health costs (Singh et al., 2017). Medical radiation poses a significant health risk affecting 20% of the global population (Allam et al., 2024; Frush et al., 2024; Kim et al., 2018).

The key element of protection from both ionizing and non-ionizing radiation is the prevention of harm to humans and the environment. For humans, the aim is to protect all individuals, while for the environment, the aim is to protect species, ecosystems and biota against adverse effects. The basic principles of ionizing radiation protection are necessity, optimization and dose limits (Abuzaid et al., 2024; Allam et al., 2024; Alsubaie & Abujamea, 2024; International Commission on Non-Ionizing Radiation Protection, 2020; Shafiq & Mehmood, 2024).

As ionizing radiation is used more frequently worldwide for medical, industrial, agricultural, research and military purposes, public concern about radiation-induced health problems has increased (Lee et al., 2021). Often individuals in society are unable to distinguish between deterministic and stochastic effects. However, they believe that any exposure is very dangerous (Hudzietzová & Sabol, 2014). Recent studies assessing awareness and knowledge between the general public and radiation professionals show that there is a lack of awareness and knowledge about exposure to ionizing radiation (Evans et al., 2015; Ribeiro et al., 2020). This is due to how health risks are portrayed by the mass media; some media sources may misinform the general public by exaggerating and others by downplaying. The technical language of radiation risk assessment plays an important role, especially given the educational differences in the general population (Ribeiro et al., 2020).

Radiation awareness refers to the level of awareness of individuals about the effects of radiation on health and the environment. Radiation knowledge, on the other hand, covers the level of knowledge that individuals have about radiation sources, methods of protection from these sources and areas of use of radiation. Radiation awareness and knowledge enable individuals to be more cautious against the radiation sources they encounter in daily life and to take necessary precautions. The risks of radiation on health are of great importance, especially considering that even long-term exposure at low doses can cause serious effects. The carcinogenic effects of radiation, its potential to accumulate in the body, its negative effects on genetic structure and its special risks for vulnerable groups such as children reveal the necessity of raising a wide awareness in society on this issue.

Literature reviews on radiation awareness show that this issue is generally focused on certain occupational groups, especially healthcare professionals. However, studies to measure radiation awareness in the general population are limited. The main purpose of this study is to present a methodological review of the radiation risk awareness scale developed to measure the radiation-related risk awareness of individuals. The Radiation Risk Awareness Scale fills an important gap in this field and provides a comprehensive tool for assessing individuals' awareness and knowledge of radiation sources that they encounter in their daily lives. Within the scope of the study, the development process, validity and reliability analysis of the scale were discussed in detail. In addition, it is aimed to determine the level of radiation awareness, knowledge and health risks of individuals through this scale.

2. METHODS

2.1 Purpose of the Study

This research was conducted to develop a tool that can measure the level of awareness people have about the potential risks of radiation in their environment or in the areas where they operate.

2.2. Population and Sample

In determining the sample size in scale development research, it is recommended to reach a sample size 5 to 10 times the number of scale items (Grove et al., 2012; Şencan, 2005). Considering this recommendation, a sample size of 260 people is considered sufficient for our scale consisting of 26 items. In addition, according to the latest data created by the Turkish Statistical Institute, there are 60 million 229 thousand 333 adult individuals residing in Turkey in 2023 (TÜİK, 2022). 60.229.333 people are accepted as the universe and it is stated that it is sufficient to reach 384 people in the sampling table at 95% confidence interval (Altunışık et al., 2012; Kalaycı, 2017). The research was conducted with convenience sampling method within the specified dates and data were obtained from 1370 adult individuals. Sufficient data were obtained and analyzed according to the literature.

2.3. Data Collection Tools

The data collection form consists of two parts. In the first part, the Personal Information Form, which includes the socio-demographic characteristics of the participants, includes 5 items on gender, age, marital status, educational status, and place of residence.

Radiation Risk Awareness Scale, a question pool was created by reviewing the literature to develop a tool that can measure the level of awareness that people have against the potential risks of radiation in their environment or in the areas where they operate. The question pool was evaluated by taking expert opinions and the draft form was determined as 26 items. The 5-point Likert-type scale is graded as '1 - Strongly disagree, 2 - Disagree, 3 - Somewhat agree, 4 - Agree, 5 - Strongly agree'. As the average score of the individuals approaches 1, it shows that the risk awareness due to radiaston decreases, and as it approaches 5, it shows that the risk awareness due to radiaston is high. As a result of the factor analysis of the data obtained in the study, a final scale form (Addendum) consisting of 24 questions and 3 dimensions was created.

2.4. Data Collection and Analysis

After obtaining the necessary ethical permissions, the data were collected on a voluntary basis, with adult individuals residing in Turkey answering the scale questions web-based by creating a Google Form. The research was conducted between 05.04.2024-05.05.2024. Before using the data collection form used for the research, the participants were informed by explaining the purpose of the research. The data obtained were analyzed using SPSS 26.0 and AMOS 24 programs. According to the analysis methods used and the distribution of the number of remaining items, the final Radiation Risk Awareness Scale Scale was reached.

In determining the analysis methods to be used, item total correlation analysis, cronbach alpha, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) methods were preferred in scale development studies. The significance accepted in item analysis was taken at $p < .05$ level.

3. RESULTS

The distribution of the findings regarding the socio-demographic characteristics of the participants is given in Table 1 below.

Table 1. Socio-Demographic Characteristics of The Participants

Socio-Demographic Characteristics	Options	Number (n)	Percentage (%)
Gender	Female	937	68.4
	Male	433	31.6
Age	18-24 years old	968	70.7
	25-29 years old	140	10.2
	30 years and over	261	19.1
Marital status	Single	1042	76.1
	Married	328	23.9
Education	Primary/Secondary School	127	9.3
	High School	299	21.8
	Associate Degree	609	44.5
	Bachelor's degree and above	335	24.5
Place of residence	Village/Town	306	22.3
	District	572	41.8
	City Center	492	35.9
TOTAL		**1370**	**100.00**

1370 adult individuals participated in the study. The majority of the participants (68.4%) were women, and 70.7% of the participants were between the ages of 18-24. The majority of the participants were single (76.1%) and 44.5% had an associate's degree in terms of educational attainment. In terms of place of residence, the highest participation was from district centers (41.8%), while there was also a significant participation from provincial centers (35.9%) and villages/towns (22.3%).

In order to determine the statistical construct validity of the scale, firstly, explanatory factor analysis technique is used. First of all, Kaiser Mayer Olkin (KMO) and Bartlett's test are performed to understand the suitability of the scale for factor analysis. The KMO coefficient tests the suitability of the sample size and correlations between variables for factor analysis. The values found are interpreted as excellent if 0.90 and above, very good between 0.80 - 0.90, good between 0.70 - 0.80, fair between 0.60 - 0.70, poor between 0.50 - 0.60, unacceptable below 0.50 (Kalaycı, 2017). In factor analysis, the factor load value coefficient is a value used to explain the relationship between items and factors. Under which factor a variable has a large weight in absolute value, that variable is in close relationship with that factor. Variance at this level is generally considered to be quite good if the factor loading is 0.50 and above, regardless of its sign, and is taken into account in variable removal. The fact that questions are included in both factors creates complexity (Coşkun et al., 2017; Kalaycı, 2017; Özdamar, 2017). In this context, as a result of the item total score correlation values, questions S16 and S26 were discarded from the scale questions. The total explained variance values and factor loadings according to the results of the explanatory factor analysis are presented in Table 2 and Table 3.

Table 2. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.300	38.748	38.748	9.300	38.748	38.748
2	3.059	12.745	51.493	3.059	12.745	51.493
3	1.132	4.716	56.208	1.132	4.716	56.208
4	.842	3.510	59.718			
5	.718	2.990	62.708			
6	.675	2.813	65.520			
7	.665	2.773	68.293			
8	.615	2.563	70.856			
9	.573	2.387	73.243			
10	.527	2.196	75.440			
11	.515	2.147	77.587			
12	.495	2.061	79.647			
13	.494	2.059	81.707			
14	.473	1.972	83.678			
15	.451	1.880	85.558			
16	.448	1.866	87.424			
17	.428	1.785	89.209			
18	.411	1.713	90.921			
19	.403	1.680	92.601			
20	.376	1.566	94.167			
21	.366	1.526	95.694			
22	.356	1.484	97.178			
23	.342	1.425	98.603			
24	.335	1.397	100.000			
KMO = 0.959; **Bartlett's X^2 =** 15996.616; p < .05						

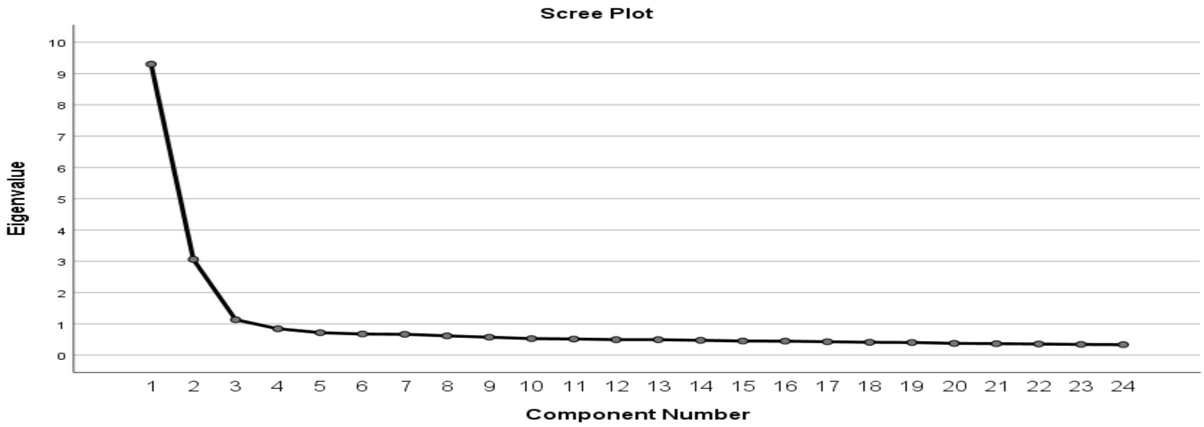

Figure 1. Scree Plot of The Scale

Table 3. Factor Loadings of Scale Questions

Questions	Factors		
	F1	**F2**	**F3**
S11. Pregnant women should be kept away from environments with radiation.	0.766		
S10. There are negative effects of radiation on the environment.	0.702		
S4. It is important to receive training on the safe use of radiation sources.	0.701		
S9. My electronic devices have the potential to emit radiation.	0.691		
S7. Radiation has negative effects on child development.	0.681		
S5. We are exposed to radiation in my daily life.	0.663		
S25. Measures should be taken at individual and social level to reduce exposure to radiation.	0.656		
S17. It is important to take personal precautions to protect from radiation sources.	0.652		
S8. There are potential risks of radiation exposure during medical treatment or tests.	0.555		
S15. There are commonly used sources of radiation in our daily lives.	0.547		
S6. I have knowledge about recognizing and protecting myself from radiation sources.		0.747	
S3. I take personal precautions to reduce exposure to radiation.		0.715	
S18. I follow current news about radiation.		0.714	
S1. I have sufficient knowledge about the effects of radiation on health.		0.710	
S2. I know the potential sources of radiation in my environment.		0.706	
S12. I inform my family about the risks related to radiation.		0.699	
S19. I know how radiation is used in medical treatment.		0.677	
S21. I distinguish between natural and human sources of radiation.		0.651	
S23. Radiation has negative effects on food.			0.669
S24. Radiation has long-term effects even at low doses.			0.663
S13. Radiation has the potential to accumulate in the body.			0.624
S22. Radiation poses a special risk to children.			0.590
S14. Radiation has carcinogenic effects.			0.584
S20. Radiation has negative effects on the genetic structure of the human being.			0.575
F1: Radiation Consciousness, **F2:** Radiation Information, **F3:** Health Risks of Radiation			

When Table 2 and Table 3 were examined, it was determined that the KMO analysis result of the radiation-related risk awareness scale data was 0.959 and the Barlett test was significant ($p < .05$) and the size of the sample and the correlations between variables were suitable for factor analysis. As a result of the EFA of the scale, it was determined that the scale had a three-factor structure. When the factor loads of the scale were analyzed, questions S4, S5, S7, S8, S9, S10, S11, S15, S17, S25 of the scale questions formed the radiation consciousness sub-dimension with an explanation rate of 38.748%; Questions S1, S2, S3, S6, S12, S18, S19, S21 constitute the radiation information sub-dimension with an explanation rate of 12.745%; questions S13, S14, S20, S22, S23, S24 constitute the health risks of radiation dimension with an explanation rate of 7.392%. The percentage of explaining the total variance of the radiation-related risk awareness scale was found to be 56.208. CFA was conducted to support the EFA results.

CFA evaluates the fit with the data by estimating predetermined factor loadings, error variances and relationships between factors (Yaşlıoğlu, 2017). In this context, it was deemed appropriate to examine the CFA fit index values (X2/Sd, GFI, AGFI, CFI, RMSEA and RMR) to examine the construct validity in the study. The path diagram and fit index results of the CFA analysis of the scale are presented below.

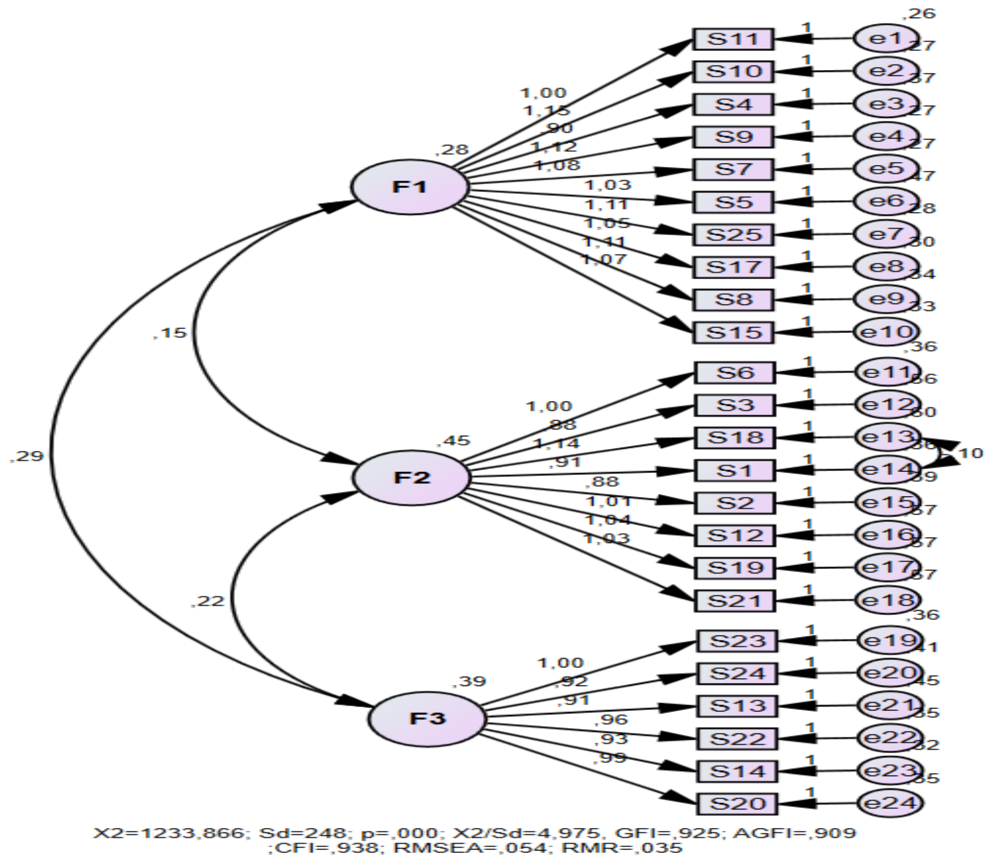

Figure 2. Path Diagram of The Scale

Figure 2 presents the results of the CFA path analysis of the radiation-related risk awareness scale. In this context, it was observed that the standardized item loadings varied between 0.88 and 1.14. These values above 0.32 are considered as a criterion that keeps the factor loading within acceptable limits (Çokluk et al., 2012; Özdamar, 2017). In order to improve the goodness of fit values, covariance linkage was made between questions S1 and S18 (Meydan & Şeşen, 2015; Şimşek, 2007; Wang & Wang, 2019).

Table 4. CFA Results of The Scale Fit Indices

Fit indices	Good Fit	Harmony	Model Values
X^2/Sd	<2	<5	4.975
GFI	>0.95	>0.90	0.925
AGFI	>0.95	>0.90	0.909
CFI	>0.95	>0.90	0.938
RMSEA	<0.05	<0.08	0.054
RMR	<0.05	<0.08	0.035

Table 4 shows the goodness of fit index values of the radiation-related risk awareness scale and it was determined that it showed acceptable fit according to the values stated in the literatüre (Hooper et al., 2008; Meydan & Şeşen, 2015; Munro, 2005; Rose et al., 2004; Şimşek, 2007; Wang & Wang, 2019).

The distribution of Skewness and Kurtosis data between "-1.5 and +1.5" shows that the data do not deviate from normal distribution (Kalaycı, 2017; Tabachnick & Fidell, 2013). In addition, the Cronbach Alpha value used in Likert scales between 0.60-0.79 indicates that it is reliable and between 0.80-1.00 indicates that it has high reliability (Kalaycı, 2017; Munro, 2005; Uzunsakal & Yıldız, 2018). Reliability and normality analysis results for the scale and its dimensions used in the study are presented in Table 5.

Table 5. Normality and reliability analysis values of the radiation risk awareness scale and its subscales

Scale and Dimensions	Item Number	Mean±Sd	Skewness	Kurtosis	Cronbach Alpha
RADIATION RISK AWARENESS	24	3.91±0.52	-0.348	0.511	0.926
Radiation Consciousness	10	4.24±0.58	-0.891	0.953	0.907
Radiation Information	8	3.42±0.70	-0.025	0.005	0.872
Health Risks of Radiation	6	4.01±0.64	-0.381	-0.146	0.851

When Table 5 is examined, it is found that the Skewness and Kurtosis values of the scale and its sub-dimensions are between "-1.5 and +1.5", which shows that the data do not deviate from normal distribution. In addition, the Cronbach Alpha values of the scale and its sub-dimensions are between 0.80-1.00, indicating that the scale is highly reliable.

Table 6. Correlation Analysis Findings Between The Radiation Risk Awareness Scale and Its Subscales

Scale and Dimensions		RADIATION RISK AWARENESS	Radiation Consciousness	Radiation Information	Health Risks of Radiation
RADIATION RISK AWARENESS	**r**	1	.864**	.759**	.867**
	p		< .001	< .001	< .001
Radiation Consciousness	**r**		1	.378**	.771**
	p			< .001	< .001
Radiation Information	**r**			1	.464**
	p				< .001
Health Risks of Radiation	**r**				1
	p				
**p < .001					

As seen in Table 6, Pearson correlation analysis results are included to examine the relationship between the general and sub-dimensions of the radiation-related risk awareness scale. It was determined that all of the relationships between the general and sub-dimensions of the iatrogenesis perception scale were statistically significant ($p < .001$). In addition, it was determined that there was a high positive relationship between the sub-dimensions and radiation-related risk awareness.

4. CONCLUSION

Radiation risk awareness is an important issue facing modern societies. Radiation is a form of energy emitted from various sources and can occur naturally or as a result of human activity. Ionizing radiation can have potential risks to health. Being aware of these risks is important to protect the health of individuals and communities. In this context, radiation from natural sources, such as natural springs and solar radiation, should be considered, as well as increased exposure risks from the use of technologies such as nuclear power plants, medical imaging devices and wireless communications. With this in mind, the research was undertaken to develop an instrument to measure people's awareness of the potential risks of radiation in their environment or in the areas in which they operate. Developing a radiation risk awareness scale can provide a basic tool for understanding the potential risks from radiation sources and taking effective measures. It can also improve risk communication by increasing public involvement and trust, and help ensure appropriate regulatory measures are taken. It can be used in a wide range of contexts, from monitoring technological advances to health policy-making, thus enabling effective management of radiation-related risks.

Within the scope of the aim of the study, a question pool was formed by reviewing the literature. The question pool was evaluated by taking expert opinions and the draft form was determined as 26 items.

EFA technique was applied to determine the statistical construct validity of the scale. As a result of the EFA, 2 items with item total score correlation values of 0.50 and below were removed from the scale and it was determined that the item total score correlation values were appropriate. As a result of the analysis, the KMO analysis result was 0.959 and the Barlett test was significant ($p < .05$), indicating that the size of the sample and the correlations between variables were suitable for factor analysis. As a result of EFA, it was determined that the scale had a three-factor structure. The percentage of explaining the total variance of the scale was determined to be 56,208. CFA was conducted to support the EFA results. It was determined that the values obtained as a result of CFA had an acceptable fit in the literature. Cronbach Alpha values were examined within the scope of scale reliability. The fact that the Cronbach Alpha values of the radiation-related risk awareness scale and its sub-dimensions are between 0.80-1.00 indicates that the scale is highly reliable. In addition, it was determined that all of the relationships between the general and sub-dimensions of the radiation-related risk awareness scale were statistically significant and positively correlated.

As a result of the research, this scale consisting of 24 items and 3 dimensions can be used in researches to determine the level of awareness that people have against the potential risks of radiation in their environment or in the areas where they operate (Addendum).

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Conflict of interest

The authors declare that they have no conflicts of interest

Informed consent

Before applying the data collection form in the study, ethics committee approval was obtained with the Hatay Mustafa Kemal University Social and Human Sciences Scientific Research and Publication Ethics Committee's decision dated 04.04.2024 and numbered 05.

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Addendum: Scale Form

Radyasyona Bağlı Risk Farkındalığı Ölçeği* Aşağıdaki sorulara size en uygun seçeneği işaretleyiniz.	**Hiç Katılmıyorum**	**Katılmıyorum**	**Kısmen Katılıyorum**	**Katılıyorum**	**Kesinlikle Katılıyorum**
1.Hamile kadınlar radyasyon bulunan ortamlardan uzak tutulmalıdır.	*1*	*2*	*3*	*4*	*5*
2.Radyasyonun çevre üzerindeki olumsuz etkilerini bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
3.Radyasyon kaynaklarının güvenli kullanımı konusunda eğitim almak önemlidir.	*1*	*2*	*3*	*4*	*5*
4.Elektronik cihazlarımın radyasyon yayma potansiyeli bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
5.Radyasyonun çocuk gelişimine olumsuz etkilerini vardır.	*1*	*2*	*3*	*4*	*5*
6.Günlük yaşantımda radyasyona maruz kalmaktayız.	*1*	*2*	*3*	*4*	*5*
7.Radyasyona maruz kalmayı azaltmak için bireysel ve toplumsal düzeyde önlemler alınmalıdır.	*1*	*2*	*3*	*4*	*5*
8.Radyasyon kaynaklarından korunmak için kişisel önlemler almak önemlidir.	*1*	*2*	*3*	*4*	*5*
9.Tıbbi tedavi veya testler sırasında maruz kalınan radyasyonun potansiyel riskleri bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
10.Radyasyonun günlük yaşantımızdaki yaygın olarak kullanılan kaynaklarını bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
11.Radyasyon kaynaklarını tanımak ve onlardan korunmak konusunda bilgi sahibiyim.	*1*	*2*	*3*	*4*	*5*
12.Radyasyona maruz kalmayı düşürmek için kişisel önlemler alırım.	*1*	*2*	*3*	*4*	*5*
13.Radyasyonla ilgili güncel haberleri takip ederim.	*1*	*2*	*3*	*4*	*5*
14.Radyasyonun sağlık üzerindeki etkileri hakkında yeterli bilgiye sahibim.	*1*	*2*	*3*	*4*	*5*
15.Çevremdeki potansiyel radyasyon kaynaklarını biliyorum.	*1*	*2*	*3*	*4*	*5*
16.Radyasyonla ilgili risklere karşı ailemi bilgilendirmekteyim.	*1*	*2*	*3*	*4*	*5*
17.Radyasyonun tıbbi tedavi alanında nasıl kullanıldığını biliyorum.	*1*	*2*	*3*	*4*	*5*
18.Radyasyonun doğal kaynaklarını ve insan kaynaklı kaynakları ayırt ederim.	*1*	*2*	*3*	*4*	*5*
19.Radyasyonun gıdalardaki olumsuz etkileri vardır.	*1*	*2*	*3*	*4*	*5*
20.Radyasyonun düşük dozlarda bile uzun vadeli etkilerini vardır.	*1*	*2*	*3*	*4*	*5*
21.Radyasyonun vücutta birikme potansiyeli bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
22.Radyasyonun çocuklarda özel bir risk oluşturmaktadır.	*1*	*2*	*3*	*4*	*5*
23.Radyasyonun kanserojen etkileri bulunmaktadır.	*1*	*2*	*3*	*4*	*5*
24.Radyasyonu inanın genetik yapısına olumsuz etkileri vardır.	*1*	*2*	*3*	*4*	*5*

**Ölçekte ters kodlama yoktur.*
**5'li likert tipinde hazırlanmıştır.*
**1-10 arası Radyasyon Bilinci Boyutuna, 11-18 arası Radyasyon Bilgisi Boyutuna, 19-24 arası Radyasyonun Sağlık Riskleri Boyutuna ait ifadeleri içermektedir.*