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Evaluation of healthy life skills of 8-10-year-old children: A scale development study

Habip Balsak [a,*], Emrah Köseoğlu [b], Mehmet Güney [b]

[a] Department of Midwifery, Batman University School of Health Sciences, Batman, Turkey
[b] Department of Child Development, Harran University Viranşehir Vocational High School, Şanlıurfa, Turkey

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ABSTRACT

Background: The present study aimed to develop a measurement tool to evaluate the healthy life skills of children aged 8–10 who had reading and comprehension skills.
Methods: A total of 901 students, who were between the ages of 8 and 10, studying in the 3rd and 4th grades of 12 different primary schools in Turkey, were included in the study. Exploratory and Confirmatory Factor Analyses were used to evaluate the validity of the data obtained in the study.
Results: Confirmatory Factor Analysis revealed that the scale, comprising 22 items and four sub-dimensions, demonstrated a strong model fit. The total variance explained by the scale was 40.92 %. The identified sub-dimensions were labeled as 'Protection of Health,' 'Cleaning and Hygiene,' 'Sports and Activity,' and 'Proper Nutrition.' Additionally, the Omega Reliability Coefficient of the scale was calculated as 0.831, indicating high reliability.
Conclusion: The scale developed in the present study is a valid and reliable tool for healthcare staff and teachers to evaluate the healthy life skills of children aged 8–10 years.
Practice implication: The scale can guide healthcare professionals and educators in assessing and improving healthy life skills in children aged 8–10 years.

Introduction

There have been recent important developments in the field of child healthcare on a global scale, which have resulted in a dramatic decrease in child mortality under the age of 15 in the last 25 years (UNICEF, 2019). However, these improvements were mostly limited to countries in the upper-income group. Approximately half of the child mortality still results from treatable and preventable diseases in middle- and especially low-income countries (Cha & Jin, 2020; Strong et al., 2021). Similar to child mortality, preventable causes also come to the forefront in terms of child morbidity. In this context, effective training and preventive interventions have critical roles for child health.

It is already known that some behaviors and skills are effective in helping children live a healthy life. It has been confirmed by many previous studies that healthy lifestyle behaviors (e.g., proper nutrition, physical activity, and personal hygiene) contribute significantly to child health (Black et al., 2020; Rodriguez-Ayllon et al., 2019; Staniford & Schmidtke, 2020). It is accepted by authorities that primary prevention measures such as acquiring healthy life skills and improving the quality of life are important in reducing child morbidity and mortality (WHO, 2020). In this context, providing children with healthy life skills in schools comes to the forefront as an important issue in terms of school health.

School health has important roles in terms of preventive health services in the sustainability of child health (WHO, 2021). Children spend approximately 1/3 or 1/4 of their daily time in and around their schools, which poses an important opportunity for children to acquire healthy life skills (Ulutaşdemir et al., 2016). To make use of this opportunity, many national and international programs are being performed to improve school health and health in children (Kabasakal, 2019; Leger et al., 2022). WHO Health Promoting Schools Project is one of the most well-known examples in this field. Through this project, WHO aimed to contribute to child health. The initiative addresses student well-being through six key components: physical, emotional, social, mental, environmental, and spiritual health (Leger et al., 2022). This project also aimed to create a cooperation model in the fields of education and health for children to acquire healthy life habits and improve their general health. The Health Promoting Schools Project used the education system as a tool to protect and improve the health of children and young people (Leger et al., 2022; Sánchez-Hernando et al., 2022).

* Corresponding author at: Kültür, Batman Üniversitesi Merkez Kampüsü Pk:72060, 72040, Batman / Türkiye.
E-mail address: h.balsak@gmail.com (H. Balsak).

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Although developing a healthy lifestyle in children makes a significant contribution to public healthcare, studies conducted previously on healthy lifestyles in the literature are mostly a topic discussed during adolescence and adulthood. When studies conducted on healthy lifestyles were reviewed, a significant number of measurement tools and studies were detected in the literature (Genç & Karaman, 2019; Kelly et al., 2011; Walker & Hill-Polerecky, 1996). However, previous studies conducted on healthy lifestyles in pre-adolescent childhood, which constitute an important sensitive group for public healthcare, are more limited than those conducted with adults (Landrigan, 2004; Osgood et al., 2010). However, it is stated that children are influenced by their parents and their environment regarding their health lifestyles in early childhood, starting from the age of 4 (Mollborn et al., 2014).

Lifestyle and behaviors acquired during pre-adolescence, which is a period of rapid growth and development, can be important determinants of health in later years of life (Burdette et al., 2017). For example, behaviors such as limited physical activity and unhealthy nutrition during early childhood are important causes of obesity in adolescence and adulthood (Thomas-Eapen, 2021). It has been shown in some studies that childhood obesity causes cardiovascular diseases in later life (Umer et al., 2017). It is also known that adult addictions may be associated with childhood habits (Morales et al., 2020). For this reason, acquiring healthy lifestyle behaviors during childhood is very important for protecting and improving health (WHO, 2017).

Behaviors are shaped starting from adolescence when the independent decision-making process develops, and pre-adolescent experiences have important roles in the formation of these behaviors (Burdette et al., 2017; Lawrence et al., 2017). For this reason, developing expected healthy lifestyle behaviors in pre-adolescent childhood, when children are more passive, is very important in terms of primary prevention (Osgood et al., 2010; WHO, 2017). This process continues with the socialization of the child in school and other living areas after their parents, and the behaviors are shaped in this way in adolescence and later adulthood (Mollborn et al., 2021). This shows that the adoption and implementation of a healthy lifestyle during pre-adolescence will have significant effects on their current and adult health.

Studies reported in the literature conducted to evaluate healthy lifestyle behaviors of adults evaluated many different sub-dimensions such as nutrition, physical activity, health responsibility, and communication (Genç & Karaman, 2019; Walker & Hill-Polerecky, 1996). In a previous study that was conducted in early childhood, parents' opinions were taken into consideration similar to the studies conducted with adults (Mollborn et al., 2014; Özdogan et al., 2001; Ruperto et al., 2001). However, a self-report measurement tool for the healthy lifestyle of primary school students with reading and comprehension skills was not detected in the literature. The present study aimed to develop a measurement tool to evaluate the healthy life skills of children aged 8–10 who had reading and comprehension skills.

Methods

The study had a cross-sectional design. The schools where the study was conducted were anonymized to guarantee the rights of the children and institutions that were included in the study. This study adheres to the standards outlined in the Child-Centred Research Checklist by Foster et al. (2025), as recommended by the EQUATOR Network.

Participants

The study was conducted in a total of 12 primary schools from different socio-economic environments in the cities of Şanlıurfa and Batman. Children who were between the ages of 8 and 10 and studying in these schools were included in the study.

Although there is no consensus on determining the number of participants in the literature, it is reported in different sources that there must be a minimum of 300 participants for factor analysis (Field, 2009; Pallant, 2001; Tabachnick & Fidell, 2015). However, Comrey and Lee (1992) evaluated the sample size as good for 300 participants for scale development studies, very good for 500 participants, and excellent for 1000 participants and above. In this context, a total of 943 students, who were aged 8–10, studying in the 3rd and 4th grades in the schools where the study was conducted, were included in the study.

Scale development process

The Healthy Life Skills Scale for Primary School Students was developed for primary school students aged 8–10 years in the present study. The following steps were followed in the scale development process.

Creation of scale items

During the scale development process, scale items were created by conducting focus group discussions with students following a detailed literature review (Bahar et al., 2008; Balcı, 2010; Büyüköztürk, 2012; DeVellis & Thorpe, 2021; Erkuş, 2012; Field, 2009; Genç & Karaman, 2019; Leger et al., 2022; Pallant, 2020; Republic of Turkey Ministry of National Education, 2018; Tabachnick & Fidell, 2015; UNESCO, 2009; WHO, 1999; Yıldırım & Yıldız, 2021). The 6 components of a healthy lifestyle (i.e., physical, emotional, social, mental, environmental, and spiritual) that were determined by WHO in the "Health Promoting Schools Project" were taken as the basis for creating the scale items. A focus group interview that involved 5–7 people was held with 3rd and 4th-grade primary school students to evaluate the views and behaviors of primary school students regarding healthy living in these 6 components. The content analysis of the interview data revealed how children conceptualized and expressed healthy living skills. Based on these results, and by considering the relevant existing literature (Bahar et al., 2008; Balcı, 2010; Genç & Karaman, 2019; Yıldırım & Yıldız, 2021), a 49-item question pool was created as a foundation for the scale to be developed within the scope of this study. Then, the item pool was examined by a classroom teacher, a Turkish teacher, and a field expert (an academician who was working in the field of classroom education) in terms of language validity and student levels. After the necessary reviews and corrections, the items in the question pool were converted into a scale form, which was then sent to 10 field experts (3 Basic Education, 2 Measurement and Evaluation, 2 School Health Nurses, 3 Public Healthcare Specialists) who were working at 4 different state universities in Turkey for expert opinions. An explanation section was left for each item in the scale form, and experts were asked to express their opinions regarding the suitability of the items. Feedback was provided from 9 of these experts and the scale form was revised in line with expert opinions and the number of items was reduced to 43.

Pilot application

The 43-item question pool, which was created in line with expert opinions, was prepared in the format of a 5-point Likert-type scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always). It was used in the pilot application to 48 students in the context of checking language and content validity. In the pilot application that was applied by the researchers, explanations were given to the students about the questions, and the feedback from the students was noted. As a result of the feedback received and the content and language validity, 4 more items (I5, I6, I40, and I43) were removed from the scale form, and the number of items was reduced to 39.

Applying the draft scale and giving the scale its final form

The scale form, which was reduced to 39 items after the pilot implementation, was applied to 943 students in the 3rd and 4th grades at the primary schools for the main application. The forms of 42 students were excluded from evaluations because of incomplete and incorrect coding

after the examination of the collected scale forms. A total of 901 forms were included in the data analysis. Firstly, the data of 599 students were analyzed for Exploratory Factor Analysis (EFA). To evaluate the factor structure that was obtained after EFA, Confirmatory Factor Analysis (CFA) was conducted with the data of 302 students. The results obtained in EFA were tested with CFA. The resulting dimensions were named in line with expert opinions. Threshold values were determined using methods based on percentiles and distribution metrics (arithmetic mean, standard deviation), complemented by the integration of expert opinions. As a result of all these processes, the "Healthy Life Skills Scale for Primary School Students" was given its final form.

Ethics

Ethics committee permission was received from Harran University Social and Human Sciences Ethics Committee for the scale development study on 18.03.2022 with the number 2022/32. The study was conducted in the first semester of the 2022–2023 academic year. In this context, cooperation was made with 12 primary schools that had different socioeconomic characteristics and participated in the study voluntarily in Şanlıurfa and Batman. After obtaining permission from the relevant institutions, consent forms were obtained from the parents of the children who were included in the study. Ill individuals were informed that participation in the study was voluntary.

Analysis of data

Validity and reliability analyses were made for the data that were obtained from 901 filled out the scale forms completely. The normal distribution characteristic of the scale was examined with Skewness-Kurtosis values (Skewness: −0.224, Kurtosis: 0.441). It was accepted that the data met the assumption of normality because these values were between −1 and + 1 (Kline, 2011; Muthén & Kaplan, 1985). Suitability for factor analysis was evaluated with Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) Test. The construct validity of the scale was first evaluated with EFA and the Direct Oblimun Rotation Method was used. Factor structures that were obtained in EFA were evaluated with CFA. McDonald's Omega Reliability Coefficient was calculated for the reliability analysis of the entire scale and scale sub-dimensions. The SPSS 24 (Statistical Package for the Social Sciences) and AMOS 24 (Analysis of Moment Structures) software were used in data analysis.

Results

The demographic data regarding gender, age, number of siblings, and mother/father's educational levels of the children who participated in the study are given in Table 1.

Validity

Exploratory factor analysis (EFA)

The item-total score correlation was examined before EFA to determine internal consistency. The Sub limit value of 0.30 was taken into consideration in the item total score correlation coefficient (Nunnally & Bernstein, 1994), and three items below this value were removed from the dataset (Table 2).

After the item-total correlation, the score averages of the groups forming the lower 27 % and the upper 27 % were compared with the Independent Groups ***t***-test to determine the discrimination of the remaining 36 items, and a significant difference ($p = .00$) was found for all 36 items.

The result of Bartlett's Sphericity Test, which was used to determine the suitability of the data for factor analysis, was found to be significant (p: 0.000), and the Kaiser-Mayer-Olkin (KMO) Coefficient was 0.831. According to these values, it was concluded that the dataset was suitable for EFA. No restriction was placed on the number of factors in the first EFA and 36 items in the scale were collected under 11 factors, explaining 54.945 % of the total variance. Then, the distribution of the items into factors was examined by using the Direct Oblimun Rotation Technique. The Scree Plot and the eigenvalues of the factors were used when the number of factors in the exploratory factor analysis was decided. A 4-factor structure was tested in line with the Scree Plot given in Figure 1.

A value of a minimum of 0.30 was accepted in determining the factor loads of the items (Pallant, 2001). In this respect, care was taken to collect the items under a single factor and to ensure that the factor loads were above 0.30. Also, the deletion process was performed starting from the items with a difference between the factor load values at the level of 0.10 among the overlapping items under more than one factor. After the items were deleted, the Healthy Life Skills Scale for Primary School Students scale consisted of 22 items under 4 factors. The variance that was explained by 22 items that were collected under 4 factors was determined as 40.920 %. It was stated previously that this value is sufficient if between 40 % and 60 % (Scherer et al., 1988; Tavşancıl, 2005). The results of the Rotation Analysis that was used to determine the total amount of variance explained by the items and the distribution of the items to the factors are given in Table 3 and Table 4, respectively.

When the load values of the items on the sub-dimensions were examined in the scale, it was found that these values were at an acceptable level. The lowest item load value was found to be 0.436 and the highest item load value was 0.734.

Confirmatory factor analysis (CFA)

Confirmatory Factor Analysis (CFA) was used on the data of 301 students to test the 4-factor structure that emerged as a result of

Table 1
The demographic data of the children included in the study.

	Groups	n	%
Gender	Female	486	53.94
	Male	415	46.06
Age	8	281	31,19
	9	294	32.63
	10	326	36.18
Number of siblings	None	97	10.77
	1	143	15.87
	2	178	19.76
	3	208	23.08
	4 and above	275	30.52
Mother's education level	Illiterate	63	7.00
	Literate	106	11.76
	Primary school	167	18.53
	Secondary school	259	28.75
	High school	187	20.75
	University	119	13.21
Father's education level	Illiterate	61	6.77
	Literate	74	8.21
	Primary school	136	15.09
	Secondary school	197	21.87
	High school	238	26.42
	University	195	21.64
Total		**901**	**100**

Table 2
Item-total correlations.

Item-total correlation		Item-total correlation		Item-total correlation		Item-total correlation		Item-total correlation	
I1	0.300	I11	0.395	I19	0.374	I27	0.350	I35	0.322
I2	**0.243***	I12	0.363	I20	0.427	I28	0.408	I36	0.425
I3	**0.164***	I13	0.344	I21	0.318	I29	0.386	I37	0.373
I4	0.331	I14	0.308	I22	0.344	I30	0.351	I38	0.434
I7	0.317	I15	0.415	I23	0.328	I31	0.362	I39	0.412
I8	0.297	I16	0.303	I24	0.302	I32	0.297	I41	0.329
I9	0.355	I17	0.354	I25	**0.276***	I33	0.444	I42	0.343
I10	0.388	I18	0.398	I26	0.350	I34	0.321		

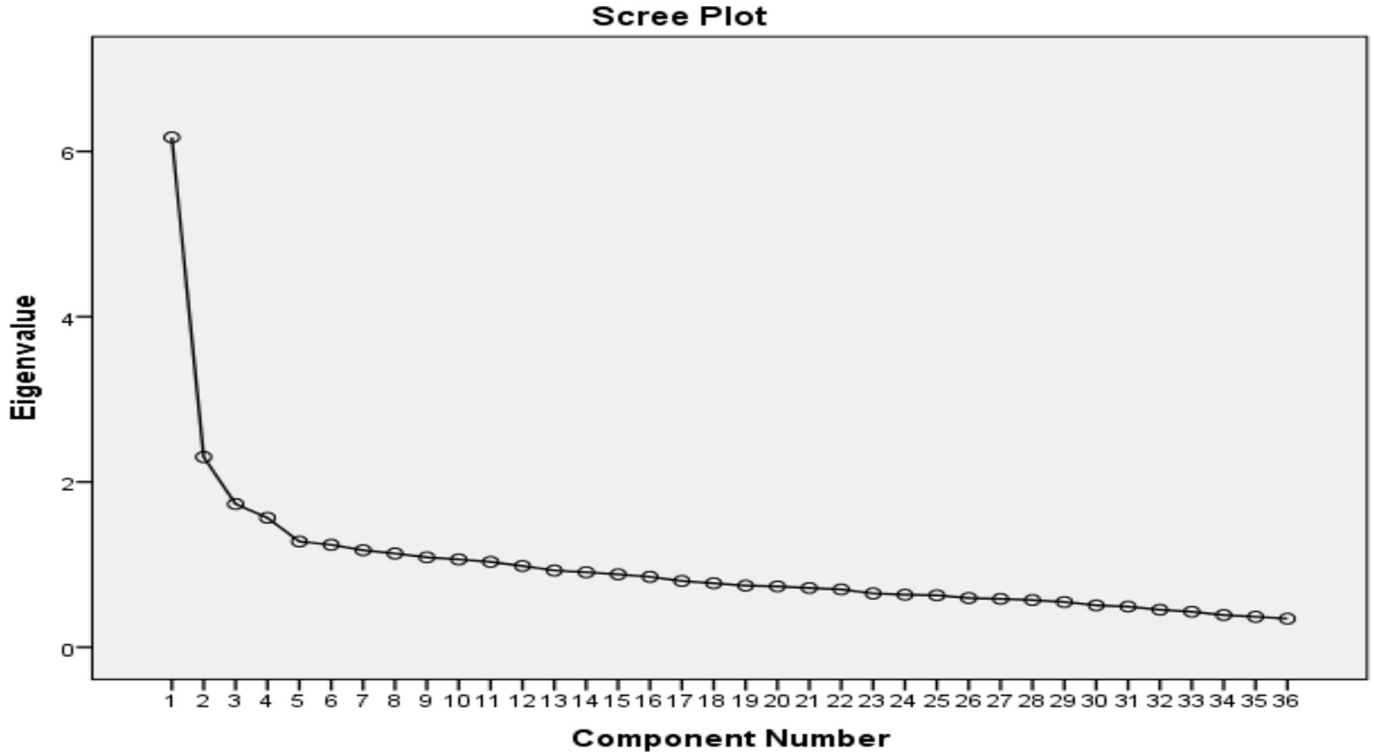

Fig. 1. Scree plot chart for the items.

Exploratory Factor Analysis. As a result of the analysis, the 4-factor structure was confirmed. The graphics and fit indices of the model used for CFA are given in Fig. 2 and Table 5, respectively.

According to the results of CFA given in Table 5, it was found that the CMIN/DF, RMSEA, GFI, and AGFI Fit Indices of the scale were good and the other indices were at acceptable levels. In this context, it was found that the scale items supported the 4-factor structure.

The naming of the factors was initiated to finalize the "Healthy Life Skills Scale for Primary School Students", which was obtained after EFA and CFA. In this respect, the factors were named "Protection of Health", "Cleaning and Hygiene", "Sports and Activity", and "Proper Nutrition" by the researchers consulting expert opinions. Factor names and the distribution of the items in these factors are given in Table 4.

Reliability

Two methods were used to determine the reliability of the "Healthy Life Skills Scale for Primary School Students". The first was the test-retest method which is used to determine the stability of the scores obtained on a scale over time. The second method is the McDonald's Omega Reliability Coefficient which is calculated to examine the reliability of a scale. The scale that was Primary Schoo prepared for the test-retest reliability method was administered to 43 primary school students twice, 30 days apart. The correlation between the measurements was then examined. In this respect, the Pearson Correlation Coefficient was calculated and was found to be 0.721. This value (between 0.70 and 1.00) is considered a high correlation (Büyüköztürk et al., 2010). The Omega Coefficient that was calculated to determine the internal consistency of the scale was found to be 0.831, which shows that this value is acceptable in terms of the reliability of the scale (Kalaycı, 2010; Şencan, 2005). The scale consisted of 22 items on a 5-point Likert scale [Never-1), Rarely (2), Sometimes (3), Often (4), Always (5)]. The score range that can be obtained from the scale is 22–110. In the final version of the scale obtained from the DFA dataset, the total score mean of HLSS is 79.29 ± 10.16.

Table 3
Total variance amounts explained.

Factor	Initial eigenvalues			Total factor loads		
	Total	Variance %	cumulative	Total	Variance %	Cumulative
1	4.194	19.065	19.065	4.194	19.065	19.065
2	2.025	9.203	28.268	2.025	9.203	28.268
3	1.528	6.944	35.212	1.528	6.944	35.212
4	**1.256**	**5.708**	**40.920**	**1.256**	**5.708**	**40.920**
....	....	...	.....			
22	0.378	1.716	100.000			

Discussion

The "Healthy Life Skills Scale for Primary School Students" (HLSS) was developed in the present study to determine the healthy lifestyle behaviors of primary school children. In this context, it is stated that Bartlett's Test and KMO Sample Adequacy must be evaluated (Büyüköztürk, 2012; Field, 2009) and a KMO value of over 0.70 is sufficient for EFA, it becomes perfect as it approaches 1, a significant value for the Bartlett's Test is a prerequisite for applying EFA (Bryman & Cramer, 2002; Sharma, 1995). It was found in the analyses that the KMO value was adequate (0.831) and the Bartlett's Sphericity Test result was significant ($p = .000$). The distribution of items to factors was examined in EFA by using Principal Component Analysis and Direct Oblimun Rotation Technique. The choice of rotation method may vary depending on the purpose of the researchers. If there is a relationship between the factors in the prepared scale, it is recommended to use Oblique Rotation Techniques (Pallant, 2020; Tabachnick & Fidell, 2015). In this context, the Oblique Rotation Technique was used because the factors in the scale consisted of sub-skills that were associated with a skill and were interrelated.

As a result of the validity analysis, the explained variance rate was found to be 40.92 %. This rate was found to be 57.66 % in a scale

Table 4
Transformed COMPONENTS MATRIX AS A RESULT OF FACTOR ANALYSIS.

Sub-Dimensions	Items	Factors			
		1	2	3	4
Sub Dimension 1	I37. I do not watch television very closely.	0.734			
(Protecting of Health)	I38. I do not watch television for more than 1–2 h a day.	0.705			
	I36. I do not drink cold water when I am sweaty.	0.700			
	I39. I do not play with my phone or tablet for more than 1–2 h a day.	0.631			
	I30. I do not buy openly sold food.	0.571			
	I28. I do not consume unhealthy foods.	0.571			
	I17 I do not drink carbonated drinks such as Coke and soda.	0.473			
Sub Dimension 2	I9. I use toilets clean.		0.646		
	I11. I keep parks and playgrounds clean.		0.619		
(Cleaning and Hygiene)	I14. I keep the environment I live in clean.		0.584		
	I8. I make sure that my hair is clean.		0.539		
	I10. I throw my garbage in the trash can.		0.522		
	I13. I cover my mouth with a tissue or the inside of my elbow when I cough or sneeze.		0.487		
	I7. I make sure that my clothes are clean.		0.481		
	I4. I wash my hands before and after meals.		0.456		
Sub Dimension 3	I32. I participate in activities such as football, volleyball, or basketball.			0.720	
(Sports and Activity)	I34. I participate in Physical Education classes actively.			0.632	
	I33. I do sports with my friends.			0.622	
	I35. I play active games every day.			0.426	
Sub Dimension 4	I27. I wash vegetables and fruits before I eat them.				0.750
(Proper Nutrition)	I21. I consume vegetables and fruits in their proper seasons.				0.554
	I29. I consume healthy foods.				0.436

development study that was conducted on adolescents to measure healthy lifestyle behaviors (Kudubeş & Bektas, 2020). In a similar study that was conducted by Walker and Hill-Polerecky (1996) with adults, this rate was reported as 47.1 %. Although these values that were obtained at varying rates were close to those obtained in our study, they were generally higher than the explained variance rate in our study. Health is a multidimensional concept with biological, psychological, and social aspects and is directly affected by life changes and social positions (Haslam et al., 2021). It is considered that the evaluation of this multidimensional and broad concept in primary school children caused the explained variance rate to be relatively less. In a previous scale development study in which a specific issue such as anti-smoking was evaluated in a similar age group, this rate was found to be 54.72 % (Chan et al., 2017). This rate was reported to be 32.65 % in the democratic attitudes scale development study of primary school children (Erbil & Kocabaş, 2017). These results show the changes in the variance rates explained by the measurement tools according to the study topic in the primary school age group. Also, it is considered adequate for the variance rate explained to be between 40 % and 60 %, except for special cases (Çam & Baysan-Arabacı, 2010; Scherer et al., 1988; Tavşancıl, 2005). In this respect, the proportion of variance explained by HLSS was sufficient.

HLSS evaluated the healthy lifestyles of primary school children in a total of 22 questions, which were divided into 4 sub-dimensions as *health protection*, *cleanliness and hygiene*, *sports and physical activity*, and *proper nutrition* with ensured semantic integrity and conceptual relationship as a result of EFA (Table 3). In their study conducted on adolescents, Chan et al. (2017) examined healthy lifestyle behaviors in 3 similar sub-dimensions. In another healthy lifestyle behaviors scale that was developed for adults (Walker & Hill-Polerecky, 1996), it was discussed in 6 sub-dimensions. Again, 6 sub-dimensions were reported in a measurement tool that was developed to evaluate the healthy lifestyle behaviors of pregnant women (Yılmaz & Karahan, 2019). These results indicate that the number of items and subdimensions in measurement tools associated with healthy lifestyles in adults is higher than in scale development studies conducted for children. This is considered to be because of the difficulty in evaluating abstract health-related concepts (i.e. spiritual development and stress management) in primary school children when compared to adults. The questions in the question pool, which initially had 22 sub-dimensions and 43 questions, generally consisted of abstract concepts such as spiritual development and stress management. For this reason, although it is not possible to evaluate behaviors associated with a healthy lifestyle in standard dimensions, healthy lifestyles might differ in children and other similarly sensitive groups. As a result, although the concept that is measured is broad and multidimensional, more concrete concepts that are associated with healthcare were evaluated because of the difficulties in measuring abstract health-associated concepts (i.e., spiritual development and stress management) in children.

The results obtained with EFA must be confirmed with CFA in scale development studies (Hooper et al., 2008). As a result of CFA, it was determined in the Goodness-of-Fit evaluations that CMIN/DF, RMSEA, GFI, and AGFI fit indices were good, and SRMR, CFI, NNFI, and IFI Fit Indices were at acceptable levels (Hooper et al., 2008; Mustafa et al., 2020). In this way, each item in the HLSS was defined in the related sub-dimension, and the 4-dimensional scale structure of the 22 questions that were obtained with EFA was supported by CFA.

The internal consistency of HLSS was evaluated with the item-total correlation. In this context, the items that had a correlation value above 0.3 (Table 1) were included in the scale (Nunnally & Bernstein, 1994). It is recommended in the present literature that the reliability of the multi-factor structure that is determined following a validity analysis be evaluated with the Omega Coefficient (Rosellini & Brown, 2021; Soysal, 2023). In the calculation that was made in this context, the Omega Coefficient was found to be 0.831. As a result of the internal consistency and reliability analysis, it was concluded that the HLSS is a reliable tool for measuring healthy life skills in primary school age.

In the HLSS application, risk groups were identified through analyses grounded in the distribution of final outcomes. Numerous studies and methods in the literature focus on determining such cut-off points and threshold values (Field, 2009; Sharma & Jain, 2014). Utilizing percentiles, distribution measures (arithmetic mean, standard deviation), and expert opinions are among the widely adopted methods (Field, 2009; Cohen, 2009). According to the evaluations, the arithmetic mean of the total HLSS score was found to be 79.29 ± 10.16. Using a threshold value corresponding to one standard deviation below the mean under the assumption of normal distribution, it was determined that children scoring below 69.13 exhibit low healthy life skills and may require preventive interventions. Consequently, the classification of scale scores into low (22–69), moderate (70–89), and high (90–110) levels has been validated for practical application based on expert opinions.

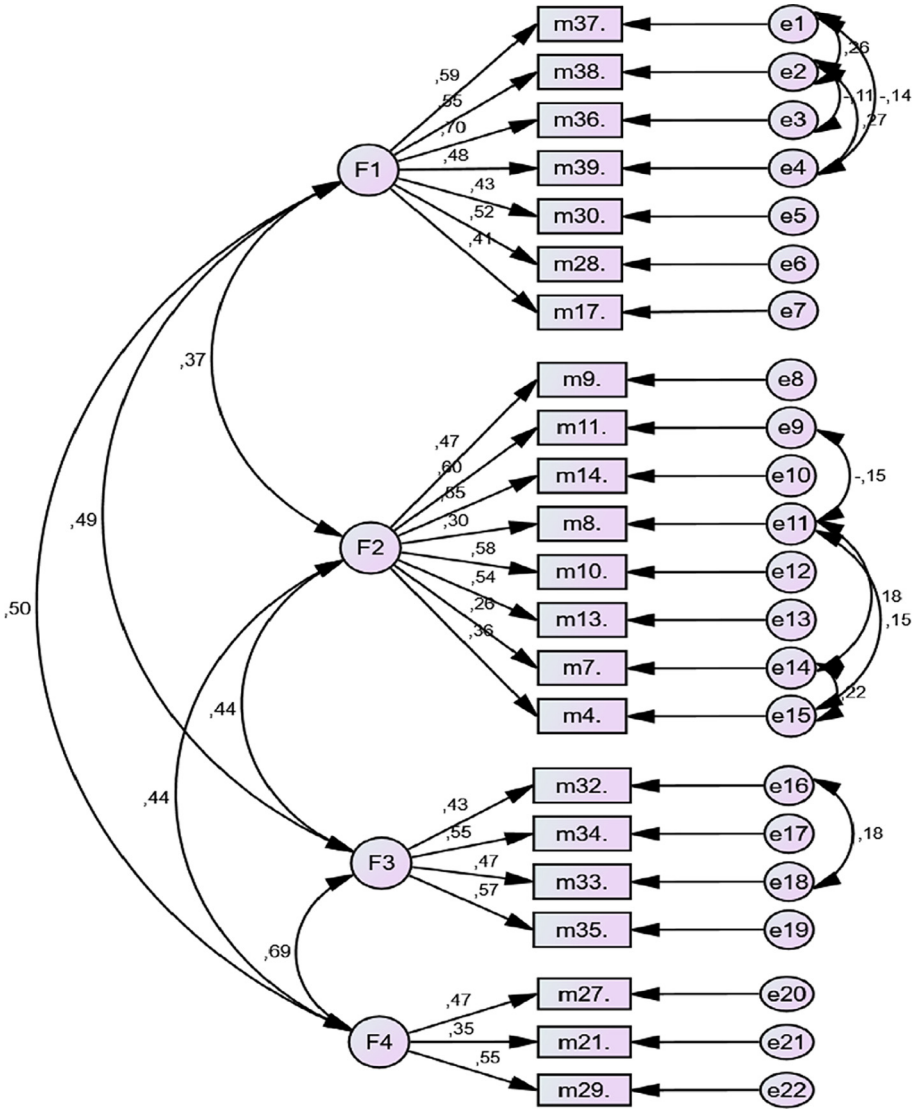

Fig. 2. CFA model.

Limitations

The findings of this study provide valuable contributions; however, it also has certain limitations. First, this study attempts to measure a broad and complex concept like health. While the assessment of healthy lifestyle behaviors considers multiple dimensions of health—physical, mental, social, and environmental factors—the scope of health as a concept extends beyond the parameters of the measurement tool. This may result in certain dimensions of health being addressed only partially, potentially limiting the generalizability of the findings to broader health contexts.

Second, the measurement tool used in this study relies on self-reporting, which may lead to response biases or underreporting due to the age, perception, and communication abilities of the children. Specifically, the cognitive differences among children aged 8–10 may impact the accuracy of their responses. Furthermore, as the study focuses on a specific age group and context, the generalizability of the findings to other age groups, cultures, or regions remains uncertain. Lastly, the study does not address the long-term validity of the measurement tool or the long-term effects of healthy lifestyle behaviors assessed by it.

Threshold values for identifying at-risk groups among children assessed with the HLSS were established using expert opinions and distribution measures. However, due to the absence of an accepted 'gold standard' for evaluating healthy life skills, specific methods such as ROC analysis could not be employed to determine cut-off points (Sharma & Jain, 2014). Conducting advanced research to test the HLSS in different populations will enable the determination of more specific cut-off values, allowing for a more precise distinction of risk groups.

To overcome these limitations, future studies should aim to address the broader dimensions of health more comprehensively and test the

Table 5
CFA fit indices of the scale.

	Scale values	Good fit	Acceptable fit	Conclusion
CMIN/DF (χ^2/sd)	1.46	≤3	4–5	Good fit
RMSEA	0.039	≤ 0.05	(0.06–0.08)	Good fit
SRMR	0.051	≤ 0.05	(0.06–0.08)	Acceptable fit
GFI	0.922	≥ 0.90	(0.89–0.85)	Good fit
CFI	0.913	≥ 0.95	≥ 0.90	Acceptable fit
NNFI (TLI)	0.90	≥ 0.95	(0.94–0.90)	Acceptable fit
IFI	0.92	≥ 0.95	(0.94–0.90)	Acceptable fit
AGFI	0.90	≥ 0.90	(0.89–0.85)	Good fit

GFI: Goodness of Fit Statistics. AGFI: Adjusted Goodness of Fit Statistics. NNFI = Non-Normed Fit Index. CFI = Comparative Fit Index. RMSEA: Root Mean Square Errors of Approximation. SRMR: Standardized Root Mean Square Errors (Bollen & Lennox, 1991; Brown, 2009; Hu & Bentler, 1999; Jöreskog & Sörbom, 1993; Kline, 2011; Şimşek, 2007; Tabachnick & Fidell, 2015; Thompson, 2004).

measurement tool with larger and more diverse samples across different contexts. Additionally, including feedback and experiences from teachers, families, and school health staff in future research could provide deeper insights into the practical applicability of the tool.

Conclusion

In this study, a self-report-based measurement tool was developed to evaluate the healthy lifestyles of children aged 8–10 with reading comprehension skills. This tool provides teachers, parents and health professionals (Nurses, Doctors) with a systematic method to assess children's healthy lifestyle behaviors. The study makes a significant contribution to the literature by offering a valuable resource for scientific studies and practical applications in evaluating children's health-related behaviors. From a nursing perspective, this tool can enhance the capacity of school nurses to deliver preventive and promotive health services. By using this tool, school nurses can effectively analyze the physical, mental, and social health statuses of children and identify specific areas for intervention. Such early efforts to promote healthy behaviors during childhood are critical to preventing chronic illnesses later in life.

Additionally, this measurement tool enables nurses to design targeted interventions that address individual children's needs, such as improving physical activity levels, addressing nutritional imbalances, or supporting emotional well-being. By leveraging this tool, nurses can take an active role not only in the assessment process but also in raising awareness among families and educators, organizing health education programs, and fostering lifelong healthy habits. By providing a scientifically validated and practical tool, this study strengthens the foundations of school health services and contributes to the overall improvement of child health and quality of life.

Availability of data and material

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

CRediT authorship contribution statement

Habip Balsak: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Emrah Köseoğlu:** Writing – review & editing, Visualization, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Mehmet Güney:** Writing – review & editing, Visualization, Supervision, Methodology, Formal analysis, Data curation, Conceptualization.

Ethics approval statement

The Declaration of Helsinki's guiding principles were followed in conducting the study. This study was approved by the Unıversıty Social and Human Science Ethics Committee (Date: 25.03.2022 E-76244175-050.01.04-117,904).

Ethical consideration

The study was conducted in accordance with the Helsinki Declaration at all stages. Institutional permission and ethics approval was obtained from the ethics committee prior to the start of the study. The approval was granted on March 25, 2022, and assigned the reference number 117904.

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Declaration of competing interest

No conflict of interest has been declared by the authors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pedn.2025.03.027.

References

Bahar, Z., Beşer, A., Gördes, N., Ersin, F., & Kısal, A. (2008). Healthy life style behavior scale II:A reliability and validity study. *Journal of Cumhuriyet University School of Nursing*, *12*(1), 1–13.

Balcı, A. (2010). *Research methods, techniques and principles in social sciences* (8th ed.). Pegem Academi.

Black, M. M., Trude, A. C. B., & Lutter, C. K. (2020). All children thrive: Inte-gration of nutrition and early childhood development. *Annual Review of Nutrition*, *40*(1), 375–406. https://doi.org/10.1146/annurev-nutr-120219-023757.

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, *110*(2), 305.

Bryman, A., & Cramer, D. (2002). *Quantitative data analysis with SPSS release 10 for windows: A guide for social scientists*. Routledge.

Burdette, A. M., Needham, B. L., Taylor, M. G., & Hill, T. D. (2017). Health lifestyles in adolescence and self-rated health into adulthood. *Journal of Health and Social Behavior*, *58*(4), 520–536. https://doi.org/10.1177/0022146517735313.

Büyüköztürk, S. (2012). *Data analysis handbook for social sciences statistics, research design SPSS applications and comments* (8th ed.). Pegem Akademi.

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2010). *Scientific research methods* (5th ed.). Pegem Akademi.

Çam, M. O., & Baysan-Arabacı, L. (2010). Qualitative and quantitative steps on attitude scale construction. *Turkish Journal of Research & Development in Nursing*, *12*(2), 59–71.

Cha, S., & Jin, Y. (2020). Have inequalities in all-cause and cause-specific child mortality between countries declined across the world? *International Journal for Equity in Health*, *19*(1), 1–13. https://doi.org/10.1186/s12939-019-1102-3.

Chan, S. M., Melnyk, B. M., & Chen, A. C. C. (2017). Chinese version of the healthy lifestyle beliefs scale for Taiwanese adolescents: A psychometric study. *Journal of Pediatric Nursing*, *32*, 19–24.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Lawrence Erlbaum Associates.

DeVellis, R. F., & Thorpe, C. T. (2021). *Scale development: Theory and applications*. Sage publications.

Erbil, D. G., & Kocabaş, A. (2017). A scale development study for 3rd grade elementary students: Democratic attitude scale. *Kastamonu Education Journal*, *25*(1), 221–232. https://dergipark.org.tr/en/pub/kefdergi/issue/27737/309043.

Erkuş, A. (2012). *Measurement and scale development in psychology*. Pegem Akademi.

Field, A. P. (2009). *Discovering statistics using SPSS*. London, England: SAGE.

Foster, M., Whitehead, L. L., O'Sullivan, T. A., Hill, J., & Mörelius, E. (2025). A child-centred research checklist to improve the design and reporting of paediatric research studies: A descriptive mixed methods study. *International Journal of Nursing Studies*, *162*, Article 104958. https://doi.org/10.1016/j.ijnurstu.2024.104958.

Genç, A., & Karaman, F. (2019). Developing of healthy life skills scale in university students. *Istanbul Gelisim University Journal of Health Sciences*, *7*, 656–669. https://doi.org/10.38079/igusabder.496557.

Haslam, C., Haslam, S. A., Jetten, J., Cruwys, T., & Steffens, N. K. (2021). Life change, social identity, and health. *Annual Review of Psychology*, *72*(1), 635–661. https://doi.org/10.1146/annurev-psych-060120-111721.

Hooper, D., Coughlan, J., Michael, R., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*(1), 53–60.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structural analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Scientific Software International.

Kabasakal, E. (2019). A nurse for each school: Inclusive students and their health needs. *Journal of Contemporary Medicine*, *9*(2), 191–195. https://doi.org/10.16899/jcm.577310.

Kalaycı, S. (2010). *Multivariate statistical techniques with SPSS applications* (5th ed.). Asil Publishing.

Kelly, S. A., Melnyk, B. M., Jacobson, D. L., & O'Haver, J. A. (2011). Correlates among healthy lifestyle cognitive beliefs, healthy lifestyle choices, social support, and healthy behaviors in adolescents: Implications for behavioral change strategies and future research. *Journal of Pediatric Health Care*, *25*(4), 216–223. https://doi.org/10.1016/j.pedhc.2010.03.002.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Kudubeş, A. A., & Bektas, M. (2020). Orginal article: Psychometric properties of the Turkish version of the healthy lifestyle belief scale for adolescents. *Journal of Pediatric Nursing*, *53*, e57–e63. https://doi.org/10.1016/j.pedn.2020.02.006.

Landrigan, P. J. (2004). Children as a vulnerable population. *International Journal of Occupational Medicine and Environmental Health*, *17*(1), 175–177.

Lawrence, E. M., Mollborn, S., & Hummer, R. A. (2017). Health lifestyles across the transition to adulthood: Implications for health. *Social Science & Medicine*, *193*, 23–32. https://doi.org/10.1016/j.socscimed.2017.09.041.

Leger, L. S., Buijs, G., Mohammadi, N. K., & Lee, A. (2022). Health-promoting schools. *Handbook of settings based health promotion. vol. 105*. Berlin/Heidelberg, Germany: Springer.

Mollborn, S., James-Hawkins, L., Lawrence, E., & Fomby, P. (2014). Health lifestyles in early childhood. *Journal of Health and Social Behavior*, *55*(4), 386–402. https://doi.org/10.1177/0022146521997813.

Mollborn, S., Lawrence, E., & Krueger, P. M. (2021). Developing health lifestyle pathways and social inequalities across early childhood. *Population Research and Policy Review*, *40*(5), 1085–1117. https://doi.org/10.1007/s11113-020-09615-6.

Morales, A. M., Jones, S. A., Kliamovich, D., Harman, G., & Nagel, B. J. (2020). Identifying early risk factors for addiction later in life: A review of prospective longitudinal studies. *Current Addiction Reports*, *7*(1), 89–98. https://doi.org/10.1007/s40429-019-00282-y.

Mustafa, M. B., Nordin, M. B., & Razzaq, A. B. A. (2020). Structural equation modelling using AMOS: Confirmatory factor analysis for taskload of special education integration program teachers. *Universal Journal of Educational Research*, *8*, 127–133.

Muthén, B., & Kaplan, D. (1985). A comparison of some methodologies for the factor analysis of non- normal Likert variables. *British Journal of Mathematical and Statistical Psychology*, *38*(2), 171–189. https://doi.org/10.1111/j.2044-8317.1985.tb00832.x.

Nunnally, J., & Bernstein, I. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.

Osgood, D. W., Foster, E. M., & Courtney, M. E. (2010). Vulnerable populations and the transition to adulthood. *The Future of Children*, *20*(1), 209–229. https://doi.org/10.1353/foc.0.0047.

Özdogan, H., Ruperto, N., Kasapcopur, O., Bakkaloglu, A., Arisoy, N., Ozen, S., ... M. (2001). The Turkish version of the childhood health assessment questionnaire (CHAQ) and the child health questionnaire (CHQ). *Clinical and Experimental Rheumatology*, *19*(4 Suppl 23), S158–S162 (PMID: 11510322).

Pallant, J. (2001). *SPSS survival manual.* Maidenhead.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS.* Routledge.

Republic of Turkey Ministry of National Education (2018). *Life sciences curriculum.* Board of Education. https://mufredat.meb.gov.tr/dosyalar/2018122171428547-hayat%20b%c4%b0lg%c4%b0s%c4%b0%c3%96%c4%9eret%c4%b0m%20programi.pdf.

Rodriguez-Ayllon, M., Estévez-López, F., Cadenas-Sanchez, C., Gracia-Marco, L., Lubans, D. R., Ortega, F. B., & Esteban-Cornejo, I. (2019). Physical activity, sedentary behaviour and mental health in young people: A review of reviews. In A. Pingitore, F. Mastorci, & C. Vassalle (Eds.), *Adolescent health and wellbeing* (pp. 35–73). Cham: Springer. https://doi.org/10.1007/978-3-030-25816-0_3.

Rosellini, A. J., & Brown, T. A. (2021). Developing and validating clinical questionnaires. *Annual Review of Clinical Psychology*, *17*, 55–81. https://doi.org/10.1146/annurev-clinpsy-081219-115343.

Ruperto, N., Ravelli, A., Pistorio, A., Malattia, C., Cavuto, S., Gado-West, L., ... Martini, A. (2001). Cross-cultural adaptation and psychometric evaluation of the childhood health assessment questionnaire (CHAQ) and the child health questionnaire (CHQ) in 32 countries. Review of the general methodology. *Clinical and Experimental Rheumatology*, *19*(4 Suppl 23), S1–S9 (PMID: 11510308).

Sánchez-Hernando, B., Gasch-Gallén, Á., Antón-Solanas, I., Gea-Caballero, V., Juárez-Vela, R., Gállego-Diéguez, J., ... Santolalla-Arnedo, I. (2022). A comparative study of life skills, lifestyle habits and academic performance in health promoting and non-health promoting schools in the autonomous community of Aragon, Spain. *PeerJ*, *10*. https://doi.org/10.7717/peerj.13041.

Scherer, R. F., Luther, D. C., Wiebe, F. A., & Adams, J. S. (1988). Dimensionality of coping: Factor stability using the ways of coping questionnaire. *Psychological Reports*, *62*(3), 763–770. https://doi.org/10.2466/pr0.1988.62.3.763.

Şencan, H. (2005). *Reliability and validity in social and behavioral measurements.* Seçkin Publishing.

Sharma, B., & Jain, R. (2014). Right choice of a method for determination of cut-off values: A statistical tool for a diagnostic test. *Asian Journal of Medical Sciences*, *5*(3), 30–34.

Sharma, S. (1995). *Applied multivariate techniques.* John Wiley.

Şimşek, Ö. F. (2007). *Introduction to structural equation modeling: Basic principles and LISREL applications.* Ekinoks Publishing.

Soysal, S. (2023). Comparison of alpha, stratified alpha, and omega reliability coefficients in multidimensional test structures. *Journal of Ahmet Kelesoglu Education Faculty*, *5*(1), 213–236. https://doi.org/10.38151/akef.2023.51.

Staniford, L. J., & Schmidtke, K. A. (2020). A systematic review of hand-hygiene and environmental-disinfection interventions in settings with children. *BMC Public Health*, *20*(1), 1–11. https://doi.org/10.1186/s12889-020-8301-0.

Strong, K. L., Pedersen, J., White Johansson, E., Cao, B., Diaz, T., Guthold, R., ... Liu, L. (2021). Patterns and trends in causes of child and adolescent mortality 2000-2016: Setting the scene for child health redesign. *BMJ Global Health*, *6*(3), Article e004760. https://doi.org/10.1136/bmjgh-2020-004760.

Tabachnick, B., & Fidell, L. S. (2015). *Using multivariate statistics* (6th ed.). New York: Pearson Longman.

Tavşancıl, E. (2005). *Measuring attitudes and data analysis with SPSS* (2nd ed.). Nobel Publishing.

Thomas-Eapen, N. (2021). Childhood obesity. *Primary Care; Clinics in Office Practice*, *48*(3), 505–515. https://doi.org/10.1016/j.pop.2021.04.002.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* Washington DC: American Psychological Association.

Ulutaşdemir, N., Balsak, H., Çopur, E.Ö., & Demiroğlu, N. (2016). A branch of public health nursing: School health nursing. *Turkiye Klinikleri J Public Health Nursing-Special Topics*, *2*(1), 121–124.

Umer, A., Kelley, G. A., Cottrell, L. E., Giacobbi, P., Innes, K. E., & Lilly, C. L. (2017). Childhood obesity and adult cardiovascular disease risk factors: A systematic review with meta-analysis. *BMC Public Health*, *17*(1), 1–24. https://doi.org/10.1186/s12889-017-4691-z.

UNESCO (2009). Understanding life skills. http://www.unicef.org./lifeskills/indexhttp://.www.unicef.org/lifeskills/index-whichskills.html 20.11.2019.

UNICEF (2019). Levels and trends in child mortality report 2019. https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2019.

Walker, S. N., & Hill-Polerecky, D. M. (1996). *Psychometric evaluation of the health-promoting lifestyle profile II.* University of Nebraska Medical Center.

World Health Organization (1999). Partners in life skills education—Conclusions from a United Nations interagency meeting (Report No. WHO/MNH/MHP/99.2). http://www.who.int/mental_health/media/en/30.pdf.

World Health Organization (2017). Global accelerated action for the health of adolescents (AA-HA!): Guidance to support country implementation. https://iris.who.int/bitstream/handle/10665/255418/WHO-FWC-MCA-17.05-eng.pdf?sequence=1.

World Health Organization (2020). Children: improving survival and well-being. https://www.who.int/news-room/fact-sheets/detail/children-reducing-mortality.

World Health Organization (2021). *WHO guideline on school health services.* World Health Organization ISBN 978–92–4-002939-2 (electronic version) Page:7.

Yıldırım, K., & Yıldız, Z. (2021). *Attitudes towards healthy lifestyle scale.* İKSAD Publishing.

Yılmaz, E., & Karahan, N. (2019). Development and validity reliability of healthy lifestyle Behaviours in pregnancy scale. *Cukurova Medical Journal*, *44*(Suppl. 1), 498–512. https://doi.org/10.17826/cumj.568118.