

Full Length Research

Validity and reliability study of environmental awareness and attitude scale for preschool children

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The aim of this study is to conduct a validity and reliability study of the Environmental Awareness and Attitude Scale for Preschool Children (EAASPC). For this purpose, the EAASPC consisting of 26 items was developed by the authors. Views of experts were sought regarding the items and pictures of the scale, and after making necessary adjustments a pilot study was conducted by the authors with a group of 50 children. As the items and the scale were found to be suitable, the EAASPC was administered to 310 children. Analysis of the data was performed using an SPSS statistics program. In order to measure the validity of the scale, factor analysis was performed and the correlation coefficients between the subscales was determined. For reliability analysis, Cronbach's alpha and Spearman Brown calculations were conducted. Moreover, for item discrimination the total scores of the upper and lower 27 % of the sample were used. At the end of the analyses, the scale was finalized with 26 items. Descriptive factor analysis results support the findings that the scale is composed of two subscales. In the Environmental Attitudes subscale, 3 factors that explain 40.94% of the total variance were found. Factor loadings of the items in the Environmental Attitudes subscale varied between 0.42 and 0.74 and in the Environmental Awareness subscale factor loadings varied between 0.39 and 0.74. The correlation coefficients between the factors of the Environmental Awareness subscale were $r = .80$, $.78$ and $.83$ and for the Environmental Attitudes subscale were $r = .70$, $.79$ and $.72$ respectively. In statistics done for the reliability study of the Environmental Attitudes subscale, the Spearman Brown reliability coefficient was found to be 0.75, and the Cronbach's alpha reliability coefficient was found to be 0.73. For the Environmental Awareness subscale these coefficients were found to be $.65$ and $.65$ respectively. For the whole EAASPC scale the Spearman Brown reliability coefficient was found to be 0.60, while the Cronbach's alpha reliability coefficient was found to be 0.67. According to t-test results concerning the significance of the difference between the upper and lower 27% of the total scores, there is a significant difference in favour of the upper group. The item discrimination power of the EAASPC scale for the first factor (Environmental Attitudes) varies between 0.34 and 0.47, for the second factor (Environmental Awareness) it varies between 0.32 and 0.40. The scale's average item discrimination power is 38. This value indicates that the scale has a discrimination feature. According to study results a scale composed of 26 items with two subscales was formed and the scale can be claimed to be a valid and reliable instrument for preschool children.

Keywords: preschool children, environmental awareness, environmental attitude, validity and reliability

INTRODUCTION

Addressing environmental issues has been an important endeavour over the last 40 years. Especially in recent years great effort has been expended in developing environmental awareness in children as in early years an individual has the ability to acquire self-care skills and demonstrate individual independence. Moreover, during this period children start to learn social rules and roles, differentiate between right and wrong, develop conscience and form healthy relationships with family and immediate surroundings (Koç, 2009). An education given during this period in which a number of important values, judgments, attitudes and behaviors are acquired is very important in shaping the behavior of an individual in society. For this reason, the aims of preschool education include raising individuals entrenched in an environmental culture, inculcating awareness of the effects of humans in causing environmental problems, engaging in active participation in solving environmental problems and developing environmental awareness among individuals (Bogner, 2004; Hsu, 2004). Environmental education introduced during this period is considered as a continuous learning process in which students acquire knowledge, skills values and experience to solve environmental problems for the benefit of future generations (Vaughan, Gack, Solorazano, and Ray 2003). In order to increase the efficiency of environmental education programs, it is relevant to examine behavior changes in environmental attitudes of students (Pooley and O'Connor, 2000).

There are a number of studies about the effects of environmental education on the development of positive environmental attitudes in preschool education (Heimlich and Ardoin, 2008, Kopnina, 2013; Manoli, Johnson, and Dunlap, 2007). A number of researchers have stated that attitude has an important effect on behavior (Chatzifotiou, 2006; Evans et al., 2007; Ferná'ndez-Manzanal, Rodr'iguez-Barreiro and Carrasquer, 2007).

The developmental features in the preschool period, include the years with the highest potential to acquire attitude and behaviors. It is very beneficial that a qualified environmental education be given to the children to acquire enough knowledge and develop positive attitudes and behavior about the environment. In this context, before preparing a qualified environmental education program for preschool children their attitudes and behaviors about the environment should be identified. However, Stepath (2004) stated that there was a close relationship between attitudes about the environment and environmental awareness. A possible increase in attitudes towards the environment would have an important role in increasing environmental awareness. The concept of awareness is defined as having knowledge about something that needs to be seen or known or is the state of paying attention to something

that should be comprehended (Türk Dil Kurumu, 2013). Taking that definition as a starting point, environmental awareness can be defined as "having knowledge about the things that are to be known or to be seen about the environment and paying attention to the things that should be comprehended" (Erten, 2004).

In Turkey, it is seen that this issue has been given importance and there are studies about children's attitudes and awareness levels about the environment (Cevher-Kalburan, 2009; Gülay, Yılmaz, Turan-Güllaç and Önder, 2010; Kahrıman-Öztürk, Olgan and Tuncer, 2012; Akçay, 2006; Buhan, 2006; Çabuk, 2001; Gülay and Ekici, 2010; Haktanır and Çabuk, 2000; Kesicioğlu and Alisinanoğlu, 2009; Taşkın and Şahin, 2008; Yağlıkara, 2006). Most of these were qualitative studies that were conducted with preschool teachers and children.

The measurement instruments that have been used in the studies for environmental education were generally designed for primary school pupils (Erdoğan, Ok, Marcinkowski, 2012; Yaşaroğlu, 2012; Atasoy and Ertürk, 2008; İşyar, 1999; Malkus and Musser, 1994; Avan, 2011; Wu, 2012; Manoli, Johnson, and Dunlap, 2007; Bruni, Chance, and Schultz, 2012; Johnson and Manoli, 2011) and only three instruments have been developed for preschool children (Musser & Diamond, 1999; Gülay, 2011, Kahrıman-Öztürk, Olgan and Tuncer, 2012; Evans et al., 2007; Cevher-Kalburan, 2009; Çabuk, 2001).

One of the available scales is the Children's Attitudes Toward the Environment Scale for Preschool version (CATES-PV) that was developed by Musser and Diamond in 1999 and adapted into Turkish by Gülay (2011) and Kahrıman-Ozturk, Olgan and Tuncer (2012). At the end of their adaptation studies Gülay (2011) finalized the scale with 15 items, while Kahrıman-Ozturk, Olgan, and Tuncer (2012) finalized it with 12 items. In this scale there are qualitative questions about the pictures that are presented (Musser and Diamond, 1999; Gülay, 2011; Kahrıman-Ozturk, Olgan and Tuncer, 2012).

The Children's Environmental Attitudes Scale was developed by Evans et al. (2007) and adapted into Turkish by Cevher-Kalburan (2009). This scale was developed in order to assess environmental attitudes of first and second grade students attending state schools in New York and it includes three games. In the first and second game there were three questions with two choices in each game and 5 questions in the third game, so there were 11 questions in total (Cevher-Kalburan, 2009).

The Environmental Awareness Level Identification Test for Preschool Children was developed by Çabuk (2001) and includes the following; domains or factors: distinguishing subjects about the environment (6 items),

organizing subjects about the environment (5 items), and comprehending subjects about the environment (6 items). In the scale there are items like smoking when you are pregnant, swimming in a polluted lake, throwing rubbish on the beach and car, etc. (Çabuk, 2001).

Scales about environmental attitude and awareness were generally adaptations of scales that were developed abroad and translated into Turkish. Two of the available measurement instruments are for assessing attitudes and the other is for assessing environmental awareness; there is no instrument that both assesses students' and awareness of the environment. As a result, in this study it was aimed to develop the Environmental Awareness and Attitude Scale for Preschool Children (EAASPC) aged 60-66 months, and to conduct a reliability and validity study.

METHOD

Design of the Research

In this study the survey model was used as it is the most appropriate for the nature of this research. The survey model is appropriate for large samples and it is a model that aims to "collect data to identify specific features of a group" (Büyüköztürk, Çakmak, Akgün, Karadeniz and Demirel, 2011).

Study Group

The sample of the survey consisted of 310 children aged 60-66 months attending a nursery class or an independent preschool that are affiliated with the National Ministry of Education in Aydın and Konya city centers. The sample was selected using the stratified sampling method representing children and their families with different socio-economic levels in Konya city center and Aydın city center. The schools were classified as being of low, average and high socio-economic levels by the Directorate of National Education.

According to Nunally (1978) for conducting factor analysis, the number of subjects should be ten times greater than the number of items, while Tavşancıl (2002) suggested that the number of subjects should be between 5 to 10 times the number of items. According to Tabachnick & Fidell (1996) for factor analysis 300 subjects is considered "good", 500 subjects is "very good" and 1000 subjects is "perfect". Considering the convenience of availability, 310 children were included for our scale with 26 items. There were 96 males 85 females from Konya while there were 65 females and 64 males from Aydın, totalling 310 children in the sample of the study.

Process of Scale Development

In order to develop the items of the scale a literature review about children's environmental attitudes and awareness was first conducted (Akçay, 2006; Domka, 2004; Ernst, 2007; Grodzinska- Jurczak, Stepska, Nieszporek and Bryda, 2006; Haktanır and Çabuk, 2000; Palmer, Grodzinska- Jurczak and Suggate, 2003). In addition, developed scales about environmental attitudes and awareness that were documented in the literature (Çabuk, 2001; Evans et al., 2007; Fernández-Manzanal et al., 2007; Musser and Diamond, 1999; Pelletier, Tuson, Green-Demers and Noels, 1998) were examined in detail.

Using the information obtained from the literature review, 28 items were developed about preschool children's environmental attitudes and awareness. Some items were positively worded while others were written negatively. For each item, two contrasting pictures were prepared. In order to facilitate children's understanding, simple pictures were drawn to depict one situation. After the 28 items were developed and the 56 pictures were drawn, they were given to five academicians for their expert opinion. The experts evaluated the items and the pictures in terms of appropriateness and understandability. Some changes were made to 10 pictures based on the expert opinions before finalising 15 items in the Environment Attitudes subscale and 13 items in the Environmental Awareness subscale.

Administration of the trial instrument

The items of the scale and the pictures were shown to the children who were then told (Figure 1, 2):

"Each item in the Environmental Attitudes subscale is composed of two pictures. Now I will show you the two pictures that refer to an item. In each picture two different situations are depicted followed by a question". After ensuring that the children understand the question, the rest of the 15 items in the subscale were asked one at a time.

The children were then told: "Each item in the Environmental Awareness subscale is composed of two pictures. Now I will show you the two pictures that refer to an item. I will place the two pictures on the table and tell you what they depict. If the depicted situations are correct, I want you to give me the green card; if it is wrong give me the red card or if you don't know give me the yellow card." After ensuring that the children understand the question, the rest of the 13 items in the subscale were asked one at a time.

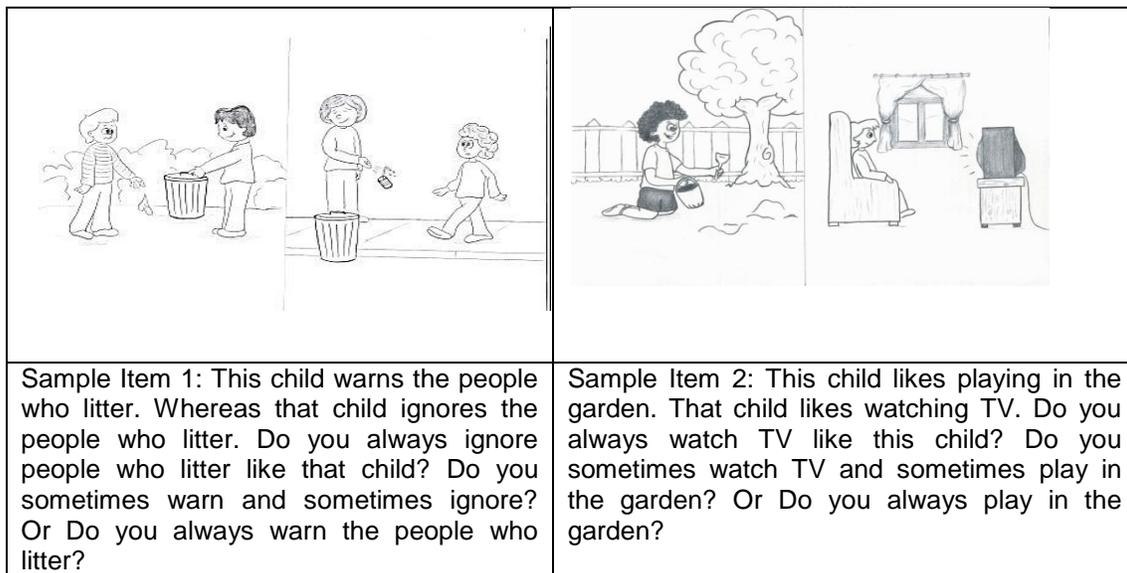


Figure 1. Sample items for environmental attitude subscale

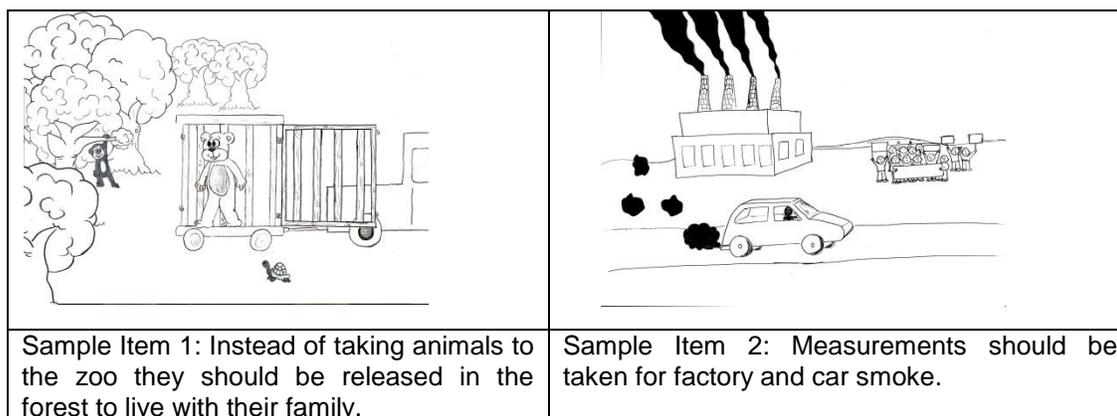


Figure 2. Sample items for environmental awareness subscale

Process of administration of the EAASPC

Before the data collection a meeting was first held with the school principal and teachers concerned to explain the aim of the study. Then, the children who would be participating in the study were taken to a suitable place in their school and they were given an explanation about the study by the researcher and the EAASPC scale was administered to the children individually. All the children were given the items of the scale in the same order; first the Environmental Attitudes items then the Environmental Awareness items. It took about 15 minutes to administer the test to each child. In a pilot study, the scale composed of 28 items was administered to 50 children (20 females and 30 males). Analyses of the data indicated a Cronbach's alpha reliability coefficient of

0.80. Subsequently, the EAASPC scale was administered to the 310 children in the sample and analysis of the data was performed.

The EAASPC data analyses

After administering the scale to the sample group, the data obtained was entered into a SPSS 16 datafile to do the necessary statistical analyses for reliability and validity. Children's responses to the Environmental Attitude items were scored as following; if the child chose "always" for the positive behavior two points were awarded, if the child chose "sometimes" 1 point was awarded and 0 point was awarded if the child chose

Table 1. KMO and Results of Bartlett Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy			0.76
Environmental Attitude Subscale	Bartlett's Test of Sphericity	χ^2	749.85
		df	91
		P	0.00
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			0.70
Environmental Awareness Subscale	Bartlett's Test of Sphericity	χ^2	289.82
		df	66
		P	00
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			0.73
Total	Bartlett's Test of Sphericity	χ^2	1.30
		df	325
		P	0.00

a negative behavior. In the Environmental Awareness subscale, the children's responses were scored 2 for right, 1 for I don't know/I have no idea and 0 for wrong. The following items were negative statements so they were coded; in reverse: 19, 20, 22-25. The total score for each child was computed and a validity and reliability study was conducted using the scores obtained.

Explanatory factor analysis was used in order to identify the construct validity and factor structure of the EAASPC Scale. Correlation coefficients between the Environmental Attitudes and Environmental Awareness subscales was examined. In order to identify the reliability of the scale, internal consistency reliability Cronbach Alpha reliability coefficients and the Spearman-Brown formula were used. Moreover, item discrimination using the the upper and lower 27 % percent test of the total scores were used.

FINDINGS

Construct Validity

First of all, in order to identify whether the data is appropriate for factor analysis the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's Test of Sphericity were examined. Kaiser stated that the coefficient is perfect when it is closer to 1 and unacceptable if it is under 0.50 (0.90 is perfect, 0.80 very good, 0.70 and 0.60 average and 0.50 bad) (Tavşancıl, 2002). Furthermore, in order to ensure that the data normally distributed, the Bartlett's Test of Sphericity was used. Significant chi square statistics gathered at the end of this test is an indicator that data comes from a normal distribution (Şencan, 2005; Tavşancıl, 2002). Table 1

In this study the KMO value was found to be 0.76 for the Environmental Attitudes subscale, 0.70 for the

Environmental Awareness subscale and 0.73 for the overall EAASPC scale. Moreover, the Bartlett's Test of Sphericity was also significant. This indicates that the data are suitable for factor analysis.

Factor analysis of the Environmental Awareness and Environmental Attitude subscales was performed using the Principle Component Analysis procedure. To reach a clear judgment about the number of factors, a Scree Test graph based on eigenvalues of the factors was also analyzed (Büyüköztürk, 2011). In this examination the discontinuities were considered and it was identified that the EAASPC scale is composed of two subscales with three factors each. It was then decided to perform factor analysis in order to ensure construct validity of the scale. The Varimax Orthogonal Rotation technique (Büyüköztürk, 2011; Kalaycı, 2008) was used. It was decided that the factor loading of an item should be at least 0.35 (Hair et. al., 1998; in Kalaycı, 2008). Kalaycı, 2008).

Table 2 shows that the factor loadings of the factors in the Environmental Attitudes subscale varied between 0.47 and 0.69 for the first factor, between 0.45 and 0.67 for the second factor and between 0.42 and 0.74 for the third factor. When the total variance was examined, the three factors explained 44.02% of the total variance. The eigenvalue of the first factor was 2.19 and it explained 15.66% of the variance, the eigenvalue of the second factor was 2.09 and it explained 14.92% of the variance, while the eigenvalue of the third factor was 1.88 and it explained 13.43% of the variance. These results show that the subscale which is was developed to assess the environmental attitudes of children aged 60-66 months is satisfactory.

Table 3 shows that for the the factor loadings of the Environmental Awareness subscale, factor the values of first factor varied between 0.58 and 0.69, between 0.39

Table 2. Factor Analysis Results of Environmental Attitude Subscale

Factor Load Values before the Rotation		Varimax Orthogonal Rotation		
		Consumption	Protecting Creatures	Environmental Pollution
Item 2	.42	.60		
Item 3	.48	.69		
Item 9	.35	.47		
Item 10	.49	.49		
Item 11	.31	.66		
Item 4	.36		.53	
Item 12	.37		.55	
Item 13	.54		.45	
Item 14	.50		.67	
Item 1	.49			.65
Item 6	.59			.63
Item 7	.49			.74
Item 8	.36			.68
Item 15	.36			.42

Table 3. Factor Analysis Results of Environmental Awareness Subscale

Factor Load Values before the Rotation		Varimax Orthogonal Rotation		
		Consumption	Protecting Creatures	Environmental Pollution
Item 21	.47	.68		
Item 23	.53	.69		
Item 27	.37	.58		
Item 16	.36		.39	
Item 17	.37		.60	
Item 18	.47		.55	
Item 20	.31		.55	
Item 22	.55		.74	
Item 19	.42			.47
Item 24	.43			.66
Item 25	.35			.55
Item 26	.32			.54

and 0.74 for the second factor and between 0.47 and 0.69 for the third factor. The total variance of the three factors explained 40.94% of the total variance. The eigenvalue for the first factor was 1.99 and it explained 16.65 % of the total variance, the eigenvalue for the second factor is was 1.48 and it explained 12.33% of the total variance and the eigenvalue for the third factor is was 1.43 explaining 11.95% of the total variance. These results show that the subscale which was developed to assess the environmental attitudes of children aged 60-66 months is satisfactory.

Correlations between the Environmental Awareness and Environmental Attitudes Subscales and Their Factors

The Table 4 shows that there is a high positive and linear

correlation between the scores that the children achieved in the Environmental Awareness subscale and the factors of this subscale ($r = 0.80$ and 0.78 , respectively, $p < 0.001$)

The Table 5 shows that there is a high positive and linear correlation between the scores that the children achieved in the Environmental Attitudes subscale and the factors of this subscale ($r = 0.70$ and 0.79 , respectively, $p < 0.001$).

Findings about the Reliability of the Scale

The values of the Cronbach's alpha and Spearman Brown reliability coefficients of the Environmental Awareness and Environmental Attitudes subscales are given in Table 6.

The table shows that the Cronbach's alpha reliability

Table 4. The Correlations Between Environmental Awareness Scores and Factors

Factors		Consumption	Protecting Creatures	Environmental Pollution
Environmental Awareness	<i>r</i>	.80**	.78**	.83**
	<i>p</i>	.00	.00	.00
	<i>n</i>	310	310	310
Consumption	<i>r</i>	-	.41**	.50**
	<i>p</i>	-	.00	.00
	<i>n</i>	-	310	310
Protecting Creatures	<i>r</i>	-	-	.54**
	<i>p</i>	-	-	.00
	<i>n</i>	-	-	310

Table 5. The correlations between environmental attitude scores and factors

Factors		Consumption	Protecting Creatures	Environmental Pollution
Environmental Awareness	<i>r</i>	.70**	.79**	.72**
	<i>p</i>	.00	.00	.00
	<i>n</i>	310	310	310
Consumption	<i>r</i>	-	.40**	.38**
	<i>p</i>	-	.00	.00
	<i>n</i>	-	310	310
Protecting Creatures	<i>r</i>	-	-	.39**
	<i>p</i>	-	-	.00
	<i>n</i>	-	-	310

Table 6. Reliability Analyses Results Concerning the Whole Scale and Factors

Subscales	Number of Items	Spearman Brown	Cronbach Alpha
Environmental Attitude	14	.75	.73
Environmental Awareness	12	.65	.66
Total	26	.60	.67

coefficient and the Spearman Brown reliability coefficient was 0.75 and 0.73 respectively for the Environment Attitude subscale. The corresponding values for the Environmental Awareness subscale were 0.66 and 0.65 respectively. The Cronbach's alpha reliability coefficient and the Spearman Brown reliability coefficient for the whole EAASPC scale was 0.67 and 0.60, respectively. The calculated internal consistency coefficients have shown that reliability level of the EAASPC scale is very high.

Item Discrimination

In this section according to total correlation method, correlations between scores obtained from each item in the factors and the scores obtained from factors were calculated and item discrimination levels were tested. Item total correlation explains the correlation between

scores from the items of the scale and the total score from the scale. If the item total correlation is positive and high, it indicates that the item exemplifies similar behavior and its internal consistency is very high (Büyüköztürk, 2011). Thus, each item's service level to the scale's overall objective was tested. Item-factor correlation values determined for each item were given in Table 7.

As it is seen from Table 7, item factor correlation coefficients for the first factor (Environment Attitude) is between 0.34 and 0.47 and for the second factor (Environment Awareness) is between 0.32 and 0.40. The average item discrimination power of the scale is 38. Each item has a positive and significant correlation with the whole factor ($p < 0.001$). Büyüköztürk (2011) has suggested that if the item total correlation of an item is 30 or higher, it discriminates between individuals very well.

In order to test how well each item discriminates between individuals and to measure the internal consistency, scale scores were grouped into upper 27%

Table 7. Item Discrimination Power (*r*) Values for Environmental Awareness and Attitude Scale

Environmental Attitude		Environmental Awareness	
<i>m.</i>	<i>r</i>	<i>m.</i>	<i>r</i>
1	.41(**)	15	.37(**)
2	.39(**)	16	.38(**)
3	.34(**)	17	.35(**)
4	.34(**)	18	.37(**)
5	.45(**)	19	.38(**)
6	.39(**)	20	.34(**)
7	.42(**)	21	.33(**)
8	.36(**)	22	.40(**)
9	.38(**)	23	.39(**)
10	.37(**)	24	.34(**)
11	.40(**)	25	.32(**)
12	.45(**)	26	.32(**)
13	.47(**)		
14	.34(**)		

** $p < 0.001$

Table 8. Independent t-test Results of Comparison of Higher and Lower Groups' Average Scores from Environmental Awareness and Attitude Scale

	Groups	<i>n</i>	<i>x</i>	<i>Ss</i>	<i>t</i>
Environmental Attitude	Upper Group	83	28.00	0.00	19.60**
	Lower Group	83	20.56	3.49	
Environmental Awareness	Upper Group	83	21.37	1.49	42.39**
	Lower Group	83	12.13	1.32	
Total	Upper Group	83	47.88	2.06	27.78**
	Lower Group	83	35.36	3.59	

** $p < .001$

and lower 27%. An independent groups t-test was administered to the groups to identify the significance level of the difference between the item scores in groups. First of all the test scores were ranked from lowest to highest and 27% of the lowest group and 27% of the highest group were determined; the significance of the difference between these groups was determined. Table 8

In the Environmental Attitudes subscale of Environmental Awareness and Attitude Scale (EAASPC) the average score of the upper group is higher ($X: 28.00$), there is a with a difference in favour of the upper group ($p < 0.001$). In the Environmental Awareness subscale, the average score of the upper group is also higher ($X: 21.37$) and there is a significant difference in favour of the upper group ($p < 0.001$). This situation shows that the internal discrimination of the items was high and that the EAASPC scale has internal validity.

RESULTS AND DISCUSSIONS

In this study, the Environmental Awareness and Attitude Scale for Preschool Children (EAASPC) was developed and validity and reliability studies were conducted. The scale is composed of 28 items with pictures in two subscales: the Environmental Attitudes subscale (with 15 items) and the Environmental Awareness subscale (with 13 items). Each subscale includes the dimensions of consumption, protecting creatures and environmental pollution. At the end of statistical analyses one item in each subscale was eliminated (5th and 28th items) and final form of the "Environmental Awareness and Attitude Scale for Preschool Children" was finalized with 26 items.

In order to determine structural validity of the scale factor analysis was selected which is a multi-variable statistical method, used to convert many variables among

which various relations exist into significant and independent factors (Hair, Black, Babin, Anderson and Tatham, 2006). Cronbach (1990) states that structural validity is one of the important factors that enhances the validity of tests. Considering these facts, before starting the factor analysis, values obtained from Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were examined in order to verify conformance of the data obtained from the pre-test in terms of the factor analysis. According to the analyses the KMO value of the scale is 0.73 and its Bartlett's Test is meaningful (chi-square: 1.30, df= 325, $p=0.00$, $p<0.001$). In other words, the KMO coefficient which is used to determine whether the data and the sampling size is suitable and adequate for the analysis selected and the results of the Bartlett's test of sphericity which checks whether or not the data comes from multi-variable normal distribution are much higher than the acceptable levels (Hair et. al., 2006). Varimax Rotation and Rotated Component Matrix of the first factor (Environmental Attitudes subscale) varied between 0.42 and 0.74, and between (Environmental Awareness subscale) 0.39 and 0.74 for the second factor load level.

When the total variance obtained at the end of components analysis was examined, in the Environmental Attitudes subscale there were three factors explaining 44.02% of the total variance. Findings showed that the eigenvalue for the first factor is 2,19 explaining 15.66% of the total variance, the eigenvalue for the second factor is 2,09 and it explains 14.92%, while and eigenvalue for the third factor is 1.88 and it explains 13.43 % of the total variance. In the Environmental Awareness subscale three factors explaining 40.94% of the total variance were obtained. The findings show that the eigenvalue for the first factor is 1.99 and it explains 16.65% of the total variance, the eigenvalue for the second factor is 1.48 and it explains 12.33% of the total variance while the eigenvalue for the third factor is 1.43 and it explains 11.95 % of the total variance. These results indicate that the scale developed in order to determine the environmental awareness and attitude of 61 to 72-months-old children is composed of two factors and items relating to environmental awareness and attitude concentrate on two different components, as expected. This finding corresponds to the accuracy of the theoretical structure included in the literature concerning the addition-subtraction skills. The findings confirm that scale developed to determine environmental awareness and attitude which is composed of 2 factors is able to completely measure this structure and is a powerful and reliable tool.

The scale developed by the method relating to the significance of difference between the upper and lower 27% groups was applied to two groups (successful and unsuccessful). If the average score of the successful group is significantly higher than that of the unsuccessful

group then the scale is considered to be reliable. It is seen that there is has a high positive and linear correlation with the scores children obtained in the subscales of Environmental Awareness and Environmental Attitudes and the factors of the scale.

The Spearman Brown reliability coefficient was found to be 0.75 and the Cronbach's alpha reliability coefficient was 0.73 for the Environmental Attitudes subscale. For Environmental Awareness subscale, the Spearman Brown reliability coefficient was calculated as 0.65 and the Cronbach's alpha reliability coefficient was calculated as 0.66. For the whole EAASPC scale these values were found to be 0.60 and 0.67 respectively. Reliability coefficients that are 0,70 and over are accepted as a sign of the satisfactory reliability of the scale (Büyüköztürk, 2011).

The power of item discrimination of the scale for the first subscale (Environmental Attitudes) is between 0.34 and 0.47 and for the second subscale (Environmental Awareness) is between 0.32 and 0.40. The average item discrimination power of the EAASPC scale is 38. Each item has a positive and significant correlation with the whole factor ($p<0.001$). The item-total score correlation reveals the relationship between the score obtained from the test items and the total score of the test. Positive and higher item-total correlation indicates that items show similar behaviours and their internal consistency is high (Büyüköztürk, 2011). Therefore, with this analysis each item can be tested for their positive contribution to the overall purpose of the scale. Büyüköztürk (2011) argues that items with item-total correlation values equal to or greater than 30 distinguished individuals at a sufficient level. Accordingly, it can be said that that the scale considerably serves the overall purpose.

The scale developed by the method relating to the significance of difference between the upper and lower 27% groups was applied to two groups (successful and unsuccessful). If the average score of the successful group is significantly higher than that of the unsuccessful group then the scale is considered to be reliable. A significance test of the difference between upper and lower 27% of total scores and t-test results concerning the significance of the difference between two subscales have shown that the scale is reliable and to discriminate between the groups.

Consequently, findings about the reliability and validity of the scale have shown that the Environmental Awareness and Attitudes Scale for Preschool Children (EAASPC) developed to measure environmental attitudes and awareness of pre-school children aged 60-66 months, reliably achieves its aim. In further studies by using the children's environmental awareness and attitudes can be compared with different variables and new correlations can be presented.

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