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Reliability and Validity of the "Decision-making Skills Instrument for Children"

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Abstract

The purpose of this study is to develop a valid and reliable data collection tool to assess the decision-making skills of children at the age of 5 to 6. The study group is composed of 300 children attending independent pre-schools located in the central district of Amasya province and their parents. In the study, four-factor and 29-item "*Decision-Making Skills Instrument-Child Form*" involving "yes" and "no" answers and Likert-type single-factor and nine-item "*Decision-Making Skills Instrument-Parent Form*" aimed at assessing children's decision making skills based on the parents' impressions involving the answers "never", "sometimes", "sometimes", "often", and "always" were developed. The findings showed that ""*Decision-Making Skills Instrument-Child Form*" consisting 29 items and "*Decision-Making Skills Instrument-Parent Form*" consisting 9 items are reliable and valid measurement tools.

Keywords: decision-making skills, children, parents, early childhood

1. Introduction

Early childhood is important for children to have problem-solving skills and feeling of confidence, to be capable of easily adapting to different situations, expressing themselves, and making right decisions, and to be highly inquisitive and enterprising (Alisinanoğlu & Ulutaş, 2003). Children experience many problematic situations throughout their development and search solutions to the problems concerning themselves and their occupations (Kotovosky and Simon, 1990). Each problematic situations develop their problem-solving skills and encourage them to be stronger individuals in their lives (Crebert et al., 2011). During the pre-school period, the child acquires many knowledge and skills such as reasoning, inference, questioning, and decision making in order to solve the problems (Kuru Turaşlı, 2012; Erden and Akman, 1998).

Decision-making refers to the selection of the most appropriate option among the alternatives available or offered (Byrnes, 2002; Evans, Brown and Killian, 2002; Jacobs and Klaczynski, 2005; Saaty, 2008). Problem-solving and decision-making are concepts that are used together. Decision-making skill constitutes the previous step of problem-solving behavior. Decision-making behavior is about the functions of cognitive structures. It can be defined as an individual's selecting the most appropriate option among the available ones in order to meet his needs (Simons, 1997). Kuzgun (2006) stated that problem-solving and decision-making are complex processes. The individuals identify various alternatives during this process. They assess these alternatives, decide on an option, and implement this decision.

Choices are an important phase of decision-making situations. In the daily life, children encounter certain situations that force them to make decisions under various circumstances. Social and political structure, religious beliefs, school life, and life style are the factors influential on children's choices. The difficulty of the situation and emotions are among the factors that are most influential on decision-making (Pringle, 1993). Decision-making process starts when the individual needs to make a decision. Afterwards, the individual determines the purposes, collects information about the options that are fit for the purposes, assesses his decisions, and makes a choice, thereby making his decision (Johnson-Laird and Shafir, 1994).

Children want to see the results of their actions while making decisions. Decision-making in children involves several steps such as determination of the purposes, creation of the options, assessment of the options, selection of the

appropriate options, and implementation of the decision. Just like many other researchers (Baron, 1994, Furby and Beyth-Marom, 1992), Byrnes also states that children's socio-emotional competencies are an important step for decision-making (Byrnes, 2002).

Children's and young people's decision-making competencies have become the center of interest in printed publications and media tools. Recently, parents, educators, and researchers have started to become interested in the age-related changes in children in terms of decision-making under risky situations, making the rightest decision, and decision-making styles (Jacobs & Klaczynski, 2005).

Lack of studies regarding young children's decision-making skills draws attention both in Turkey and throughout the world. Furthermore, there is no measurement tool to assess these skills in early years. Having a measurement tool to assess young children's decision-making skills will contribute much to the literature. Accordingly this research aimed to develop a valid and reliable data collection tool to assess the decision-making skills of children at the age of 5 to 6.

2. Method

2.1 Study Group

Totally 300 preschool children and their parents were voluntarily participated to research. Children and parents were selected via cluster sampling method which provides an equal selection chance for each of the clusters in the population that are formed either naturally or artificially with various purposes within the population (Karasar, 2009).

Children were aged 5 (36.0%) and 6 (64.0). In terms of gender, 57.0 % of the children were girl and 43.0% were boys. 43.0% of them had two siblings, 37,0% were first born, 58,0% never had preschool education before. 49,0% of the mothers graduated from high school, 54,0% fathers graduated from university, and they had middle socio economic status.

2.2 Data Collection Tools

"*Decision-Making Skills Instrument-Child Form*" and "*Decision-Making Skills Instrument- Parent Form*" were developed by the researchers for this study.

2.2.1 The Development Process of the Tools

Literature was reviewed initially to create "*Decision-Making Skills Instrument-Child Form*". Measurement tools that were employed in the previous studies were analyzed. "Adolescent Decision-Making Questionnaire" (ADMQ) adapted into Turkish by Çolakkadıoğlu and Güçray (2007), "Melbourne Decision-Making Questionnaire" developed by Mann et al. (1997), "Scale for Decision Strategies" (Kuzgun, 1992), and "Decision-Making Skills Evaluation Scale" developed by Karakaş (1999) were examined.

Following the literature review, a sample group representing the target group and consisting of parents (n=15) with children aged 5-6, children (n=30), their parents and teachers (15) was formed to collect information regarding what kind of decisions children make under which circumstances. Content analysis was carried out on the collected responses. Item pool including situations that are associated with decision-making were created for each instrument. "*Decision-Making Skills Instrument-Child Form*" had 96 items and 8 decision making situations and each situation incorporates 12 questions. Attention was paid for the items to be simple and clear, not to involve more than one judgment/idea/perception, and to contain equally positive and negative statements. As the score obtained from the measurement decreases, children's decision-making skills increase.

"*Decision-Making Skills Instrument-Parent Form*" had 20 items that are directly associated with decision-making or the situations that are assumed to be directly associated with decision-making were chosen for "*Decision-Making Skills Instrument-Parent Form*". It is a Likert-type 5-point form (i.e. "never (1)", "sometimes (2)", "occasionally (3)", "usually (4)", and "always (5)"). Some of the items were reversely coded. The lowest score to be obtained from the parent form is 0 while the highest one is 100. The higher is the score obtained from the parent form, the higher is the child's decision-making skill.

2.3 Data Collection Process

"*Decision-Making Skills Instrument-Child Form*" was administered by the researcher to each child individually at the schools they attended. It was administered in a silent environment equipped with desks and chairs suitable for the children's sizes. It is important to communicate with children and define the situations clearly while implementing the measurement tool. The implementation should be conducted individually with each child. The researcher should sit next to the child, explain the situation to the child without any interpretation, ask the questions, receive the yes/no response, and record the responses. Implementation of the measurement tool takes nearly 15 minutes.

"*Decision-Making Skills Instrument-Parent Form*" was sent to the parents via the children after the teacher guided them

to take it their homes. The forms were recollected one week later. The form can be administered to the parents in groups. The implementation nearly takes 10 minutes.

Personal data forms were filled in through examination of the records in the children's personal files under the guidance of their teachers. The students without personal data forms or the ones with incomplete personal data forms took the forms to their parents and brought back after they were filled in.

2.4 Data Analysis

Explanatory factor analysis (EFA) was employed to determine construct validity of the both child and parent form of the "*Decision-Making Skills Instrument*". Factor analysis is a statistical operation that needs to be performed in the tool development process. Developing a tool only by taking into account item total correlations will not yield accurate results (Erkuş, 2012). Cronbach's alpha reliability and test-retest method were used to demonstrate both child and parent instruments.

3. Findings

3.1 Content Validity

"*Decision-Making Skills Instrument-Child Form*" and "*Decision-Making Skills Instrument- Parent Form*" were reviewed by the five early childhood experts, one educational sciences expert, and one Turkish language expert for the content validity. The experts analyzed whether the tool items measure decision-making skills as well as their grammatical correctness and clarity.

Lawshe's technique was employed to assess the content validity according to expert views. The experts used the expression "fit" for all the items in the test. Therefore, the item fit level CVRs of both measurement tools were calculated to be 1.00 according to the views received from seven experts. This value indicates that all the items in the test are necessary and content validity is achieved (Yurdugül, 2005, p.2).

3.2 Construct Validity of the "Decision-making Skills Instrument-child Form"

Explanatory factor analysis (EFA) was performed to determine the construct validity of "*Decision-Making Skills Instrument-Child Form*". In the first step of factor analysis Kaiser-Meyer-Olkin (KMO) sample adequacy and Bartlett's sphericity test were conducted. KMO statistics yielded a result of .82, and the sample size was determined to be perfectly fit. Bartlett's sphericity test results indicated that the data were fit for factor analysis ($p<.05$). The factors and eigenvalues are given in the Table 1 and the scree plot is given in the Figure 1.

Table 1. Eigenvalues of the "*Decision-Making Skills Instrument-Child Form*"

Factors of Child form	**Eigenvalue**	**Factors of Parent Form**	**Eigenvalue**
Factor 1	18.86	Factor 1	3.446
Factor 2	4.56	Factor 2	1.568
Factor 3	4.05	Factor 3	1.233
Factor 4	2.93	Factor 4	1.068

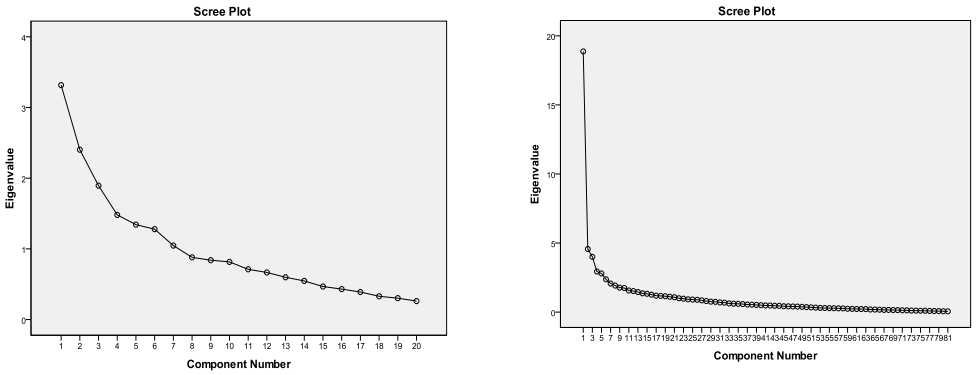

Figure 1. Scree Plot of the Factors and Eigenvalues of "*Decision-Making Skills Instrument-Child Form*"

Table 2. Factor Pattern Matrix for the "*Decision-Making Skills Instrument-Child Form*" (Rotated Principal Components)

Items	Factor Covariance	Rotated Factor Load Values			
		Factor 1	Factor 2	Factor 3	Factor 4
i30	.573	.692			
i66	.553	.681			
i90	.472	.633			
i55	.419	.620			
i54	.442	.618			
i84	.426	.611			
i67	.467	.608			
i96	.318	.560			
i72	.419	.556			
i78	.319	.545			
i91	.436	.530			
i60	.350	.527			
i44	.344	.514			
i31	.403	.504			
i79	.377	.488			
i8	.257	.488			
i20	.415	.485			
i21	.276	.472			
i75	.271	.472			
i47	.402	.476			
i7	.234	.450			
i36	.477	.447			
i73	.338	.429			
i52	.284	.419			
i70	.627		.784		
i82	.596		.738		
i58	.566		.727		
i94	.436		.635		
i10	.341		.578		
i34	.364		.574		
i71	.379		.515		
i59	.397		.503		
i32	.501			.684	
i92	.526			.681	
i80	.436			.631	
i56	.421			.556	
i68	.390			.532	
i47	.402			.476	
i29	.370			.446	
i83	.351			.417	
i69	.441				.642
i81	.431				.639
i57	.426				.638
i33	.383				.612
i93	.378				.601
i24	.304				.541
i35	.360				.446
Explained Variance; Total: 37.48% Factor 1: 23.29% Factor 2: 5.63% Factor 3: 4.94% Factor 4: 3.62%					

Initially the values whose eigenvalues are not less than one are taken. However, the researcher can increase this threshold value according to the analysis results (Büyüköztürk, 2009). In this study, the factors with eigenvalues not less than two were considered to be important factors. Therefore, "*Decision-Making Skills Instrument-Child Form*" was limited to four factors, and the analysis was repeated via Varimax vertical rotation technique based on principle components (Table 2). On the other hand "*Decision-Making Skills Instrument-Parent Form*" had a single factor, and the analysis was repeated via Varimax vertical rotation technique based on principal components. Factor load value was determined to be .30 in the study. The factor loads of the items after factor analysis are given in the Table 2.

Büyüköztürk (2009) stated that variance explained at a rate of 30% or over is adequate. It is clear that measurement tool with four factors explain 37.5% of the total variance. It is possible to say that validity of the measurement tool is high since the eigenvalues of the factors and factor loads of the items are high.

Table 3. Factor Pattern Matrix for the "*Decision-Making Skills Instrument-Parent Form*" (Rotated Principal Components Results)

Items	**Factor Covariance**	**Rotated Factor Load Values**
		Factor 1
i18	.732	.664
i16	.510	.657
i15	.634	.652
i12	.604	.643
i19	.625	.619
i8	.560	.541
i6	.694	.492
i3	.464	.471
i14	.577	.434
i10	.494	.397
i20	.426	.377
i5	.663	.329
Explained Variance Total: 31%		

Factor Pattern Matrix for the "*Decision-Making Skills Instrument-Parent Form*" are given in the Table 3. Before the rotation of the items KMO and Bartlett's sphericity test were performed. Statistics of the. Both tests s also showed that the data were fit for factor analysis (KMO =733, p<.05). The sample accepted to be fit at a good level for the factor analyses.

When the items with factor loads lower than .30 were excluded, it was seen that the sub-scale was reduced to 12 items. The factor loads of the tool with 12 items range from .329 to .664. It explains 31.0% of the total variance with a single factor. The eigenvalues and factor loads of the items showed that the validity of the test is high.

3.3 Reliability Study

Cronbach's alpha and test-retest methods were employed to indicate the reliability of "*Decision-Making Skills Instrument-Child Form*" and "*Decision-Making Skills Instrument-Parent Form*" *(Table 4).*

Reliability of the tools were investigated via Cronbach's alpha coefficient. The reliability coefficient ranges from 0 to +1. Having reliability coefficients close to one indicates high reliability as well as high internal consistency among the items, which is favorable. At the end of the reliability analyses of items found to be lower than were excluded, and the analysis was repeated.

Table 4. Internal consistency of the "Decision-Making Skills Instrument-Child Form" and "Decision-Making Skills Instrument-Parent Form"

Factor 1 (Decided/Undecided) **α**=.83		**Factor 2** (Difficulty in Decision Reactions) α=.81		**Factor 3** (Dependent/Independent Decision-Making) α=.78		**Factor4** (Emotions in Decision-Making) α=.88		**Parent Form** (α=.76)	
Item No	**Item-Total Correlation**	**Item No**	**Item-Total Correlation**	**Item No**	**Item-Total Correlation**	**Item No**	**Item-Total Correlation**	**Item No**	**Item-Total Correlation**
i30	.60	i34	.51	i32	43	i33	.37	i3	.41
i54	.59	i58	.63	i56	.67	i57	.55	i6	.35
i78	.48	i70	.60	i68	.58	i69	.39	i8	.46
i90	.38	i82	.63	i80	.63	i81	.54	i10	.33
i31	.53	i94	.61	i92	.57	i93	.56	i12	.50
i55	.32							i15	.46
i67	.57							i16	.53
i79	.58							i18	.48
i91	.59							i19	.46
i36	.38								
i60	.42								
i72	.46								
i84	.44								
i96	.37								

The reliability analysis shown that correlations ranged from .37-.60 for Factor 1, .51-.63 for Factor 2, .43-.67 for Factor 3 and .54-.56. for factor 4. Cronbach's alpha internal consistency of 14 items was found to be .827, which is high. Cronbach's alpha internal consistency of the factors was found to be .78-.88. Total Cronbach's alpha value of the "*Decision-Making Skills Instrument-Child Form*" was .88. At the end of validity and reliability analyses, factors named as respectively Decided/Undecided (Factor 1), Difficulty in Decision Reactions (Factor 2), Dependent/Independent Decision-Making (Factor 3) and Emotions in Decision-Making (Factor 4).

The item-total correlations of the "*Decision-Making Skills Instrument-Parent Form*" ranged from .33 to .53. The Cronbach's alpha internal consistency value of 9 items was.76.

3.4 Test-retest Reliability

Test-retest method was employed to see to what extent the test yields stable measurements depending on the time. The test-retest method indicates the correlation between the scores obtained from the implementation of a test on the same group twice with a specific interval between the two implementations. For the reliability of the test-retest method, 100 children from among 300 children and 100 parents from among 300 parents were selected randomly. Pearson's product-moment correlation coefficient was calculated for the data obtained from the two implementations, and t-test was performed for the dependent samples. It is expected for correlation coefficient to be significant and close to 1 and t-test result to be significant at a rate of .05. (Büyüköztürk, 2009).

Based on the statistical analysis results, total correlation coefficient for ""*Decision-Making Skills Instrument-Child Form*" is .91; correlation coefficient for the "*Decided/Undecided*" sub-scale is .89; "*Difficulty in Decision Reactions*" sub-scale is .90; "*Dependent/Independent Decision Making*" sub-scale is .87; and "*Emotions in Decision-Making*" sub-scale is .94. All the obtained correlations indicate high and significant relationships at a rate of .01. This result state that there is a consistency between the tool scores obtained from the first and the second implementations.

Table 5. Test-Retest Results

Factors	Implementation	S	$\bar{X}$	SS	sd	t	p
Decided/Undecided	The first implementation	100	7.21	4.44	99	.050	.960
	The final implementation	100	7.20	4.49			
Difficulty in Decision Reactions	The first implementation	100	1.23	1.63	99	-.847	.399
	The final implementation	100	1.29	1.60			
Dependent/Independent Decision-Making	The first implementation	100	3.01	1.81	99	.965	.337
	The final implementation	100	2.91	1.82			
Emotions in Decision-Making	The first implementation	100	3.06	1.80	99	.000	.995
	The final implementation	100	3.04	1.81			
Total *Decision-Making Skills Instrument-Child Form*"	The first implementation	100	14.45	7.33	99	.31	.975
	The final implementation	100	14.44	7.49			
Decision-Making Skills Instrument-Parent Form"	The First Implementation	100	29.0	5.06	99	1.436	.154
	The Final Implementation	100	28.8	4.94			

p>.05

Table 5 gives that the first implementation and the final implementation scores do not differ significantly in the "*Decided/Undecided*" sub-scale [t(99)=.50, p>0.5], "*Difficulty in Decision Reactions*" sub-scale [t(99)=-.847, p>0.5], "*Dependent/Independent Decision-Making*" sub-scale [t(99)=.965, p>0.5], and "Emotions in Decision-Making" sub-scale [t(99)=.000, p>0.5], as well as the overall "*Decision-Making Skills Instrument-Child Form*" [t(99)=.31, p>0.5].

The correlation coefficient of "*Decision-Making Skills Instrument-Parent Form*" was calculated to be .96. This correlation coefficient indicates high and significant relationships at a rate of .01. Additionally the first implementation and the final implementation scores do not significantly differ in "*Decision-Making Skills Instrument-Parent Form*" [t(99)=1.436, p>0.5].

4. Discussion and Conclusion

The purpose of this study is to develop assessment tools to evaluate decision-making skills of children at the age of 5-6. Cronbach's alpha reliability coefficient was calculated in order to reveal the reliability of the assessment tool in terms of internal consistency. 29-item Decision-Making Skills Assessment Tool-Child Form has 4 sub-dimensions. "*Decided/Undecided*" sub-scale has item-total correlations ranging from .37 to .60. Its reliability coefficient is .83. "*Difficulty in Decision Reactions*" sub-scale has item-total correlations ranging from .51 to .63. Its reliability coefficient is .81. The "*Dependent/Independent Decision-Making*" sub-scale has item-total correlations ranging from .43 to .67. Its reliability coefficient is .78. "*Emotions in Decision-Making*" sub-scale has item-total correlations ranging from .37 to .56. Its reliability coefficient is .79. Reliability coefficient of the whole "*Decision-Making Skills Instrument-Child Form*" is .89.

Stability of the assessment tool was also analyzed. Test-retest method was employed for this purpose. (n=100). According to the results, the correlation coefficient for ""*Decision-Making Skills Instrument-Child Form*" is .91, .89 for "*Decided/Undecided*" sub-scale, .90 for "*Difficulty in Decision Reactions*" sub-scale, .87 for "*Dependent/Independent Decision-Making*" sub-scale, and .94 for "*Emotions in Decision-Making*" sub-scale, all of which are high values. Hence, it can be said that the measurement to be conducted via ""*Decision-Making Skills Instrument-Child Form*" will be valid and reliable.

"*Decision-Making Skills Instrument-Parent Form*" has a single factor with 9 items. The item-total correlations of the

parent form found .33-.53. Its Cronbach's alpha internal consistency was .76. It was seen that "*Decision-Making Skills Instrument-Parent Form*" yields valid and reliable measurements. Test-retest (n=100) was employed to analyze the stability of the assessment tool. The coefficient of correlation between the two implementations was found to be .96, which is high. All in all, "*Decision-Making Skills Instrument-Child Form*" and "*Decision-Making Skills Instrument-Parent Form*" developed in this study are valid and reliable. Each research to be conducted with these assessment tools will contribute further to the tools for them to yield stronger measurements. What is more, validity and reliability studies can be conducted in relation to the applicability of the tools to other age groups.

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