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Research Article

Development and validation of the IS-C psychometric tool for evaluating children's impulsivity

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Abstract: This research aims to develop an instrument for the evaluation of impulsivity traits in children and to examine the psychometric features of the developed scale. The process of developing the scale involved three main phases: namely, item generation, evaluation of content validity, and analysis of psychometric properties. The study sample comprised 319 children (68 females, 201 males) aged 5-18, all diagnosed with attention deficit hyperactivity disorder (ADHD), including 50 who underwent pilot testing. Both exploratory and confirmatory factor analyses were employed to assess the factor structure of the scale, resulting in an 18-item scale encompassing motor impulsivity, non-planning impulsivity, and attention-related impulsivity factors. The Confirmatory Factor Analysis *(CFA)* indicated a satisfactory model-data fit. The overall scale demonstrated high reliability, with Cronbach's Alpha coefficients reaching 0.863. The analyses indicated that the scale is both valid and reliable.

1. INTRODUCTION

Impulsivity, which is accepted as a basic feature of childhood psychopathology, has been associated with various psychopathologies, especially attention deficit hyperactivity disorder (ADHD) (Beauchaine et al., 2017; Martel et al., 2017). ADHD, one of the most widespread disorders of childhood, is characterized by issues with hyperactivity, attention deficiency, and impulse control (Öztürk & Başgül, 2015). Patients with attention deficit and hyperactivity disorder may exhibit attention issues, hyperactivity, impulsive issues, or both symptoms simultaneously (Ercan & Aydın, 2005). The prevalence of attention deficit and hyperactivity disorder is between 2-17% in children, adolescents, and adults (Öztürk & Başgül, 2015). Beginning in childhood, ADHD symptoms can last until adolescence (60-80%) for a sizeable portion of patients, and even into adulthood (40-60%) for some patients (Ercan, 2015). In this context, ADHD, which is widespread in society, has several detrimental effects on a person's ability to be successful at school as well as their ability to interact with others and do business (Ercan & Aydın, 2005; Hallowell & Ratey, 2011; Yazgan, 2010). The impulsive/hyperactive subtype of ADHD substantially influenced these negative aspects. *Willcutt et al. (1999*) reported a relationship between impulsive/hyperactive subtype and oppositional defiant disorder or conduct disorder. Similarly, it has been noted that impulsivity and hyperactivity

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symptoms in teenagers are indicators of forensic criminal behavior, while attention deficit alone is not (Willcutt et al., 1999*).*

In studies on impulsivity, it is emphasized that high levels of impulsivity may contribute to interpersonal and social difficulties and may also cause various mental health problems such as substance use disorders. In addition, it is also reported to be an important factor in juvenile delinquency and criminal behavior (Sharma et al., 2014).

Based on this information in the relevant literature, it can be said that impulsivity negatively affects an individual's quality of life, relationships, and functionality. Impulsivity arises from the interplay of various factors, including neurological, genetic, environmental, cognitive, social, and emotional influences. The complex interaction among these factors contributes to the manifestation of impulsivity (Gladwin et al., 2020; Han et al., 2022; Kreek et al.,2005; Nomura & Nomura, 2006; Sharma et al., 2014).

The risky act of impulsivity is characterized by the premature expression of thoughts, which frequently results in unfavorable outcomes and improper circumstances (L'Abate, 1993). Eysenck (1977) described impulsivity as the taking of risks, inability to prepare, and slow mental processing. In the literature, it is seen that impulsivity is classified in various ways by researchers (Dickman, 1990; Eysenck & Eysenck, 1977; Patton et al., 1995; Whiteside & Lynam, 2001). *Patton et al. (1995*) divided it into three categories; namely, acting without sufficient planning and thought, acting without sufficient motor activation, and attention issues (lack of a plan). Motor impulsivity is an area that represents impairments in the ability to inhibit impulsive action and inappropriate responses. Attentional impulsivity refers to a tendency to switch attention quickly and can lead to inappropriate snap judgments. Inability to plan impulsivity refers to the inability to think about a current orientation or the future (Patton et al.,1995). Impulsivity is a pattern of conduct rather than one impulsive act (Moeller et al., 2001). Impulsive persons have the potential to hurt not just themselves but also other people. As a result, impulsiveness is the fast and unplanned response to internal and external stimuli without considering any potential negative effects on oneself or others (L'Abate, 1993).

To diagnose, treat, and implement necessary interventions for any potential psychopathology, it is crucial to identify and address impulsivity. Various methods have been developed by mental health professionals worldwide to assess different dimensions of impulsivity in children. Typically, self-report surveys, parent, and teacher rating scales, as well as behavioral or computer-based tasks, are employed to identify impulsivity in children (Cyders & Coskunpınar, 2011; Olson et al., 1999). Measurement tools commonly used to assess impulsivity in children include the Barratt Impulsiveness Scale for Children, UPPS Impulsive Behavior Scale, Teacher-Rated Children's Attention and Impulse Control Questionnaire (TRCAICQ), Dickman Impulsivity Inventory for Children (IDIJ-c), ADHD-IV Rating Scale for measuring inattentive, impulsive, and hyperactive behaviors, Eysenck's Impulsiveness Questionnaire, Kansas Reflection-Impulsivity Scale for Preschool Children, and the Go/No-Go task (Barkley, 1991; Cosí et al., 2008; DuPaul et al., 1998; Eysenck et al., 1984; Halperin et al., 1991; Leyva & Nolivos, 2015; Patton et al., 1995; Watts et al., 2020; Wright, 1971).

This research contributes to the limited measurement tools available on impulsivity for children in Türkiye. This scale, developed for Turkish parents to evaluate their children's impulsivity levels, can provide a more in-depth understanding of child psychopathology and behavioral problems and thus can be used in early diagnosis and intervention processes for children's mental health. Additionally, the development of this scale in Turkish culture may enable its widespread use in clinical practices and research.

2. METHOD

2.1. Design

In this study, a methodological approach that included three basic stages was used in the development of the Children's Impulsivity Scale (CDS). In the first stage, an item pool was created for IS-C. Then, in the second stage, the content validity of the scale was meticulously evaluated. Finally, the third phase focused on improving and evaluating the psychometric properties of the IS-C. Through these systematic steps, the research aimed to ensure the comprehensiveness, appropriateness, and reliability of the scale.

2.2. Participants

Data from a private child psychiatry clinic was collected throughout the development and validation of the IS-C. Individuals who were willing to participate in the research were included in the research using the convenience sampling method. Participants in the current study had to meet the following criteria: being diagnosed with ADHD, being between the ages of 6 and 16, and not having any other psychiatric disease diagnosis. Data was collected from the parents of children who met these criteria. Different sampling groups were utilized at various stages of the scale's development. In this situation, groups for confirmatory and explanatory factor analyses (N=269) and the pilot scheme (N=50) were developed. To apply factor analysis, the sample must be five to ten times larger than the number of items in the scale (Bryman & Cramer, 2002). On the other hand, Kline (1994) states that a sample size of 200 people will usually be adequate, but this number can be reduced to 100 in cases when the factor structure is clear and sparse (Kline, 2015). When looking at the study groups in the research, the study groups can be said to be sizable enough for both validity and reliability analyses.

2.3. Instruments

2.3.1. Personal information form

It was formed by the researcher using information from the literature. The personal information form includes basic information about the children's age, education level, family type, and family income status, as well as basic information about their parents.

2.3.2. Turgay DSM-IV-based child and adolescent behavioral disorders screening and rating scale (T-DSM-IV-S)

The validity and reliability studies of the Turkish form of this scale, developed by Turgay (1995), were conducted by *Ercan et al. (2001).* The scale, which comprises 41 items, was created by translating the DSM-IV diagnostic criteria into questions without altering their original intent. The scale includes 9 questions that investigate attention deficit disorder, 6 questions that focus on hyperactivity, 3 questions that focus on impulsivity, 8 questions that focus on the oppositional defiant disorder (ODD), and 15 questions that focus on behavioral disorders. Mothers, fathers, and teachers of children who are thought to have ADHD fill out the scale. Each item is given a score between 0 and 3, where 0 is the lowest and 3 is the highest. At least 6 of the 9 items examining attention deficit must be answered with a score of 2 or 3, and at least 6 of the 9 questions examining hyperactivity and impulsivity must be answered with a score of 2 or 3.

2.4. Procedure

2.4.1. Formation of the item pool

In line with the theoretical knowledge and the relevant literature, an item pool was created by considering the definitions of basic impulsivity dimensions and clinical symptom findings (American Psychiatric Association, 2013; Ercan, 2015; Hallowell & Ratey, 2011; Mukaddes, 2015). While creating the item pool, more than one item should be written about the same symptom, the items should cover all aspects of impulsivity, a single symptom should be measured with one item, there should be positive and negative items related to impulsivity, the

items should be concise, each item should have a main idea, and possible attention should be paid to features such as items being written in clear, understandable and simple language. For each of the three dimensions (motor, non-planning, and attention-related impulsivity) that were determined to be included in this newly developed scale, different questions were prepared by the behavioral aspects of these dimensions. Consequently, a 32-item item pool was created and a 4-level Likert scale was used. Participants rated their level of agreement with each statement from rarely/never (1) to always (4).

2.4.2. Content validity

Following the creation of the item pool, a group of six experts in the field and the language was formed to provide feedback on whether the items in the item pool accurately reflect the relevant conceptual framework and whether the expressions are appropriate in terms of linguistic, semantic, and spelling. To test the content validity, an expert opinion form was given to the experts and they were asked to give answers to this Likert-type scale as follows: 1. Not relevant, 2. Relevant but requires a significant change, 3. Relevant but requires little change, and 4. Very relevant. The items constituting the item pool were examined by field experts as to whether they reflected the relevant theoretical structure and their opinions and suggestions were received by language experts as to whether they were linguistically, semantically, and orthographically appropriate. Necessary adjustments were made to the items in line with the opinions and suggestions. The content validity index *(I-CVI)* was determined by considering the scores given by the experts to options 3 and 4 for each question, and the scale-level content validity index *(S-CVI)* was calculated by averaging these values. This process was used to evaluate the overall validity of the scale (Polit & Beck, 2006). According to Lynn (1986), when there are six or more experts, the *I-CVI* should equal 0.83. Thus, six items having *I-CVI* values of less than 0.83 were taken from the scale. In the end, the scale's S-CVI was found to be 0.90. An *S-CVI* value of 0.90 and higher could be used to support the claim that content validity is suitable (Polit et al., 2007). Finally, the scale's 25 items were evaluated by a Turkish field expert to confirm its language validity.

2.4.3. Pilot study

The internal validity of the scale and the compatibility of each item with the scale were determined through a pilot application. Accordingly, the pilot application was conducted with a group of 50 individuals who shared characteristics with the sample used for the measurement. For each person, the amount of time it would take to complete the form after it was handed out was determined. The test's average completion time was calculated by dividing the time between the first and last finishers by the total number of test takers. The situation of those who finished the test too early or too late was not considered. The completion time of the test was determined as 5 minutes. Cronbach alpha values and item-total correlation values were examined in the pilot application. According to the analysis, the Cronbach alpha value for the pilot application is 0.787. At this point, it was determined that 7 items (4th, 7th, 9th, 11th, 17th, 20th, and 21st items) did not fit the scale total adequately and that the item-total correlation values were below the acceptable level (below 0.20), therefore these items were to be removed from the scale. Validity and reliability analyses were carried out on the scale's 18-item final form.

2.5. Psychometric Testing and Statistical Analysis

Statistical analysis of the data in the study was conducted using *LISREL* 8.8 and *SPSS* 23.0.

2.5.1. Construct validity

Factor analysis, which combines several statistical techniques to parse complex data using a correlation or covariance matrix, is the most widely used technique for evaluating the psychometric properties of scales (Brown, 2015). Therefore, exploratory factor analysis *(EFA)* and confirmatory factor analysis *(CFA*) were used to assess the construct validity of the scale.

EFA is a technique for determining the number and type of relationships that may exist between elements of a measurement instrument. Kaiser-Meyer-Olkin *(KMO)* and Bartlett Sphericity Tests were conducted to evaluate the suitability of the data set for *EFA* analysis. The fact that Bartlett's test is significant and the *KMO* value is both greater than 0.60 and close to one indicates that the data are suitable for factor analysis (Hayran, 2012; Seçer, 2015; Terwee et al., 2007). Following this, the principal component analysis technique and direct oblimin rotation with Kaiser normalization were used to clarify the factor structure. The most appropriate structure and number of elements were determined using eigenvalues of 1 and above (DeVellis, 2016; Johnson & Christensen, 2019). According to recommendations, the factor value of each item should be 0.30 or higher (Çam & Baysan-Arabacı, 2010; Grove et al., 2012; Tavşancıl, 2019). In this study, the minimum factor loading accepted in determining which item will be placed under which factor is 0.32.

The assumed structure of the scale, derived from the *EFA* test, underwent validation through both first and second-level confirmatory factor analyses. Commonly used fit index indicators were used to evaluate *CFA* model fit. According to the criteria proposed by Marcoulides and Schumacker (2001) and Seçer (2015), *RMSEA* and *SRMR* should be less than 0.08. Other fit index values should exceed 0.9. Additionally, the ratio of Chi-square to degrees of freedom *(χ^2/df)* should be less than 3.0.

2.5.2. Criterion-related validity

For the criterion-related validity of the scale, a correlation analysis was performed between IS-C and T-DSM-IV-S. The correlation between the IS-C and the T-DSM-IV-S was investigated using Spearman's Correlation Coefficient.

2.5.3. Reliability of the scale

Split-half reliability, internal consistency, and composite reliability analyses were used to assess the scale's reliability. Item-total score, floor and ceiling effects, and Cronbach's alpha coefficient were used to analyze internal consistency. A Cronbach's alpha value of 0.70 or higher was considered acceptable. Item-total correlations must be positive and higher than 0.25 (Kalaycı, 2010). To determine the satisfactory internal and content validity of an outcome instrument, it is advised that the percentage of ceiling and floor effect be less than 15% (Terwee et al., 2007). The two-half test reliability method is another method for calculating the scale's internal consistency coefficient. Spearman-Brown and Guttman split-half coefficients and the correlation between halves were calculated to determine split-half reliability. The minimum acceptable Spearman-Brown and Guttman split-half coefficients should be 0.70 (DeVellis, 2016; Johnson & Christensen, 2019). Hotelling's T2 test was used to determine whether the item averages were different from each other (Kartal & Bardakçı, 2018). The results of Tukey's Test for Non-additivity *(ANOVA and Tukey's Test for Non-additivity),* which were carried out specifically to examine the additivity feature of the scale, were evaluated (Özdamar, 2016).

2.6. Ethical Considerations

Ethics committee approval was received dated 23/09/2020 and numbered 60116787-020/57785. Verbal and written information regarding the research, the "Informed Consent" principle, the "Respect for Autonomy" principle (indicating that the subjects were free to choose whether or not to participate in the study), and the "Confidentiality and Protection of Confidentiality" principle (assuring the subjects that their data would be kept private) were all provided to the parents and children.

3. RESULTS

3.1. Sample Characteristics

The study comprised 269 children in total. The average age of the children was 9.85±2.51, and 74% of them were boys. The moms' average age was 37.47±4.95, and 44.6% of them had

completed high school. The fathers' average age was 40.91±4.77, and 46.5% of them had completed high school (Table 1).

Table 1. *Distribution of the Participants' Socio-Demographic Details (n:269).*

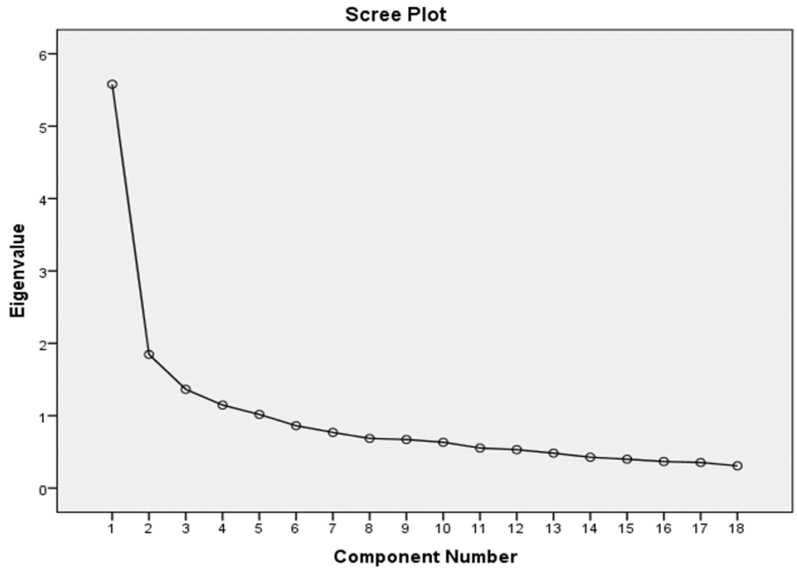
Variables	*n*	%
Child's Sex		
Female	68	25.3
Male	201	74.7
Mother's Education		
Elementary	50	18.6
High school	120	44.6
University	99	36.8
Father's Education		
Elementary	50	18.6
High school	125	46.5
University	94	35.0
	Mean±SD	Min.- Max.
Child's Age (year)	9.85±2.51	5-18
Mother's Age	37.47±4.95	26-59
Father's Age	40.91±4.77	30-58

3.2. Construct Validity

3.2.1. Exploratory factor analysis (EFA)

The *KMO* coefficient in the 18-item IS-C *EFA* was found to be 0.869, and the results of Bartlett's sphericity test (χ^2*:* 1511.495, *df*= 153, $p<0.001$) were significant. The Direct Oblimin method was chosen in the factor analysis to ensure that the structure of the relationship between the factors remained the same. Based on the Principal Component Analysis, it was discovered that 18 items were composed of three components (Figure 1) (scree plot).

Figure 1. *Scree plot graph.*



Following an Exploratory Factor Analysis, the first factor (seven items) was named "Motor impulsivity," the second (six items) "Non-planning impulsivity," and the third (five items) "attention-related impulsivity." This was determined by taking into consideration the conceptual structure and contents of the items. With factor loadings ranging from 0.446 to 0.792, the first factor accounted for 30.99% of the variance in total. 10.259% of the variance

was explained by the factor loadings of the items in the second factor, which varied from 0.405 to 0.664. The third component's item factor loadings, which accounted for 7.582% of the variance overall, varied from 0.618 to 0.770. The total variance explained by the scale was found to be 48.840%. The eigenvalue for the first factor was determined as 5.580, 1.847 for the second, and 1.365 for the third (Table 2).

Table 2. *Explanatory factor analysis and item-total score analysis for the sub-scales.*

Sub-Scales	Explanatory Factor Analysis	Item-Subscale Total Score Analysis	
Items	Factor value of items	Item-subscale score Correlations (r)	*p*
Factor 1 Motor impulsivity)			
Q3	0.510	0.541	*p* <0.01
Q10	0.446	0.314	*p* <0.01
Q12	0.524	0.595	*p* <0.01
Q14	0.486	0.503	*p* <0.01
Q15	0.792	0.674	*p* <0.01
Q16	0.746	0.559	*p* <0.01
Q18	0.768	0.663	*p* <0.01
Eigenvalues	5.580		
Described Variance (%)	30.999		
Factor 2 (Non-planning impulsivity)			
Q5	0.664	0.471	*p* <0.01
Q6	0.660	0.483	*p* <0.01
Q8	0.622	0.333	*p* <0.01
Q13	0.596	0.539	*p* <0.01
Q24	0.450	0.451	*p* <0.01
Q25	0.405	0.325	*p* <0.01
Eigenvalues	1.847		
Described Variance (%)	10.259		
Factor 3 (Attention-related impulsivity)			
Q1	0.703	0.525	*p* <0.01
Q2	0.770	0.564	*p* <0.01
Q19	0.638	0.460	*p* <0.01
Q22	0.618	0.509	*p* <0.01
Q23	0.640	0.515	*p* <0.01
Eigenvalues	1.365		
Described Variance (%)	7.582		
Total explained variance (%)	48.840		

The correlation between the factors of the impulsivity scale was examined to determine the relationship between the factors. Table 3 shows the correlation values between the impulsivity scale's sub-dimensions. The findings indicate significant relationships between the scale's three sub-dimensions.

Table 3. *Inter-factor Correlation.*

Subscales	Factor 1	Factor 2	Factor 3
Factor 1	1		
Factor 2	0.540**	1	
Factor 3	0.503**	0.452**	1

**p<0.01 (2-tailed)

3.2.2. Confirmatory factor analysis (CFA)

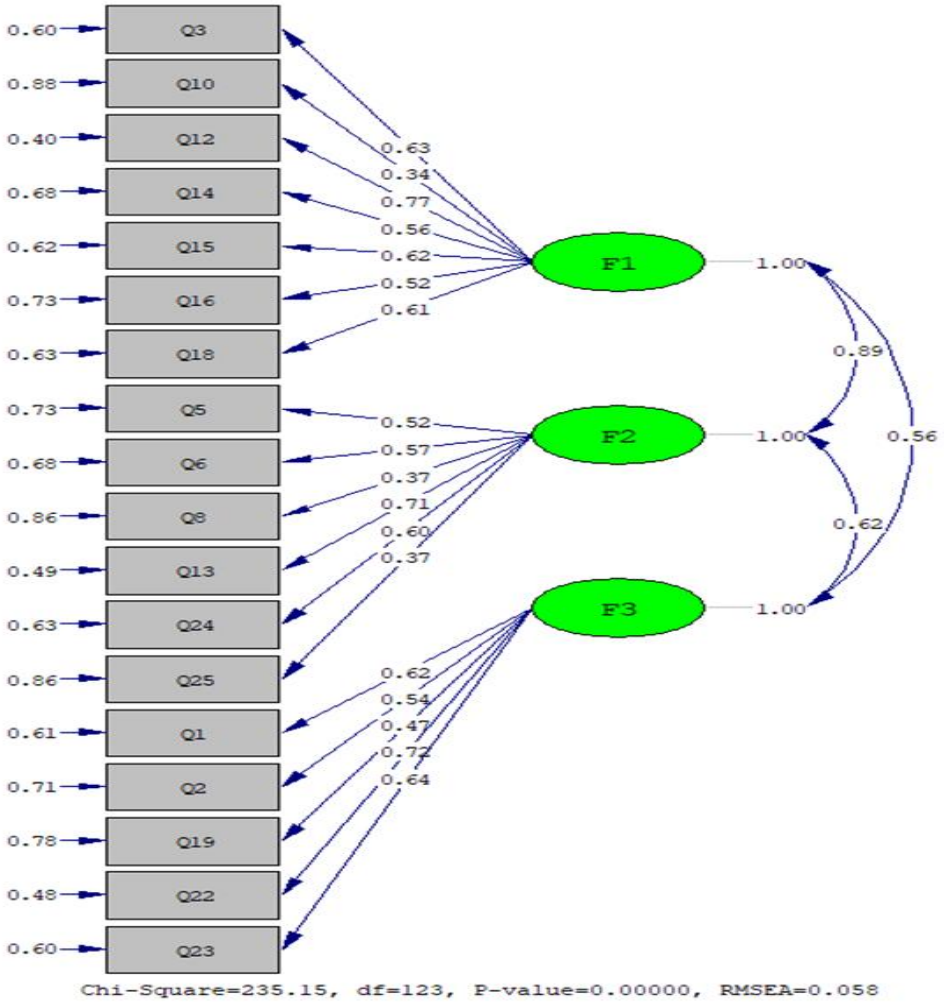
The IS-C, which has 18 items and three sub-factors, has fit indices that are significant according to the first level *CFA* results (χ^2= 235.15, df=123, p=0.000, χ^2/df=1.91) as shown in Figure 1. *RMSEA*: 0.05, *RMR*: 0.05, *SRMR*: 0.05, *CFI*: 0.96, *NNFI*: 0.95, *NFI2*: 0.93, *GFI:* 0.91, *AGFI*: 0.88, *IFI*: 0.96, and *RFI*: 0.91 are the values of the fit index (Table 4). All the fit indices for the structural model produced by the initial level *CFA* analysis were, therefore, at a good level. When the t-values between the factors and items were examined, it was seen that all the items were significant at the 0.05 level. Standardized correlation values were statistically significant (p<0.01); correlation values between motor impulsivity and non-planning impulsivity factors were 0.89 while the values were 0.56 between motor impulsivity and attention-related impulsivity factors and 0.62 between non-planning impulsivity and attention-related impulsivity factors (Figure 2). Standardized analysis values indicate how well each item (observable variable) represents its latent variable. When the diagram in Figure 1 is examined, one-way arrows pointing towards the observed variables from the latent variables motor impulsivity, non-planning impulsivity, and attention-related impulsivity show a linear significant relationship. This is an indicator of how well each variable represents the latent variable on which it is dependent (Şimşek, 2020). As shown in Figure 1, the standardized analysis values for each *CFA*-related item range from 0.34 to 0.77.

Table 4. *Results of the first and second level confirmatory factor analysis.*

Fit Indices Examined	Model		Result
	First-level CFA	Second-level CFA	
χ^2/df	1.91	2.07	Perfect Fit
RMSEA	0.05	0.06	Perfect Fit/ Acceptable Fit
RMR	0.05	0.05	Perfect Fit
SRMR	0.05	0.06	Perfect Fit/ Acceptable Fit
CFI	0.96	0.96	Perfect Fit
NNFI	0.95	0.95	Perfect Fit
NFI	0.93	0.92	Acceptable Fit
GFI	0.91	0.90	Perfect Fit
AGFI	0.88	0.87	Acceptable Fit
IFI	0.96	0.96	Perfect Fit
RFI	0.91	0.90	Acceptable Fit

RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root-Mean-Square Residual; RMR: Root-Mean-Square Residual; FI: Comparative Fit index; NNFI: Non-Normed Fit Index; NFI: Normed Fit Index; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index

Figure 2. *Results of first-level confirmatory factor analysis.*



As demonstrated in Figure 2 (χ^2= 259.53, *df*=125, *p*=0.000, (χ^2/*df*=2.07), the second-level *CFA* results indicate that the fit indices of the IS-C are significant. *RMR*: 0.05, *RMSEA*: 0.06, *SRMR*: 0.06, *NNFI:* 0.95, *CFI:* 0.96, *NFI:* 0.92, *AGFI:* 0.87, *GFI:* 0.90, *RFI:* 0.90 and *IFI:* 0.96 were the values of the fit index (Table 4). Standardized correlation values were statistically significant (p<0.01); correlation values between scale and motor impulsivity factors were 0.86, while they were 0.97 between scale and non-planning impulsivity factors and 0.64 between scale and attention-related impulsivity factors. In the second level *CFA* analysis, modifications were implemented between Q2 and Q19, Q16 and Q18 items following the modification suggestions, and it was discovered that the model provided a better fit after the modifications. As shown in Figure 2, the standardized analysis values for each *CFA*-related item range from 0.36 to 0.75.

3.2.3. Item-total score analysis

EFA and *CFA* are widely acknowledged as the two most important analyses for ensuring construct validity during the scale development process. Even though item analysis is a reliability analysis, item-total correlations are calculated before *EFA* and *CFA* analyses to ensure item validity. According to the analysis of 18-item IS-C, the item correlation coefficients ranged between 0.294 and 0.643 (p<0.001) (Table 5).

Table 5. *Item-total score analysis.*

No	Items	Item-Scale Score Correlation (r)*	Cronbach's Alpha if Item Deleted
Q1	Able to regulate their behavior	0.453	0.857
Q2	When playing games and doing activities, she/he waits for her/his turn	0.420	0.858
Q3	She/he cannot wait	0.529	0.854
Q5	She/he cannot keep her/his word	0.415	0.858
Q6	She/he answers to the query without fully hearing or reading it	0.467	0.856
Q8	She/he is unaware of the risks.	0.294	0.864
Q10	She/he can tolerate situations when they arise that she does not want to	0.356	0.860
Q12	She/he wants to act in every way that comes to mind.	0.643	0.849
Q13	Does not wait for her/his turn when performing successive tasks	0.635	0.849
Q14	Is quick-paced	0.511	0.854
Q15	Till she achieves her/his goals, she/he persists even when she receives a negative answer.	0.538	0.853
Q16	She/he has angry outbursts that are excessive for the circumstance or incident that she/he is experiencing.	0.497	0.855
Q18	Promptly gets furious when any of his/her requests are rebuffed	0.599	0.851
Q19	Can maintain calm while sitting in places like theaters, movies, and classrooms	0.317	0.863
Q22	She/he is calm	0.514	0.854
Q23	She/he takes action while considering the outcome of her actions	0.453	0.857
Q24	Interrupts others as they are speaking	0.550	0.853
Q25	She/he cannot give up the tiny award at that moment, even if she/he will end up receiving a larger prize.	0.299	0.863

3.2.4. Criterion-related validity

Table 6 shows a moderate positive correlation (r= 0.524, 0.594, and 0.580, respectively) between the motor, non-planning, and attention-related impulsivity subscales of the IS-C and the hyperactivity and impulsivity subscale of the T-DSM-IV-S (p<0.01; n=155). According to the results, the criterion validity of the IS-C was established.

Table 6. *Criterion-related validity: Findings on the similar scale validity of the IS-C (n=155).*

Scale	IS-C		
	Motor impulsivity	Non-planning impulsivity	Attention-related impulsivity
T-DSM-IV-S (Hyperactivity and impulsivity subscale)	*r*	*r*	*r*
	0.524**	0.594**	0.580**

**p<0.01 (2-tailed); IS-C: Impulsivity scale for children; T-DSM-IV-S: DSM-IV-based child and adolescent behavior disorders screening and rating scale

3.3. Reliability of the Scale

The Cronbach Alpha reliability coefficients for "Factor 1," "Factor 2," "Factor 3," and the overall scale were determined to be 0.812, 0.702, 0.747, and 0.863, respectively (Table 7). The results of Table 3 indicate that the correlation coefficients between sub-scale item scores were statistically significant (p<0.001) and varied from 0.314 to 0.674 for "Factor 1," 0.325 to 0.539 for "Factor 2," and 0.460 to 0.564 for "Factor 3," respectively. The Spearman-Brown

coefficients for the total scale were determined to be 0.857 by the split-half analysis, 0.827 for "Factor 1," 0.724 for "Factor 2," and 0.814 for "Factor 3." The results showed that the Guttman split-half coefficients for the overall scale, "Factor 1," "Factor 2," and "Factor 3" were 0.856, 0.820, 0.721, and 0.790, respectively. The correlation values for the two halves of the overall scale and subscale measures were found to be moderately and highly significant. The composite reliability coefficient, which was calculated using the error variance values, and the factor loadings that the *CFA* generated were 0.810 for factor 1, 0.741 for factor 2, 0.807 for factor 3, and 0.917 for the overall scale (Table 7).

The floor effect of the overall scale was 0.4, and its ceiling effect was 6.7. The floor and ceiling effects were as follows: 0.4 and 10.0 for "Factor 1," 0.7 and 13.4 for "Factor 2," and 0.7 and 12.6 for "Factor 3." According to Tukey's Test for Non-additivity, the items that make up the IS-C were found to be homogeneous and interrelated questions. Moreover, it showed that while the overall scale was not additive (Tukey Non-additivity: F= 9.532, p=0.002<0.05), the subscales of factor 1 (F=1.841, p=0.175>0.05), factor 2 (F=0.272, p=0.602>0.05), and factor 3 (F=0.056, p=0.812>0.05) were additive (Table 7). Hotelling's T-squared test was used to determine whether the test design was appropriate for ISC's reliability analysis applications, and the results showed that ISC's model had a suitable structure (F=21.390, p=0.000)

Table 7. *Reliability analysis of the total scale and sub-scales (n=269).*

Scale and Subscales	Cronbach-a	Spearman-Brown	Guttman split-half	Correlation between two halves	Composite Reliability	Floor effect %	Ceiling effect %	Tukey's Test for Non-additivity	Mean±SD	Min.-Max.
Factor 1	0.812	0.827	0.820	0.705	0.810	0.4	10.0	F=1.841 *p*=0.175	20.65±4.69	8-28
Factor 2	0.702	0.724	0.721	0.568	0.741	0.7	13.4	F=0.272 *p*=0.602	15.72±3.75	6-24
Factor 3	0.747	0.814	0.790	0.686	0.807	0.7	12.6	F=0.056 *p*=0.812	12.94±3.21	5-20
Scale	0.863	0.857	0.856	0.750	0.917	0.4	6.7	F=9.532 *p*=0.002	40.66-9.49	19-71

4. DISCUSSION and CONCLUSION

Numerous acts that are improper for the situation or that are overly dangerous, ill-thought-out, and frequently result in unfavorable outcomes are symptoms of impulsivity (Özdemir et al., 2012; Mukaddes, 2015). Thus, the purpose of this study was to develop a scale for gauging impulsivity in children. During the scale's development, a review of the literature was done, and the created item pool was presented to field experts, followed by pilot applications and item compatibility testing. The developed draft form was submitted to expert opinions on the scale's validity, and the Content Validity Index for each item on the scale was calculated. As stated in the literature, six items with values less than the determined value were removed from the test (Lynn, 1986). Furthermore, it was determined that the Content Validity Index value for the whole test is greater than the scope validity criterion, and the test's content validity is statistically significant (Polit et al., 2007).

A pilot application was given to 50 children who resembled the target demographic to reduce any issues that were likely to occur during the real application. Following the removal of seven items (4^{th}, 7^{th}, 9^{th}, 11^{th}, 17^{th}, 20^{th}, and 21^{st} items) that were shown to have minimal test-related contributions, the item-total correlation analysis was conducted again. After the pilot application, a scale comprising 6 negative and 12 positive items was obtained. After that, it was decided whether the sample size was adequate and whether the variables had the appropriate

degree of association by using the *KMO* and Bartlett sphericity tests. Correlation coefficients between partial and observed values were compared using the *KMO* test, an index. The ISC in the current study has a *KMO* value of 0.86, indicating that factor analysis may be performed on it. Furthermore, the p-value of the scale for Bartlett's test of sphericity was notably low (p<0.001), indicating that the correlation matrix of the scale's components is appropriate for factor analysis. In the following step, *EFA* was used to test the construct validity of the scale. None of the scale's items had overlapping features, and each item's factor loads exceeded 0.32. It was discovered that a three-dimensional structure explained 48.84% of the variation in total. Studies on scale development and adaptation should account for at least 40% of the variance according to Kline (2015). This means that the value determined by exploratory factor analysis during the research phase was adequate to determine the scale's factor structure.

The model fit of the factor structure obtained from *EFA* was examined using first- and second-level *CFA*, and the model fit indices were found to be at a good level. The *CFA* results revealed that the fit indices and factor loading values were within the ranges suggested by the literature (Marcoulides & Schumacker, 2001; Seçer, 2015). According to the relevant literature and theoretical views, the three-factor structure obtained after determining the model fit of the IS-C was named motor impulsivity, non-planning impulsivity, and attention-related impulsivity. It was determined that the standardized correlation values were statistically significant and that there were positive and significant relationships between the variables of motor, non-planning, and attention-related impulsivity. *CFA* results of the IS-C show that the scale confirms its three-factor structure and that the items adequately define and measure the concept they are intended to measure (DeVellis, 2016; Johnson & Christensen, 2019; Marcoulides & Schumacker, 2001) *EFA* and *CFA* results show that the three-dimensional factor structure of the scale is suitable for the Turkish sample and that the scale has a strong factor structure for the Turkish sample.

The criterion validity of the IS-C was examined by calculating the correlation coefficient between it and the T-DSM-IV-S hyperactivity and impulsivity subscale. In this study, a correlation coefficient between 0.70 and 0.30 was assumed to indicate a moderate correlation (Büyüköztürk, 2018). According to the findings, all subscales of IS-C were found to be moderately positively related to the hyperactivity and impulsivity subscale score of T-DSM-IV-S. It can be said that these results show that the IS-C has criterion validity. Additionally, the correlation values between the ISC subscales show that there are significant relationships between the three subscales of the scale and that there is no multicollinearity problem.

The reliability of the IS-C was assessed using split-half reliability, composite reliability, and internal consistency techniques. When the subscales and total score of the scale were examined, it was seen that it had composite reliability, split-half reliability, and internal consistency. For a scale to be considered reliable, it is typically expected to have a reliability rating of 0.70 or higher (Büyüköztürk, 2018; DeVellis, 2016; Johnson & Christensen, 2019). The internal consistency, split-half reliability, and composite reliability of the IS-C are supported by the data. In this study, the correlations between the items and the total score of the sub-dimension and the scale were both higher than 0.25 (Kalaycı, 2010). The total score correlations for item Q8 and item Q25 on the scale were 0.294 and 0.299, respectively. These items were retained in the scale because the factor loads for them ranged from 0.622 to 0.405. Because if the items in the scale have a tolerable item-total correlation (0.20-0.30 value), it is recommended not to rush to remove these items from the scale, but rather to look at the factor loading values during the factor analysis and decide accordingly (Seçer, 2015). This finding demonstrates that the items were related to both the scale and its sub-dimensions.

The results of Tukey's test for non-additive value are significant, which means that the scale's items have a structure that can account for at least three independent sub-dimensions and that the items are significantly different from one another. The probability of the total scale not being additive was determined as p<0.05, which shows that the overall scale is not additive.

When the sub-dimensions of the scale are examined, it is revealed that the probability of not being additive is $p>0.05$, that is, all sub-dimensions of the scale are additive (Özdamar, 2016). To determine if the item means varied from one another in this study, Hotelling's T2 test was performed (Kartal & Bardakçı, 2018). According to the results, there are differences between the means for scale items, item difficulty degrees are not all equal, participant responses to items are not all identical, and all scale items are significant. The scale's subscale is said to fall short of measuring the intended feature if the floor and ceiling percentages are higher than 15% (Terwee et al., 2007). The results of the present study demonstrated that the scale was a trustworthy measurement instrument and that the floor and ceiling effects were less than 15%.

Testing test-retest reliability in this study was not possible due to time constraints. The psychometric qualities of the scale are very strongly supported by the available data. To measure impulsivity in the context of this study, a validated and reliable instrument was developed. Furthermore, it can be applied to further research on this topic because there is no available scale like this scale in the literature.

In child and adolescent psychiatry, a scale that simply measures impulsivity and is completed by the family is not included in clinical practice in our nation. This study is the first in this field. Recognition of impulsivity, which underlies or coexists with many neurological and psychological diseases, is of great importance in terms of treatment, clinical follow-up, nursing care, and psychoeducation planning. This scale can be used to monitor pharmaceutical and cognitive-behavioral therapy in impulsivity. In the treatment strategy, the disease caused by impulsivity can be treated or impulsive behavior can be the focus of treatment. This newly created scale may help identify impulsivity and plan interventions on this issue.

4.1. Suitability for Clinical Application

We developed and validated the Children's Impulsivity Scale (IS-C) and identified the following three domains: non-planning impulsivity, motor impulsivity, and attention-related impulsivity. The impulsivity scale can be a valuable tool in understanding the effects of impulsivity on social functioning, academic performance, general attitudes, and behaviors in children. The effect of impulsivity on obesity, accident risks, behavioral problems, anger control difficulties, risky behaviors, fighting, peer bullying, screen addiction, substance addiction, etc. can be examined. In addition, the relationship of impulsivity with difficulties or problems in family processes can be investigated. The Turkish version of the scale and its evaluation are shown in the Appendix.

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Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in IJATE belongs to the author(s). **Ethics Committee Number**: Pamukkale University, Non-Interventional Clinical Research Ethics Committee, 60116787-020/57785.

Contribution of Authors

Fatma Özgün Öztürk: Conceptualization, Investigation, Data curation, Writing – original draft, Writing – review & editing, Software. **Ganime Can Gür:** Conceptualization,

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REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed., Vol. 10). American Psychiatric Association.

Barkley, R.A. (1991). The ecological validity of laboratory and analogue assessment methods of ADHD symptoms. *Journal of Abnormal Child Psychology, 19*, 149-178. https://doi.org/10.1007/BF00909976

Brown, T.A. (2015). *Confirmatory factor analysis for applied research*. Guilford publications.

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

Büyüköztürk, Ş. (2018). *Sosyal bilimler için veri analizi el kitabı* [*Handbook of data analysis for social sciences*]. Pegem Atıf İndeksi, 001–214.

Cosí, S., Morales-Vives, F., Canals, J., Lorenzo-Seva, U., & Vigil-Colet, A. (2008). Functional and dysfunctional impulsivity in childhood and adolescence. *Psychological Reports, 103*(1), 67-76. https://doi.org/10.2466/pr0.103.1.67-76

Cyders, M.A., & Coskunpinar, A. (2011). Measurement of constructs using self-report and behavioral lab tasks: Is there overlap in nomothetic span and construct representation for impulsivity? *Clinical Psychology Review, 31*(6), 965-982. https://doi.org/10.1016/j.cpr.2011.06.001

Çam, M., & Baysan-Arabacı, L. (2010). Qualitative and quantitative steps on attitude scale construction. *Hemar-G, 12*(2), 59–71.

DeVellis, R.F. (2016). Scale development: Theory and applications. Sage publications.

Dickman, S.J. (1990). Functional and dysfunctional impulsivity: Personality and cognitive correlates. *Journal of Personality and Social Psychology, 58*(1), 95. https://doi.org/10.1037/0022-3514.58.1.95

DuPaul, G.J., Anastopoulos, A.D., Power, T.J., Reid, R., Ikeda, M.J., & McGoey, K.E. (1998). Parent ratings of attention-deficit/hyperactivity disorder symptoms: Factor structure and normative data. *Journal of Psychopathology and Behavioral Assessment, 20*, 83-102. https://doi.org/10.1023/A:1023087410712

Ercan, E.S. (2015). Dikkat eksikliği hiperaktivite bozukluğunda prognoz ve öngörücü faktörler [Prognosis and predictive factors in attention deficit hyperactivity disorder]. *Türkiye Klinikleri J Child Psychiatry-Special Topics, 1*(1), 96–98.

Ercan, E.S., & Aydın, C. (2005). *Dikkat eksikliği hiperaktivite bozukluğu* [*Attention deficit hyperactivity disorder*]. Gendaş Kültür.

Ercan, E., Amado, S., Somer, O., & Çıkoğlu, S. (2001). Dikkat eksikliği hiperaktivite bozukluğu ve yıkıcı davranım bozuklukları için bir test bataryası geliştirme çabası [An effort to develop a test battery for attention deficit hyperactivity disorder and disruptive behavior disorders]. *Çocuk ve Gençlik Ruh Sağlığı Dergisi, 8(*3), 132–144.

Eysenck, S.B., & Eysenck, H.J. (1977). The place of impulsiveness in a dimensional system of personality description. *British Journal of Social and Clinical Psychology, 16*(1), 57-68. https://doi.org/10.1111/j.2044-8260.1977.tb01003.x

Eysenck, S.B., Easting, G., & Pearson, P.R. (1984). Age norms for impulsiveness, venturesomeness, and empathy in children. *Personality and Individual Differences, 5*(3), 315-321. https://doi.org/10.1016/0191-8869(84)90047-6

Gladwin, T., Jewiss, M., Banic, M., & Pereira, A. (2020). Associations between performance-based and self-reported prospective memory, impulsivity, and encoding support. *Acta Psychologica, 206*, 103066. https://doi.org/10.1016/j.actpsy.2020.103066

Grove, S.K., Burns, N., & Gray, J. (2012). *The practice of nursing research: Appraisal, synthesis, and generation of evidence*. Elsevier Health Sciences.

Hallowell, E.M., & Ratey, J.J. (2011). *Driven to distraction* (revised): *Recognizing and coping with attention deficit disorder*. Anchor.

Halperin, J.M., Wolf, L., Greenblatt, E.R., & Young, G. (1991). Subtype analysis of commission errors on the continuous performance test in children. *Developmental Neuropsychology, 7*(2), 207-217. https://doi.org/10.1080/87565649109540488

Han, X., Zhang, H., Xu, T., Liu, L., Cai, H., Liu, Z., …, & Yuan, T. (2022). How impulsiveness influences obesity: the mediating effect of resting-state brain activity in the dlpfc. *Frontiers in Psychiatry, 13*. https://doi.org/10.3389/fpsyt.2022.873953

Hayran, O. (2012). *Sağlık bilimlerinde araştırma ve istatistik yöntemler* [*Research and statistical methods in health sciences*]. Nobel Tıp Kitabevi.

Johnson, R.B., & Christensen, L. (2019). *Educational research: Quantitative, qualitative, and mixed approaches*. SAGE Publications.

Kalaycı, Ş. (2010). *SPSS uygulamalı çok değişkenli istatistik teknikleri* (Vol. 5) [*Multivariate statistical techniques with SPSS*] (Vol. 5). Asil Yayın Dağıtım.

Kartal, M., & Bardakçı, S. (2018). *SPSS ve AMOS uygulamalı örneklerle güvenirlik ve geçerlik analizleri* [*Reliability and validity analysis with SPSS and AMOS applied examples*]. Akademisyen Yayınevi.

Kline, R.B. (2015). *Principles and practice of structural equation modeling*. Guilford Publications.

Kreek, M.J., Nielsen, D.A., Butelman, E.R., & LaForge, K.S. (2005). Genetic influences on impulsivity, risk taking, stress responsivity and vulnerability to drug abuse and addiction. *Nature Neuroscience, 8*(11), 1450-1457. https://doi.org/10.1038/nn1583

L'Abate, L. (1993). *A family theory of impulsivity. In The impulsive client: Theory, research, and treatment*. (pp. 93–117). American Psychological Association.

Leyva, D., & Nolivos, V. (2015). Chilean family reminiscing about emotions and its relation to children's self-regulation skills. *Early Education and Development, 26*(5-6), 770-791. https://doi.org/10.1080/10409289.2015.1005691

Lynn, M.R. (1986). Determination and quantification of content validity. Nursing Research.

Marcoulides, G.A., & Schumacker, R.E. (2001). New developments and techniques in structural equation modeling. Psychology Press.

Moeller, F.G., Barratt, E.S., Dougherty, D.M., Schmitz, J.M., & Swann, A.C. (2001). Psychiatric aspects of impulsivity. *American Journal of Psychiatry, 158*(11), 1783–1793.

Mukaddes, N.M. (2015). *Yasam Boyu Dikkat Eksikligi Hiperaktivite Bozuklugu ve Eslik Eden Durumlar* [*Lifelong Attention Deficit Hyperactivity Disorder and Associated Conditions*]. Nobel Tıp Kitabevi.

Nomura, M., & Nomura, Y. (2006). Psychological, neuroimaging, and biochemical studies on functional association between impulsive behavior and the 5-ht2a receptor gene polymorphism in humans. *Annals of the New York Academy of Sciences, 1086*(1), 134-143. https://doi.org/10.1196/annals.1377.004

Olson, S.L., Schilling, E.M., & Bates, J.E. (1999). Measurement of impulsivity: Construct coherence, longitudinal stability, and relationship with externalizing problems in middle childhood and adolescence. *Journal of Abnormal Child Psychology, 27*, 151-165 https://doi.org/10.1023/A:1021915615677

Özdamar, K. (2016). *Ölçek ve test geliştirme yapısal eşitlik modellemesi* [*Scale and test development structural equation modeling*]. Nisan Kitabevi.

Özdemir, P.G., Selvi, Y., & Aydin, A. (2012). *Dürtüsellik ve tedavisi* [*Impulsivity and its treatment*]. *Psikiyatride Güncel Yaklaşımlar, 4*(3), 293–314.

Öztürk, M., & Başgül, Ş. (2015). *Çocuklarda dürtüsellik* [*Impulsivity in children*]. Hayykitap.

Patton, J.H., Stanford, M.S., & Barratt, E.S. (1995). Factor structure of the Barratt impulsiveness scale. *Journal of Clinical Psychology, 51*(6), 768-774. https://doi.org/10.1002/1097-4679(199511)51:6<768::AID-JCLP2270510607>3.0.CO;2-1

Polit, D.F., & Beck, C.T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health, 29*(5), 489–497.

Polit, D.F., Beck, C.T., & Owen, S.V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health, 30*(4), 459–467.

Seçer, İ. (2015). *Psikolojik test geliştirme ve uyarlama süreci* (1. Baskı) [*Psychological test development and adaptation process*] (1. Baskı). Ankara: Anı Yayıncılık. ISBN, 978–605.

Sharma, L., Markon, K.E., & Clark, L.A. (2014). Toward a theory of distinct types of "impulsive" behaviors: a meta-analysis of self-report and behavioral measures. *Psychological Bulletin, 140*(2), 374. https://doi.org/10.1037/a0034418

Şenol, S. (2008). *Dikkat Eksikliği Hiperaktivite Bozukluğu. In Çocuk ve Ergen Psikiyatrisi Temel Kitabı* [*Attention Deficit Hyperactivity Disorder. In Basic Book of Child and Adolescent Psychiatry*] (pp. 293–311). Hekimler Yayın Birliği.

Şimşek, Ö.F. (2020). *Yapisal eşitlik modellemesine giriş: Temel ilkeler ve LISREL uygulamalari* [*Introduction to structural equation modeling: Basic principles and LISREL applications*]. Ekinoks Yayınları.

Tavşancıl, E. (2019). *Tutumların Ölçülmesi ve SPSS ile Veri Analizi* (6th ed.) [*Measurement of Attitudes and Data Analysis with SPSS*] (6th ed.). Nobel Akademik Yayıncılık.

Terwee, C.B., Bot, S.D., de Boer, M. R., van der Windt, D.A., Knol, D.L., Dekker, J., Bouter, L.M., & de Vet, H.C. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology, 60*(1), 34–42. https://doi.org/10.1016/j.jclinepi.2006.03.012

Turgay, A. (1995). *Çocuk ve ergenlerde davranım bozuklukları için DSM-IV'e dayalı tarama ve değerlendirme ölçeği* (Yayınlanmamış ölçek) [*DSM-IV based screening and assessment scale for conduct disorders in children and adolescents* (Unpublished scale)]. Integrative Therapy Institute Toronto, Kanada.

Watts, A.L., Smith, G.T., Barch, D.M., & Sher, K.J. (2020). Factor structure, measurement and structural invariance, and external validity of an abbreviated youth version of the UPPS-P Impulsive Behavior Scale. *Psychological Assessment, 32*(4), 336. https://doi.org/10.1037/pas0000799

Whiteside, S.P., & Lynam, D.R. (2001). The five-factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*(4), 669-689. https://doi.org/10.1016/S0191-8869(00)00064-7

Willcutt, E.G., Pennington, B.F., Chhabildas, N.A., Friedman, M.C., & Alexander, J. (1999). Psychiatric comorbidity associated with DSM-IV ADHD in a nonreferred sample of twins. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*(11), 1355–1362.

Wright, J.C. (1971). The Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP). Merrifield, VA, USA: National Program on Early Childhood Education. https://doi.org/10.1037/t36374-000

Yazgan, Y. (2010). *Hiperaktif çocuk ve ergen okulda* [*Hyperactive children and adolescents at school*]. Evrim Yayınevi.

APPENDIX

6.1. The Evaluation of the Scores

The scale has three sub-dimensions, eighteen items, and a 4-point Likert style of design. On the scale, the answers to questions numbered Q1, Q2, Q10, Q19, Q22 and Q23 are scored reverse. In the IS-C, the scores that can be obtained from the "Motor Impulsivity" dimension can vary from 8 to 28, those that can be obtained from the "Non-planning Impulsivity" dimension from 6 to 24, and those that can be obtained from the "Attention-related Impulsivity" dimension from 5 to 20 (Table 7). The subscale scores served as the foundation for evaluating the ISC's results. The scale does not provide a total score. An elevated score on the scale denotes a heightened degree of impulsivity. The scale can be filled in by an adult (mother or father) who is familiar with the child.

6.2. Child Impulsivity Scale - Turkish Version

ÇOCUK DÜRTÜSELLİK ÖLÇEĞİ

AÇIKLAMA: Bu test bazı durumlarda çocuğunuzun nasıl düşündüğünü ve davrandığını ölçen bir testtir. Lütfen her cümleyi dikkatlice okuyunuz ve bu sayfanın sağındaki 4 seçenekten çocuğunuz için en uygun seçeneğe (X) işareti koyunuz. Her cümle için uzun süre düşünmeyiniz. Mümkün olduğu kadar çabuk ve samimi cevaplar veriniz. Kararsız kaldığınız durumlarda ilk aklınıza gelen doğrultuda hareket ediniz.

CÜMLELER:	Nadiren/ Hiçbir zaman	Bazen	Sıklıkla	Her zaman
1. Davranışlarını kontrol edebilir.	( )	( )	( )	( )
2. Oyun ve etkinliklerde sırasını bekler	( )	( )	( )	( )
3. Sabırsızdır	( )	( )	( )	( )
5. Verdiği sözleri tutamaz	( )	( )	( )	( )
6. Sorulan sorunun tamamını okumadan veya dinlemeden cevaplar	( )	( )	( )	( )
8. Tehlikeleri hesaplayamaz	( )	( )	( )	( )
10. İstemediği bir durum yaşadığında tahammül edebilir	( )	( )	( )	( )
12. Aklına ne gelirse yapmak ister	( )	( )	( )	( )
13. Sırayla yapılan işlerde sırasını bekleyemez	( )	( )	( )	( )
14. Tez canlıdır	( )	( )	( )	( )
15. İstediği bir şeyi elde edene kadar ısrar eder	( )	( )	( )	( )
16. İçinde bulunduğu durum ya da karşılaştığı olayla orantısız biçimde öfke patlaması yaşar	( )	( )	( )	( )

18. Herhangi bir isteği karşısında engellendiğinde hemen sinirlenir	( )	( )	( )	( )
19. Sınıfta veya sinema, tiyatro gibi ortamlarda sakince oturabilir.	( )	( )	( )	( )
22. Sakindir	( )	( )	( )	( )
23. Davranışlarının sonunu düşünerek hareket eder	( )	( )	( )	( )
24. Başkalarının sözünü keser	( )	( )	( )	( )
25. Daha sonra büyük bir ödül alacak olsa da o an küçük ödülden vazgeçemez	( )	( )	( )	( )

Referanslara eklemek koşulu ile ölçek izinsiz kullanılabilir.