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Turkish Adaptation of the Behavioral Inflexibility Scale for Mentally Disabled Children: Validity and Reliability Study

Zihinsel Engelli Çocuklar İçin Davranışsal Esneklik Ölçeğinin Türkçe Uyarlaması: Geçerlik ve Güvenirlik Çalışması



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Abstract

Background: This study aimed to examine the psychometric properties of the Turkish version of the Behavioral Inflexibility Scale, originally developed by Lecavalier et al., for use with children with intellectual disabilities.

Objectives: This study was methodologically planned and conducted to adapt the Behavioral Inflexibility Scale for children with intellectual disabilities to the Turkish population.

Methods: The sample consisted of 385 parents of children with intellectual disabilities aged 3–18 years, receiving education between August 1 and October 1, 2022. Ethical approval and informed consent were obtained. Analyses included Content Validity Ratio, KMO test, Bartlett's Test of Sphericity, Exploratory and Confirmatory Factor Analyses, Cronbach's alpha, ICC, and paired samples t-test.

Results: The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy being at an acceptable level and the Bartlett's Test of Sphericity yielding significant results ($\chi^2 = 9474.41$; $p < 0.001$) indicate that the data were suitable for factor analysis. The results of the Exploratory Factor Analysis (EFA) revealed a single-factor structure with factor loadings ranging from 0.584 to 0.772. In this study, the findings of the Confirmatory Factor Analysis (CFA) ($\chi^2/df = 4.622$; RMSEA = 0.077; NFI = 0.836; RFI = 0.816; IFI = 0.867; TLI = 0.850; CFI = 0.866) demonstrated that the model showed an acceptable level of fit. Within the scope of reliability analyses, the Cronbach's alpha internal consistency coefficient was calculated as 0.97, indicating that the scale was highly reliable. Additionally, item–total correlation coefficients ranging from 0.563 to 0.773 support the strong internal consistency of the scale.

Conclusion: The Turkish version of the Behavioral Inflexibility Scale is valid and reliable for use in clinical and research settings with children with intellectual disabilities aged 3–18.

Key words: intellectual disability child; Behavioral Inflexibility; flexibility; scale; validity; reliability

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Öz

Giriş: Bu çalışma, Lecavalier ve arkadaşları tarafından geliştirilen Davranışsal Esneklik Ölçeği'nin Türkçe formunun, zihinsel yetersizliği olan çocuklarda kullanılmak üzere psikometrik özelliklerini incelemeyi amaçlamıştır.

Amaç: Araştırma Zihinsel Engelli çocuklarda Davranışsal Esneklik Ölçeğinin Türk topluma uyarlanması amacıyla metodolojik olarak planlandı ve uygulandı.

Yöntem: Araştırmanın örneklemini, 1 Ağustos–1 Ekim 2022 tarihleri arasında eğitim almakta olan, 3–18 yaş aralığındaki zihinsel yetersizliği olan çocukların 385 ebeveyni oluşturmuştur. Etik onay ve bilgilendirilmiş onam alınmıştır. Analizlerde İçerik Geçerliği Oranı, KMO testi, Bartlett Küresellik Testi, Açıklayıcı ve Doğrulamalı Faktör Analizleri, Cronbach alfa, ICC ve eşleştirilmiş örneklem t-testi kullanılmıştır.

Bulgular: Kaiser–Meyer–Olkin (KMO) örneklem yeterlilik katsayısının kabul edilebilir düzeyde olması ve Bartlett Küresellik Testi'nin anlamlı sonuç vermesi ($\chi^2 = 9474,41$; $p < 0,001$), verilerin faktör analizi için uygun olduğunu göstermektedir. Açıklayıcı Faktör Analizi (AFA) sonuçları, faktör yükleri 0,584 ile 0,772 arasında değişen tek faktörlü bir yapı ortaya koymuştur. Bu çalışmada Doğrulamalı Faktör Analizi (DFA) bulguları ($\chi^2/sd = 4,622$; RMSEA = 0,077; NFI = 0,836; RFI = 0,816; IFI = 0,867; TLI = 0,850; CFI = 0,866), modelin kabul edilebilir düzeyde uyum gösterdiğini ortaya koymaktadır. Güvenirlik analizleri kapsamında hesaplanan Cronbach alfa iç tutarlılık katsayısının 0,97 olması, ölçeğin yüksek derecede güvenilir ve madde–toplam korelasyon katsayılarının 0,563 ile 0,773 arasında değişmesi, ölçeğin güçlü bir iç tutarlılığa sahip olduğunu desteklemektedir.

Sonuç: Davranışsal Esneklik Ölçeği'nin Türkçe formu, 3–18 yaş aralığındaki zihinsel yetersizliği olan çocuklarda, klinik ve araştırma ortamlarında kullanılmak üzere geçerli ve güvenilir bir ölçektir.

Anahtar Kelimeler: Zihinsel yetersizliği olan çocuk; davranışsal esneklik; esneklik; ölçek; geçerlik; güvenilirlik

INTRODUCTION

Intellectual disability (ID) has been defined using various terms throughout history, such as mental retardation, intellectual disability, mental impairment, and cognitive dysfunction, depending on the cultural, social, and temporal context in which it was described (Ersoy & Avcı, 2001). In recent years, there has been a shift in terminology toward more respectful and inclusive language. For instance, the American Association on Intellectual and Developmental Disabilities (AAIDD, 2024) officially replaced the term “mental retardation” with “intellectual disability” to reduce stigma. However, older diagnostic systems like the DSM-IV-TR (American Psychiatric Association, 2000) still use the former terminology, highlighting the gradual nature of this transition.

Intellectual disability is characterized by significant limitations in both intellectual functioning (such as reasoning, learning, and problem-solving) and adaptive behavior, which covers a range of everyday social and practical skills. These limitations originate before the age of 18 (Luckasson et al. 2002). Individuals with ID often face challenges in areas such as communication, self-care, home living, interpersonal relationships, use of community resources, self-direction, health and safety, functional academics, leisure, and work. Difficulties in cognitive processes such as attention, memory, and generalization are commonly observed, leading to repeated failures, loss of motivation, and emotional or behavioral disturbances. These issues not only affect the children but also place considerable psychological and emotional strain on families, of-

ten resulting in increased parental stress and reduced participation in social life (Ersoy & Avcı, 2001; Yurdakök, 2007).

A key aspect of functioning and adaptation in children with ID is behavioral inflexibility. Flexibility is defined as a group of interrelated cognitive, emotional, and behavioral processes that support goal-directed behavior and adaptability in the face of changing environmental demands. It develops progressively throughout early childhood and is closely related to the maturation of executive functions (Anderson, 2002). Cognitive flexibility refers to the ability to shift perspectives, adapt to new rules, and generate alternative strategies when problem solving. Behavioral inflexibility, on the other hand, involves modifying behavior in response to situational changes. While the two terms are often used interchangeably, they stem from different disciplines cognitive psychology and behavioral neuroscience and highlight different facets of adaptive functioning (Brown, 2014).

Children with intellectual disabilities may exhibit deficits in both cognitive and behavioral inflexibility. These deficits can lead to difficulties in adapting to unexpected changes, an increase in behavioral problems such as irritability and stubbornness, and an inability to adjust behavior appropriately in different social contexts (Everri et al. 2016). For example, rigid adherence to routines, stereotyped movements, and resistance to change are characteristic indicators of reduced behavioral inflexibility. Brown et al. (2011) emphasized that this lack of flexibility, particularly in children with ASD and other developmental disabilities, often manifests as an insistence on sameness. Such rigidity impedes the child's ability to effectively cope with the dynamic and cons-

tantly changing demands of daily life (Everri et al., 2016). Moreover, behavioral inflexibility is positively correlated with early social communication skills, language development, and emotional regulation. Children who are more behaviorally flexible tend to navigate social situations more successfully, interpret communication cues effectively, and express their needs with greater ease. Conversely, children with low behavioral flexibility may have limited coping strategies, leading to frequent emotional outbursts and greater dependency on caregivers. As a result, parents of such children often report higher levels of stress (Green et al., 2006).

Although the importance of flexibility in child development is well recognized, assessment tools specifically designed to measure behavioral inflexibility in children with intellectual disabilities are limited, particularly in the Turkish literature. The Behavioral Inflexibility Scale (BIS), developed by Lecavalier et al. (2020), is a valid and reliable instrument for assessing behavioral rigidity in children with neurodevelopmental disorders; however, no Turkish adaptation of the scale has been reported to date. Therefore, the aim of this study was to adapt the BIS into Turkish and to examine its validity and reliability in children with intellectual disabilities.

Aim

This study was conducted to examine the validity and reliability of the Behavioral Flexibility Scale in Turkish children with intellectual disabilities.

Research Questions

-Is the BIS a valid measurement tool for children with intellectual disabilities?

- Is the BIS a reliable measurement tool for children with intellectual disabilities?

METHODS

The Type of Research

This research was designed as a methodological study to adapt the Behavioral Inflexibility Scale (BIS) into Turkish and to examine its psychometric properties in a sample of children with intellectual disabilities.

Setting of the Study

The study was conducted in public schools and special education and rehabilitation centers affiliated with the Ministry of National Education, where special education services are provided to children with intellectual disabilities.

Population and Sample of the Research

Population and Sample

The study population consisted of parents of children with intellectual disabilities who were receiving special education services in public schools and rehabilitation centers affiliated with the Ministry of National Education between August 1, 2022, and October 1, 2022. To determine the sample size, the study adopted the established principle of including at least five participants per scale item (38 items $\times$ 5), resulting in a minimum target of 190 parents. Ultimately, the study sample comprised 385 parents who voluntarily agreed to participate, nearly doubling the required minimum. Data were collected through face-to-face interviews using a Socio-demographic Information Form and the Turkish version of the Behavioral Inflexibility Scale (BIS). Both instruments were designed for ease of completion by the participants within the educational institutions.

Inclusion Criteria

The study included parents of children with intellectual disabilities whose children were receiving special education in public schools or in special education and rehabilitation centers affiliated with the Ministry of National Education. The children were required to be between 3 and 18 years of age. Participation in the study was voluntary, and parents were required to provide written informed consent. In addition, parents were expected to have sufficient knowledge about their child and to be capable of providing accurate and relevant information for the data collection process.

Data Collection Instruments- Validity and Reliability Information

In Collecting Research Data

Participant Information Form , “BIS” scale was used for intellectual disability children.

Participant Information Form

The survey form consists of questions about the characteristics of the mother and father (age, educational status, economic status, marital status, employment status) and the characteristics of the intellectual disability children (age, educational status, gender). “BIS” scale for children with intellectual disabilities, Luc Lecavalier et al. (2020) is a 6-point Likert scale measuring 38 items and a single substructure. Items are rated on a 6-point rating scale ranging from “Not at all a problem (0) to “Very serious or Extreme problem” (5) Cronbach’s alpha for the BIS scale is 0.97.

Variables of the Study Dependent Variable

The dependent variable is the average scale scores of the BIS of the children with intellectual disabilities participating in the study.

Independent Variables

The independent variables include questions regarding the parents of the children with intellectual disabilities (age, educational status, economic status, marital status, employment status) and the characteristics of the children with intellectual disabilities (age, educational status, gender).

Collection of Data

The survey forms of the data were collected based on self-report from parents who agreed to participate in the research by interview method in the institutions where they received education.

Translation and Cultural Adaptation of the Scale

The translation and cultural adaptation of the BIS into Turkish were carried out in accordance with the guidelines developed by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) (Wild et al., 2005). Each step in the process was meticulously followed to ensure linguistic and cultural appropriateness. Initially, the original scale was reviewed by the research team to assess its suitability for Turkish culture, and permission was obtained from the original author for translation and adaptation. The scale was translated from English to Turkish independently by three expert translators who were fluent in both languages. These initial translations were reviewed item by item by the research team, and a consensus was reached to form a single, unified Turkish version. Subsequently, the agreed Turkish version was back-translated into English by three independent language experts who had no prior knowledge of the original scale. The research team compared these back-translations and finalized a single version. When this version was compared with the original scale, it was confirmed that the semantic integrity of all items was preserved. The final back-translated version was sent to the original scale developers, who confirmed that it was

equivalent to the original in content. Thus, the Turkish version of the BIS was accepted as a valid translation. Following this, content validity was evaluated through expert review. A total of 11 field experts, all holding doctoral degrees and with proven expertise in scale development and cultural adaptation, were consulted. These experts were fluent in both Turkish (native language) and English. Based on their feedback, necessary revisions were made to ensure clarity and cultural relevance of the items. Lastly, a pilot study was conducted with the target population to evaluate the comprehensibility of the items. The feedback from this phase confirmed that the Turkish version of the scale was understandable and appropriate for the study group.

Scope and Language Validity

During the scope validity phase of the scale, five experts who were outside the research team were determined to have sufficient equipment and knowledge in the fields of psychiatry, psychiatric nursing and child health and to devote enough time to the study. Five experts, 1 Prof. While he was a doctor, he was also a 6-year doctor lecturer. Content validity of the draft form was performed according to the Davis technique. Experts reviewed the clarity and cultural appropriateness of each question. Each statement was evaluated in four dimensions (1=The article does not represent the content, 2=The article needs a lot of correction, 3=The article needs some correction, 4=The article fully represents the content). Reviews were made in line with the suggestions of experts and some expressions that were difficult to understand were rearranged. In line with the experts' opinions, the number of experts who rated an item as 3 (The item needs some correction) or 4 (The item fully represents the content) was divided by the total number of experts to calculate the content validity index (CVI) for each item. The CVI for

four items was determined as 0.85, while the CVI for the remaining items was 1. Since all items had a CVI above 0.80, no items were removed from the draft scale for content validity (Delgado-Rico, 2012). A CVI value above 0.80 indicates that the item has adequate content validity, whereas a lower value suggests that the item should be removed from the scale (Ercan, Kan 2004). After language and content validity, the final version of the 38-item "Behavioral Inflexibility Scale (BIS)" for intellectual disability children was applied to 18 parents (10 women, 8 men) who had children diagnosed with mental disabilities. Since no problems were detected regarding the clarity and comprehensibility of the questions, it was concluded that the scale had face validity.

Analysis of Data

Statistical analysis for the study was conducted using the SPSS 22.0 and AMOS 24.0 programs. Descriptive statistics were presented with frequency, percentage, mean, and standard deviation values. As the skewness and kurtosis values of the numerical variables were within the acceptable range of ± 2 , it was assumed that the data followed a normal distribution. Pearson correlation test was used to evaluate the relationship between numerical variables. To assess the construct validity of the scale, both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed. EFA was conducted using the Principal Component Analysis (PCA) method with Quartimax rotation. Following the EFA, CFA was conducted using AMOS 24.0 to test the factor structure obtained in the exploratory analysis and to evaluate the model fit with various goodness-of-fit indices (e.g., χ^2/df , RMSEA, CFI, TLI, SRMR). The reliability of the subscales and the overall scale was assessed using Cronbach's alpha co-

efficient. The significance level for all statistical analyses was set at $p < 0.05$.

Ethical Aspects of Research

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the University Social Sciences and Humanities Research Ethics Committee (26.08.2022; No. E-33490967-044-197668), institutional permission was granted by the Provincial Directorate of National Education (No. E-27001677-44-22732921), and written permission was obtained from Luc Lecavalier et al. (2020) to adapt the Behavioral Inflexibility Scale (BIS) and conduct its validity and reliability analyses. All participants were informed about the purpose of the study, and written informed consent was obtained.

FINDINGS

In this study, which examined the Turkish validity and reliability of the BIS, the findings were presented under the main headings of content validity and psycholinguistic properties, as well as validity and reliability analyses. The majority of participants were boys, comprising 57.1% of the sample. Regarding the severity of the condition, the largest proportion of children (45.7%) fell within the moderate category. In terms of maternal education, the highest percentage was among primary school graduates (42.6%), while fathers with primary school education represented the largest group as well (42.1%). Concerning maternal occupation, the majority of mothers (88.3%) were not employed, whereas most fathers (58.7%) worked in the private sector. Regarding family income, the highest proportion of families (59.5%) reported income equal to their expenses. Nuclear families were the predominant family type, accounting for 76.4% of the sample. The majority

of participants (52.2%) resided in district centers. When considering the number of children, families with three children represented the largest group (36.1%). The mean age of the children was 13.69 ± 4.10 years, with an average age at diagnosis of 5.33 ± 3.51 years and an average age at initiation of special education an average age at diagnosis of 5.33 ± 3.51 years and an average age at initiation of special education of 5.38 ± 3.41 years. The mean

age of mothers was 41.21 ± 7.73 years, and that of fathers was 44.97 ± 7.87 years. These findings indicate that children were diagnosed and began special education at an early age and that the study included families with diverse socio-demographic characteristics and children exhibiting varying degrees of condition severity (Table 1).

Table 1. Personal Information Form (n=385)

Variables	N (%)	Variables	N (%)
Child's Gender		Severity of Disease	
Girl	165 (42,9)	Light	114 (29,6)
Male	220 (57,1)	Middle	176 (45,7)
		Heavy	95 (24,7)
Mother Education		Father Education	
Not literate	39 (10,1)	Not literate	10 (2,6)
Just literate	30(7,8)	Just literate	10 (2,6)
Primary school graduate	164(42,6)	Primary school graduate	162 (42,1)
Secondary school graduate	70(18,2)	Secondary school graduate	75 (19,5)
High school graduate	62(16,1)	High school graduate	87 (22,6)
Graduated from a Universty	20(5,2)	Graduated from a Universty	41 (10,6)
Mother's Profession		Father's occupation	
Not working	340 (88,3)	Private sector	226 (58,7)
Private sector	34 (8,8)	Public	33 (8,6)
Public	11 (2,9)	Retired	126 (32,7)
Family Income Level		Family structure	
Income is less than expenses	152 (39,5)	Nuclear family	294 (76,4)
Income equal to expense	229 (59,5)	Extended family	77 (20,0)
Income is higher than expenses	4 (1,0)	Broken family	14 (3,6)
Area where the family lives		Number of Children	
Town center	201 (52,2)	One	33 (8,6)
District	158 (41,0)	Two	121 (31,4)
Town/Village	26 (6,8)	Three	139 (36,1)
		Four and above	92 (23,9)
Child's age (Mean±sd)			
Age at diagnosis	13,69 (4,10)		
Age at which special education starts	5,33 (3,51)		
Maternal age	5,38 (3,41)		
Father's age is	41,21 (7,73)		
	44,97 (7,87)		

Reliability Analysis

Construct validity refers to the degree to which a measurement instrument accurately and adequately measures the theoretical construct it is intended to assess (Çapık et al., 2018). Structural validity is considered more comprehensive than other types of validity and can be established using multiple methodological approaches. Among these methods, factor analysis is the most frequently used (Alpar, 2018). Factor analysis is a multivariate statistical technique used to reduce a large number of interrelated variables into a smaller set of conceptually meaningful latent variables, referred to as factors or dimensions (Çapık et al., 2018). To assess sample adequacy and the correlation coefficients among variables, the Kaiser-Meyer-Olkin (KMO) test is applied; a KMO value of at least 0.50 is required (Alpar, 2018). The significance of correlations among variables is evaluated using Bartlett's Test of Sphericity (BTS), a significant result ($p < 0.05$) indicates that the data are suitable for factor analysis (Alpar, 2016).

In this study, the suitability of the data for factor analysis was assessed using BTS ($\chi^2 = 9474.41$; $df = 595$; $p < 0.001$), and sample adequacy was evaluated with the KMO test (0.968). The results indicated that the data were appropriate for factor analysis (Table 2).

The Children's BIS originally had a single-factor structure consisting of 38 items. In this study, an EFA was conducted, and the total explained variance was found to be 50.353%. A variance value above 40% indicates that the factor structure is adequate. In this study, no restrictions were placed on the number of factors, and factors with an eigenvalue greater than 1 were included in the scale. In factor analysis, factors with an eigenvalue of 1 or greater were considered significant (Alpar, 2018). Considering that variance ratios between 40% and 60% are generally accepted as sufficient

in factor analysis (Büyüköztürk, 2024), the explained variance of 50.353% obtained in this study can be regarded as adequate.

Item-total correlation was used to evaluate the consistency of each item with the total scale score. This analysis demonstrates the extent to which each item reflects the construct measured by the overall scale (Kalaycı, 2017). Responses to the items are expected to show a positive correlation with both other items and the total score, indicating that participants understand the items correctly and provide consistent responses. An item-total correlation coefficient of 0.30 or higher indicates high discriminatory power (Büyüköztürk, 2024). A high correlation between the items and the total score reflects strong internal consistency of the measurement tool. The correlation coefficient is expressed as 'r' and ranges between 0 and 1. A value approaching 1 (± 1.00) indicates high reliability (Tekeş & Hasta, 2015).

In the EFA, the adequacy of the sample was assessed using the KMO test, and the suitability of the data for factor analysis was evaluated with BTS. During the factor analysis, it was observed that items 3, 5, and 11 loaded onto an additional factor besides the main one, and the factor loadings for these distributions were close to each other (with a factor loading difference of less than 0.100). These three items were sequentially removed, and the analysis was repeated each time. After the removal of items 3, 5, and 11, the factor analysis yielded a KMO value of 0.968. According to the BTS results, the data were again found to be suitable for factor analysis ($\chi^2 = 9474.41$; $df = 595$; $p < 0.001$). As a result of the revised exploratory factor analysis, it was observed that the remaining items were gathered under a single factor, and the factor loadings ranged between 0.584 and 0.772. Eigenvalue (17.623). This value indicates that the corresponding factor makes a substantially high contributi-

Table 2. Results from Exploratory Factor Analysis of the BIS

No	ITEM	X±SD	Factor Loadings
1	My child resists having to change the way he usually does things	2,06±1,51	,645
2	My child takes a long time to get comfortable in new situations	2,00±1,48	,686
4	My family must instruct others how to interact with my child because he is so rigid	1,85±1,55	,689
6	My child dislikes changes to his surroundings	1,58±1,50	,727
7	My child has trouble coming up with new ways of doing things even when the situation calls for it ***	2,30±1,55	,706
8	My child has difficulty transitioning between activities *	2,15±1,53	,667
9	My child can be hard to redirect from things he is doing	2,11±1,49	,721
10	My family limits community outings because my child is rigid	1,57±1,60	,688
12	My child is “rule-driven” or “rule-bound”	1,76±1,62	,602
13	My child has difficulty interacting with peers because he insists that the interaction go a certain way	2,12±1,62	,682
14	My family changes the way we do things to avoid disrupting my child’s routine	1,77±1,50	,760
15	My child reacts negatively when unexpected things happen	2,35±1,53	,722
16	My child insists we use specific routes when we go places	1,35±1,61	,596
17	My child becomes upset if you interrupt what he is doing	2,09±1,51	,593
18	My family needs extra time to get things done because my child must do things in a specific order	1,80±1,59	,706
19	My child insists that certain items or objects are available to him	2,13±1,69	,740
20	My child needs things to remain the same	1,57±1,55	,747
21	My child is reluctant to try new things	1,74±1,61	,670
22	My child prefers to do things the same way even if we show him an easier way to do something	2,13±1,58	,733
23	My child has trouble tolerating changes in the daily routine	1,85±1,57	,772
24	My child has to keep things in the same place	1,75±1,71	,645
25	My family avoids trying new things because my child tends to react negatively	1,51±1,55	,726
26	My child is bothered by changes in plans	1,77±1,57	,752
27	My child has trouble leaving play or leisure activities before he is able to finish them	1,80±1,60	,674
28	My child insists that other people play in a certain way	1,53±1,53	,755
29	My child insists on wearing certain items of clothing.	1,72±1,64	,584
30	My child wants to complete specific routines or rituals	1,95±1,61	,758
31	My child has rigid or routine ways that he engages in play or leisure activities	1,60±1,61	,734
32	My child gets upset by changes that seem minor to others	1,51±1,56	,729
33	My child prefers to stick with one topic or activity even when it is clear that others are not interested	1,64±1,55	,737
34	My family has to maintain a consistent routine because that is what my child requires	1,77±1,61	,776
35	My child seems to have a very particular way of doing most things	1,55±1,46	,721
36	My child insists that the order of events or activities stay the same	1,63±1,61	,793
37	My child dislikes when things are unpredictable	1,71±1,47	,744
38	My child has trouble tolerating new experiences	1,79±1,56	,783

on to the total variance of the scale. An eigenvalue well above 1 suggests that the factor is strong and meaningful, and that the items in the scale cluster clearly under this factor. Explained Variance Ratio (%50.353) this ratio shows that the factor explains 50.353% of the total variance of the scale. In the social sciences, an explained variance ratio of 40% or higher is considered very good. An explained variance above 50% supports that this factor is a dominant and strong dimension within the structure of the scale (Table 2).

In CFA, fit indices are used to interpret the chi-square/degrees of freedom ratio (χ^2/df) (Erkorkmaz et al., 2013). A χ^2/df ratio of 2 or below indicates excellent fit, while a ratio of 5 or below is considered acceptable (Erkorkmaz et al., 2013). Additionally, CFA was conducted to validate the structure. The model fit indices obtained from CFA were as follows; Chi-square (χ^2) = 80.179 ($p < 0.001$), χ^2/df = 4.622, Root Mean Square Error of Approximation (RMSEA) = 0.077, Normed Fit Index (NFI) = 0.836, Relative Fit Index (RFI) = 0.816, Incre-

Table 3. Confirmatory Factor Analysis (CFA) Results

Chi-Square Goodness of Fit (χ^2) (χ^2)	80.179 (p<0,001)
Chi-Square / Degrees of Freedom (χ^2/df)	4.622
Root Mean Square Error of Approximation (RMSEA)	0.077
Normed Fit Index (NFI)	0.836
Relative Fit Index (RFI)	0.816
Incremental Fit Index (IFI)	0.867
Tucker-Lewis Index (TLI)	0.850
Comparative Fit Index (CFI)	0.866

Table 4. Correlation Coefficients Obtained from the Internal Consistency Analysis of BIS

Item no	Item-total score correlation coefficient	Cronbach's alpha value after item deletion	Item no	Item-total score correlation coefficient	Cronbach's alpha value after item deletion
1	,623	,970	22	,714	,970
2	,665	,970	23	,753	,969
4	,666	,970	24	,623	,970
6	,707	,970	25	,705	,970
7	,685	,970	26	,732	,969
8	,645	,970	27	,651	,970
9	,703	,970	28	,736	,969
10	,666	,970	29	,563	,970
12	,580	,970	30	,740	,969
13	,660	,970	31	,714	,970
14	,742	,969	32	,707	,970
15	,701	,970	33	,717	,970
16	,574	,970	34	,755	,969
17	,570	,970	35	,698	,970
18	,686	,970	36	,773	,969
19	,721	,970	37	,722	,970
20	,728	,969	38	,762	,969
21	,647	,970			

Cronbachs' Alpha (α)

mental Fit Index (IFI) = 0.867, Tucker-Lewis Index (TLI) = 0.850, and Comparative Fit Index (CFI) = 0.866. These results indicate that the model shows an acceptable level of fit (Table 3).

Reliability Findings

The internal consistency coefficient was checked for the reliability of the BIS in mentally retarded children. The Cronbach's alpha coefficient is a reliability index that indicates whether the items of a scale are related to the characteristic being mea-

sured. A Cronbach's alpha value between 0.80 and 1.00 indicates high reliability of the measurement tool (0.60–0.79: moderately reliable, 0.40–0.59: low reliability, 0.00–0.39: not reliable) (Alpar, 2018). For this purpose, first the Cronbach alpha coefficient was measured and the total Cronbach alpha coefficient of the scale was found to be 0.97. The internal consistency coefficient of the scale shows that Cronbach's alpha is highly reliable. The item/total correlation coefficients of the scale were found to be between 0.563-0.773 (Table 4).

Table 5. Correlation coefficients related to the test-retest reliability of the BIS

	Mean	SD	r	p
The total score of the BIS in the initial administration.	48,14	36,89	0,514	<0,001
Recurring BIS total score	43,89	33,68		

SS = Standard deviation (SD), p = Level of significance

Test-retest reliability is used to evaluate whether a measurement tool produces stable results over time. In other words, administering the same test to the same group after a certain period allows researchers to determine its temporal stability (Ozdamar, 2017). For this method to be applied appropriately, a minimum interval of two weeks and a maximum of four weeks is recommended between the first and second administrations. Considering the correlation coefficients regarding the test-retest reliability of the BIS, the scale was re-administered 2 weeks later to 28 randomly selected parents. The correlation coefficient between the total scores obtained in both applications was determined as 0.514. It was observed that there was a highly significant positive relationship between both DES scores ($p < 0.001$) (Table 5). Since the intraclass correlation coefficients (ICCs) were greater than 0.90, a high agreement was observed between the initial test scores and the retest scores. These results indicate that the is a BIS, reliable instrument.

DISCUSSION

In this study, the validity and reliability of the Turkish version of the "Children's Behavioral Flexibility Scale" were examined using data obtained from parents of children with intellectual disabilities aged 3–18 years.

Discussion of Findings Related to Validity Analysis

The original English version of the scale was first translated into Turkish, and a linguistic equivalence study was conducted. The analyses demonstrated a sufficient level of correlation between the original and translated forms, confirming the language validity of the scale.

Content validity is an assessment of the extent to which a measurement tool adequately represents the concepts it aims to measure and captures different dimensions. In this process, expert opinions are consulted to evaluate the relevance and coverage of the scale items. The expertise and number of experts (generally between 5 and 40) are critical for enhancing the ob-

jectivity of content validity evaluations (Yeşilyurt & Çapraz, 2018).

For the calculation of the CVI of the BIS, opinions from 11 academicians were obtained. The CVI was calculated by dividing the number of experts who rated each item as 3 (the item needs some correction) or 4 (the item fully represents the content) by the total number of experts. Based on this calculation, the Turkish version of the scale was determined to be content-valid. The CVI of the scale was found to be 0.85, exceeding the generally accepted standard level (0.80 and above). Experts reached a consensus on all items of the scale.

The original version of the scale consists of 38 items and has a single-factor structure. During the Turkish adaptation process, three items (Items 3, 5, and 11) were removed due to low factor loadings and cross-loading issues. After their removal, the scale was reduced to 35 items. The remaining items had factor loadings ranging from 0.584 to 0.772, maintaining the unidimensional structure of the original version. The total explained variance was 50.35%, which is considered adequate to support the construct validity of the scale.

To further examine the construct validity of the scale, CFA was conducted. CFA evaluates the extent to which empirical data fit a previously defined factor structure (Karagöz, 2016). The obtained model fit indices— $\chi^2 = 80.179$ ($p < 0.001$), $\chi^2/df = 4.622$, RMSEA = 0.077, CFI = 0.866, NFI = 0.836, RFI = 0.816, IFI = 0.867, and TLI = 0.850—indicate an overall acceptable level of model fit. An RMSEA value below 0.08 suggests a low level of model error and sufficient structural fit. CFI, IFI, and TLI values above 0.85 further support the strength of the model compared to alternative models. Additionally, NFI and RFI values within acceptable ranges confirm that the model statistically represents the data. Taken together, these findings indicate that the Turkish version of the scale adequately reflects the original structure, and the CFA

results support its structural validity.

Discussion of Findings Related to Reliability

Analysis

Reliability analyses also yielded strong results. The Cronbach's alpha internal consistency coefficient was calculated as 0.97, demonstrating excellent internal consistency. For test-retest reliability, the scale was re-administered to 28 parents 14 days after the initial administration. The correlation coefficient between the two measurements was 0.514 ($p < 0.001$), supporting the temporal stability of the scale.

The phenotype of ASD demonstrates considerable variability across all dimensions. The manifestation of restricted and repetitive behaviors, as well as the intensity of these behaviors, also varies widely among individuals. Stereotyped behaviors are defined as atypical, repetitive patterns or episodes such as body rocking, hand flapping, or object manipulation that do not cause physical harm (MacDonald et al., 2007). For instance, stereotypical behaviors like hand flapping or rocking are generally harmless and do not require specific intervention. However, in some cases, behaviors such as head banging, self-biting, scratching, pinching, or hair pulling may lead to emotional outbursts and more severe behavioral problems (e.g., aggression, self-injury) when interrupted, in which case early intervention is crucial (Rojahn, Barnard-Brak, Medeiros, & Schroeder, 2015).

Children with intellectual disabilities may experience deficits in both cognitive and behavioral flexibility. Such deficits can result in difficulties adapting to unexpected changes, increased behavioral problems such as irritability and stubbornness, and challenges in demonstrating appropriate behavior across social contexts (Lecavalier et al., 2020). Indicators of reduced behavioral flexibility include rigid adherence to routines, stereotypical movements, and resistance to change. This rigidity limits the child's ability to cope effectively with the dynamic and constantly

changing demands of daily life (Uddin et al., 2021).

Rigidly maintained routines or excessively narrow areas of interest in ASD can restrict experiences, promote avoidance, and create stress within the family, school, or community context (Uljarević et al., 2016). At this point, nurses play a vital role in enhancing the overall well-being of children with disabilities, planning care processes, alleviating the burden on families, and supporting coping skills to reduce levels of depression (Yıldırım & Conk, 2005). The literature further emphasizes that nurses should take a more active role in providing education and support services for families of children with disabilities.

Behavioral inflexibility involves the ability to adapt to unexpected changes and regulate behavior, and plays a crucial role in interventions for various psychopathologies, especially neurodevelopmental disorders (Green et al., 2006). In Turkey, tools such as the “Problem Behavior Checklist” and “Strengths and Difficulties Questionnaire” are commonly used to evaluate children with intellectual disabilities. However, these tools do not adequately assess behavioral inflexibility skills. Therefore, a specialized assessment tool is necessary to determine the behavioral flexibility limitations of children with intellectual disabilities, create intervention plans, and evaluate outcomes. The Turkish version of the “Children’s Behavioral inflexibility Scale,” adapted in this study, fills a significant gap in this field and can be used reliably in both clinical and academic settings. However, further validation in different populations and age groups is recommended.

Limitations

This study has several limitations that should be acknowledged. First, the sample was collected exclusively from parents residing in a single city. This narrow sampling frame restricts the diversity of the participants and may substantially limit the generalizability of the findings to broader populations. Lo-

cal cultural norms, parenting practices, and access to healthcare services may differ significantly across regions, and these contextual factors could influence both parental perceptions and children’s behavioral inflexibility. Therefore, future studies should include participants from multiple regions with varying sociodemographic characteristics to obtain a more diverse and representative sample, thereby improving the external validity of the results. Second, the assessment of behavioral inflexibility in children with intellectual disabilities relied solely on parental reports. While parents provide valuable insights into their children’s behaviors, depending on a single informant may lead to subjective biases and reduce the objectivity of the findings. Parental stress, coping styles, and expectations may shape how behaviors are perceived and reported, potentially underestimating or overestimating certain difficulties. To address this limitation, future research should incorporate data from multiple sources—such as teachers, therapists, and healthcare professionals—allowing for a more comprehensive, objective, and multidimensional evaluation of behavioral inflexibility. Finally, comorbid psychiatric conditions that are commonly observed in children with intellectual disabilities, such as autism spectrum disorder, attention-deficit/hyperactivity disorder, and obsessive-compulsive disorder, were not clinically assessed. The absence of this evaluation constitutes an additional limitation, as these conditions may have influenced behavioral inflexibility outcomes.

Implications for Nursing Practice

In this study, the Turkish adaptation of the BIS, originally developed by Lecavalier et al., was tested on a sample of parents of children with intellectual disabilities, with the aim of contributing to the literature. The validity and reliability analyses indicated that the Turkish version of the BIS is an appropriate measurement tool. The scale can be used to assess behavioral inflexibility levels, particularly in children diagnosed with ASD and intelle-

ctual disabilities. The findings may guide nurses in child- and family-centered care by identifying areas in which the child struggles, understanding the challenges experienced by families, and planning appropriate intervention programs. By recognizing the concept of behavioral inflexibility, nurses can integrate this knowledge into the care process and provide counseling to families on strategies to enhance flexibility skills. Incorporating “coping with behavioral inflexibility” into parent education and support programs may reduce caregiver burden and facilitate children’s adaptation to social and academic life. It is recommended that the BIS be used in clinical and community nursing practice, including home visits, counseling services, and rehabilitation processes with families. Testing the scale in children with different chronic conditions and in larger samples is also suggested to expand its applications in nursing practice.

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Author Contributions

Concept, Design, Supervision: BV, Materials, Data Collection: BV, BG, NG, Analysis or Interpretation, Literature Search, Writing Manuscript: BG, AÖ, Critical Review: NG.

REFERENCES

Alpar, R. (2018). Spor, Sağlık ve Eğitim Bilimlerinden Örneklerle Uygulamalı İstatistik ve Geçerlik - Güvenirlik. 5. Baskı. Ankara: Detay Yayıncılık.

American Psychiatric Association (2000). Diagnostic

and statistical manual of mental disorders (4th Ed., Text rev; DSM-IV-TR). Washington, DC: Author.

AAIDD . 2024. “Historical Context: Use of the Term Mental Retardation on This Website.” Accessed March 2, 2025. <https://www.aaid.org/intellectual-disability/historical-context>.

Anderson P. (2002). Assessment and development of executive function during childhood. *Child Neuropsychol*, 8:71-82. <https://doi.org/10.1076/chin.8.2.71.8724>

American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders (4th ed.; DSM-IV), Washington DC: American Psychiatric Association.

Brown, V.J. & Tait, D.S. (2014). Behavioral flexibility: attentional shifting, rule switching, and response reversal. *Encycl. Psychopharmacol*, https://doi.org/10.1007/978-3-642-27772-6_340-2.

Büyüköztürk, Ş. (2024). Sosyal bilimler için veri analizi el kitabı (31. baskı). Pegem Akademi Yayıncılık.

Çapık, C., Gözüm, S., Aksayan, S. (2018). Kültürlerarası ölçek uyarlama aşamaları, dil ve kültür uyarlaması: Güncellenmiş rehber. *Florence Nightingale J Nurs.*, 26, 199-210.

Delgado-Rico, E., Carrtero-Dios, H., Ruch, W.(2012). Content validity evidences in test development: An applied perspective. *Int J Clinic Health Psych*, 12: 449-459.

Ercan İ, Kan İ. Reliability and Validity in The Scales. *Uludağ Tıp Derg.* Eylül 2004;30(3):211-216.

Erkorkmaz Ü, Etikan Ğ, Demir O, Özdamar K, Sanisoğlu SY. (2013). Doğrulayıcı faktör analizi ve uyum indeksleri, *Türkiye Klinikleri J Med Sci*, 33(1): 210-223.

Ersoy Ö, Avcı N.(2001). Children with special needs and their education - special education, *YAPA Yayın Pazarlama San.Tic. A.Ş., Kaptan Ofset*, 144-172.

Everri, M., Mancini, T., Fruggeri, L. (2016). The Role of Rigidity in Adaptive and Maladaptive Families Assessed by FACES IV: The Points of View of Adolescents. *Journal*

of Child and Family Studies.

Green V.A., Pituch K.A., Itchon J., Choi A., O'Reilly M.F., & Sigafoos J. (2006). Internet Survey Of Treatments Used By Parents Of Children With Autism. *Research In Developmental Disabilities*, 27, 70–84.

Green V.A., Sigafoos J., Pituch K.A., Itchon J., Reilly M.Q., Lancioni G.E.(2006). Assessing Behavioral Flexibility in Individuals With Developmental Disabilities, 21 (4): 230-236.

Kalaycı, Ş. (2017). SPSS uygulamalı çok değişkenli istatistik teknikleri (9. baskı). Dinamik Akademi Yayıncılık.

Karagöz Y.(2016). SPSS ve AMOS 23 uygulamalı istatistiksel analizler. 1. Basım, İstanbul: Nobel Yayıncılık, 1001-1160.

Lecavalier L., Bodfish J., Harrop C., Whitten A., Jones D., Pritchett J. et al. (2020). Development of the Behavioral Inflexibility Scale for Children with Autism Spectrum Disorder and Other Developmental Disabilities. *Autism Research*, 13(3):489-99.

Lewis, M.H., & Bodfish, J.W. (1998). Repetitive behavior disorders in autism. *Mental Retardation and Developmental Disabilities Research Reviews*, 4(2), 80–89. [https://doi.org/10.1002/\(SICI\)1098-2779\(1998\)4:2<80::AID-MRDD4>3.0.CO;2-0](https://doi.org/10.1002/(SICI)1098-2779(1998)4:2<80::AID-MRDD4>3.0.CO;2-0)

Luckasson, R., Borthwick-Duffy, S., Buntinx, W. H., Coulter, D. L., Craig, E. M. P., Reeve, A., ... & Tasse, M. J. (2002). *Mental retardation: Definition, classification, and systems of supports*. American Association on Mental Retardation.

MacDonald, R., Green, G., Mansfield, R., Geckeler, A., Gardenier, N., Anderson, J., & Sanchez, J. (2007). Stereotypy in young children with autism and typically developing children. *Research in Developmental Disabilities*, 28(3), 266-277.

Özdamar, K. (2017). Modern bilimsel araştırma yöntemleri (3. baskı). Nisan Kitabevi.

Rojahn, J., Barnard-Brak, L., Medeiros, K., & Schroeder,

S. R. (2015). Stereotyped behaviours as precursors of self-injurious behaviours: A longitudinal study with infants and toddlers at risk for developmental delay. *Journal of Intellectual Disability Research*, 60(2), 156–166. <https://doi.org/10.1111/jir.12224>.

Rutter M.(2005). Aetiology of autism: findings and questions. *Journal of Intellectual Disability Research*, 49 (4): 231-238.

Tekeş, B., Hasta, D. (2015). Özgecili ölçeği: Geçerlik ve güvenilirlik çalışması. *Nesne Psikoloji Dergisi*, 3(6), 55–75.

Uddin, L. Q., et al. (2021). "Cognitive and behavioural flexibility: neural mechanisms and implications for developmental disorders." *Frontiers in Psychology*, 12, 785685.

Uljarević, M., Lane, A., Kelly, A., & Leekam, S. (2016). Sensory subtypes and anxiety in older children and adolescents with Autism Spectrum Disorder. *Autism Research*, 9, 1073–1078.

Yeşilyurt, S., Çapraz, C. (2018). Ölçek geliştirme çalışmalarında kullanılan kapsam geçerliği için bir yol haritası. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, 20, 251–264.

Yıldırım F, Conk Z.(2005). Zihinsel yetersizliği olan çocuğa sahip anne/babaların stresle başa çıkma tarzlarına ve depresyon düzeylerine planlı eğitimin etkisi. *C.Ü. Hemşirelik Yüksekokulu Dergisi*, 9:1–10.

Yurdakök K., İnce O. (2010). Emotional abuse and neglect. *Katkı Journal of Pediatrics*, 32: 423-433.

Wahlberg T., & Jordan S. (2001). A case study in the dynamics of autism. In T. Wahlberg, F. Obiakor, S. Burkhardt, & A. F. Rotatori (Eds.), *Autistic spectrum disorders: Educational and clinical interventions*. *Advances in special education*, 14, 53–65 . Oxford, United Kingdom: Elsevier Science.

Wild D., Grove A., Martin M., Eremenco S., McElroy S., Verjee-Lorenz A., Erikson P.(2005). ISPOR Task Force for Translation and Cultural Adaptation. *Principles of*

good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: report of the ISPOR Task Force for translation and cultural adaptation. *Value Health*, 8(2):94-104.