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Yönetici İşlevlere Yönelik Davranış Değerlendirme Envanterinin (YİYDDE) Birleştirilmiş Klinik Bir Türk Örnekleminde Psikometrik Geçerliliğinin Ön Değerlendirmesi*

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ÖZET

Bu pilot çalışmada birleştirilmiş klinik bir Türk örneklemde YİYDDE'nin güvenilirliği ve geçerliliği incelenmiştir. YİYDDE, gelişimsel olarak ortaya çıkan ya da sonradan meydana gelen çeşitli nörolojik durumların (öğrenme bozuklukları, düşük doğum ağırlığı, DEHB, Tourette sendromu, travmatik beyin hasarı ve Otizm) çocuklarda ve ergenlerde nöropsikolojik olarak (bastırma, set değiştirme, çalışma belleği, planlama, izleme, duygusal control, başlatma ve düzenli olma) değerlendirilmesi için kullanılmaktadır. Örneklemde, Kocaeli ve İstanbul'da eğitim gören 50 (15 kız, 35 erkek) ilköğretim ve lise öğrencisi yer almıştır. Veriler, çocukların ebeveynlerinin ve öğretmenlerinin doldurdukları demografik bilgi formu, YİYDDE ebeveyn ve öğretmen formları aracılığıyla toplanmıştır. Sonuçlar, YİYDDE'nin psikometrik geçerliliğine ön destek sağlamıştır. Ancak, ileride daha geniş ve homojen Türk klinik örneklemler kullanılarak yapılacak çalışmaların, envanterlerin dislekside, dikkat dağınıklığında ya da hafif düzeyde zihinsel engellilikte daha güvenilir şekilde kullanılacağına işaret etmektedir.

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* This study was generated from a part of the master thesis accepted on 2010 by Institute of Social Sciences in Istanbul University of the first author.

Anahtar Sözcükler: Nöropsikolojik değerlendirme, YİYDDE, Yönetici işlevler, Güvenilirlik, Geçerlilik

An Initial Evaluation of Psychometric Validity of Behavioral Rating Inventory of Executive Function (BRIEF) in A Turkish Combined Clinical Sample*

ABSTRACT

This pilot study investigated the reliability and the validity of BRIEF forms in a combined clinical sample of Turkish children and adolescents. BRIEF is used for developmental and acquired neurological conditions (learning disabilities, low birth weight, ADHD, Tourette's disorder, traumatic brain injury, and Autism). The sample group of this study comprised 50 (15 girls, 35 boys) elementary and high school students in Kocaeli and İstanbul. The data were provided by children's' parents and their teachers via demographic information form and Turkish versions of BRIEF parent and teacher forms. The results provide preliminary support for the psychometric properties of Turkish versions of BRIEF forms for children having dyslexia, ADHD-I or mild mental retardation as to reflect different dimensions of executive functioning. Although Turkish versions of both forms demonstrated similar validity and reliability, future research by including larger and more homogenious clinical samples is needed as to support findings of this study.

Key Words: Neuropsychological Assessment, BRIEF, Executive Functions, Reliability, Validity.

INTRODUCTION

Executive function is not a specific and unitary cognitive domain. Its definitions differ widely. Generally, it can be defined as a multidimensional category of cognitive processes which consists of a variety of skills and abilities employed in order to realize a goal. According to Lezak (1995) executive functions are the ability to initiate an activity, plan the activity, behave in a goal-directed manner, and monitor one's performance. Denckla and Reiss (1997) suggested that it refers to "a cognitive module consisting of effector output elements involving inhibition, working memory, and organizational strategies necessary to prepare a response" (p. 283). The conceptualizations of executive functions vary. Generally, they are used to refer to brain circuits that prioritize, integrate, and regulate other cognitive functions including concept formation, fluency, inhibition, mental flexibility, planning, and working memory so that they result in purposeful, goal

directed behavior (Anderson, 2001; Baron, 2004; Vohs and Baumeister, 2004; Zillmer and Spiers, 2001).

Besides cognitive functioning, executive functions also manifest themselves in personality dimensions and emotional regulation of individuals. In that way deficits in executive functions may lead to personality changes. For instance, some individuals with deficits in their executive functions may become inert, apathetic, yet others may become euphoric, restless, and impulsive (Stuss and Benson, 1984). According to Michaels (2001), school age children who have malfunctioning executive systems have difficulty dealing with complex social interactions. Particularly, they face challenges in receiving the appropriate social signals (i.e.,reading facial expressions), interpreting social circumstances appropriately (i.e.,thinking the situation is funny while noticing that someone is crying), making modifications in their behaviors according to the social signals (i.e.,changing facial expression from happy to concern when seeing someone is crying).

Researchers have been developing psychological and neurobiological theories in order to explain the development of executive functions. Theories have indicated that executive functions develop in a stage-like manner. Particularly, there are three developmental stages of executive functions. First stage begins around the age of six. In this stage children develop the ability to resist distraction. Second stage begins at approximately 10 years of age. In this stage child's ability to control impulses, create and test hypotheses, and conduct organized searches of information become similar to adult levels. Final stage occurs in early adolescence. Children's planning, verbal fluency and motor sequencing skills reach adult levels (Anderson, 2001; Anderson, Anderson, Northam, Jacobs and Catroppa, 2001; Brocki and Bohlin, 2004; Welsh, Pennington and Groisser, 1991).

Anatomical structures underline executive functions are frontal lobes, prefrontal cortex (PFC) and frontal-subcortical circuits. Frontal lobes are responsible for the execution of higher order cognitive functions (executive functions) and compose of motor cortex, premotor cortex and PFC (see Figure 1) (Fuster, 1997, pp. 6-42; Zilles, 1990).

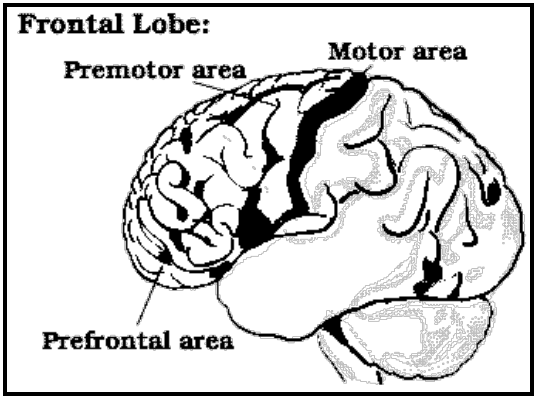

Figure 1: Parts of The Frontal Lobes (Johnson, 2009).

As an anatomical segment of the frontal lobe, PFC is the most effective part in executive functioning. There are three interconnected regions responsible for different executive functons in PFC: dorsolateral PFC, orbitofrontal PFC and anterior cingulate (see Figure 2) (Powell and Voeller, 2004). While activation of dorsolateral PFC leads to realization of executive functioning, orbitofrontal PFC and anterior cingulate regions are most effective in terms of behavioral inhibition and apathy respectively (Goldberg, 2001). However, it is not right to define executive functions as only something frontal lobes are doing. Rather, they are intimately associated with executive functions and they are strongly connected to the other brain regions via complex neuronal tracts. For that reason it is difficult to assert that executive functions are produced by only the frontal cortex activations (Morgan and Linienfeld, 2000).

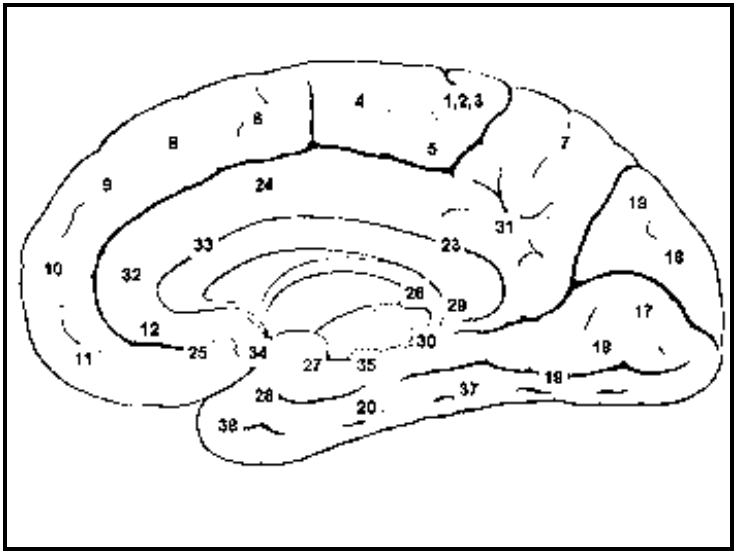

Figure 2: Medial Surface of The Brain with Brodmann's Areas Numbered. (9: Dorsolateral PFC, 11-12: orbitofrontal PFC, 24: anterior cingulate). Retrieved November 08, 2010, from http://citizendia.org/Brodmann_area.

Developmental transition of executive functions is different in children with developmental disorders as opposed to typically developing children. According to McCloskey and Kaufman (2010) deficits in executive functioning can be seen at any age of development. Yet, deficits become increasingly apparent as children move through the early elementary grades.

Recent studies have suggested that there are impairments of executive functioning in a number of developmental disorders. For example, impaired executive functions have been found with Attention Deficit Hyperactivity Disorder (ADHD), with learning disabilities (e.g., Dyslexia), and with mental retardation (Helland and Asbjornsen, 2000; Seidman, Biederman, Faraone and Weber, 1997; Skoff, 1988). According to Barkley (1997) four executive functions are impaired in individuals with ADHD. These functions are the mentally considering and manipulating information, regulating one's emotional responses, using inner-directed speech to control or regulate behavior, and re-organizing information and behavioral responses in unique ways. The findings of recent studies (Reiter, Tucha and Lange, 2005) suggest that children with dyslexia also demonstrate impairments in a

variety of executive functions. Working memory, inhibition of inappropriate reactions, verbal and figural fluency and problem solving are the ones seemed to be impaired. Children with mental retardation were found to have limitations in behavioral regulation and flexible thinking which might cause severe learning impairments (Ukena, Hashimoto and Deguchi, 2008).

Researchers indicated that executive function deficits might be the result of different etiologies of frontal lobe damage. Thus, there is a need to develop effective strategies to remediate these deficits and to improve executive functioning (D'Esposito and Gazzaley, 2006, p. 475). However, medical treatment options will not usually fix the deficits because executive deficits are often unique to the individual and rarely two children have the same profile of deficits. For that reason, while developing a treatment plan, child, his /her culture, the specific deficits, and his/her family should be taken into account (Chandler, n.d.). Michaels (2001) gave a guideline including general compensation options for school age children suffering from executive function deficits. Telling the students what the goal of each activity is, giving examples of what a finished product should look like, always having visual targets/markers and figuring out how the child learns best and converting all material to that modality are some of the classroom tips suggested by Michaels (2001).

Since underestimation of executive functioning deficits in children might cause missing the real cause of disability with a variety of psychiatric disorders, assessment and treatment of the executive deficits has a great importance in the long run. Assessment tools used for determining malfunctioning of executive functions include the Wisconsin Card Sorting Test (WCST), the Delis-Kaplan Executive Function System (D-KEFS), the NEPSY, the Behavioural Assessment of the Dysexecutive Syndrome (BADS), the and the Frontal Systems Behavior Scale (FrSBE) (McCloskey and Kaufman, 2010).

In order to understand executive functions and their relationships to the frontal lobes, many studies have been holding by researchers for a long time. Many of these studies indicated that patients with focal frontal lobe lesions should be examined as to define the relation of executive functions to the frontal lobes, to differentiate distinct executive processes related to the frontal lobes, to explain the complexity of control-automatic processes, to explain the differences in functions between the frontal lobes and other brain regions and to determine the role of the frontal lobes for affective responsiveness, social and personality development, and self-awareness and unconsciousness (Stuss and Alexander, 2000).

This study aims at performing the adaptation of Behavioral Rating Inventory of Executive Function (BRIEF) developed by Gioia, Isquith, Guy and Kenworthy (2000) into Turkish. For this purpose, validity and reliability studies in a Turkish combined clinical sample were conducted. Although there are a large number of tests for executive functions and many of these tests assess more than one component of executive functioning, majority of them were developed for adult population. Assessment tools able to reflect complexity and multidimensional nature of executive functions are necessary for a thorough evaluation of children and adolescents. BRIEF is such an instrument designed to assess executive function behaviors in the home and school environment for children ages 5 to 18.

METHOD

Subjects

This research was conducted with the parents and teachers of 50 clinically refered children getting psychological treatment or special education in Kocaeli and Istanbul (See Appendix). Participants were recruited via convenient and purposive sampling methods. The ages of children ranged from 6 to 18, with a mean age of 10.68 (SD= 3.033). Of the 50 children 35 were male and 15 were female (Table 1, 2). Mean age of the males was 10.77 (SD= 2.756). Mean age of the females was 10.47 (SD= 3.701). 44 % of the sample (n=22) comprised children with ADHD Inattentive type (ADHD-I), 32 % of the sample (n=16) was dyslexic children and 24 % of the sample (n=12) composed of children with mild mental retardation. Mean age of children with ADHD was 11.05 (SD = 3.199), with dyslexia was 9.19 (SD = 2.257) and with mental retardation was 12.00 (SD = 3.015).

Table 1: Distrubitions of Girls and Boys in Age Groups

Ages	6	7	8	9	10	11	12	13	14	15	17	18	TOTAL
Boys	1	5	2	3	4	6	7	2	2	1	2	0	35
Girls	0	3	3	1	3	2	0	0	0	1	0	2	15
TOTAL	1	8	5	4	7	8	7	2	2	2	2	2	50

Table 2: Distrubitions of Girls and Boys in Class Level

Class Level	Boys	Girls	TOTAL
Preschool	1	0	1
1	5	4	9
2	2	5	7
3	4	1	5
4	5	2	7
5	6	0	6
6	6	0	6
7	1	0	1
8	2	0	2
9	1	1	2
10	1	0	1
11	1	1	2
12	0	1	1
TOTAL	35	15	50

Instruments

Demographic Information Form: Researchers modified a form developed in Çapa Medical School of İstanbul University for the purpose of collecting socio-demographical information about children, their parents and teachers. This form included 18 questions formulated in order to determine general socio-demographical attributes of research participants such as sex, age, class level, employment, long-term residence, perceived socio-economic class, educational level and occupation.

Behavioral Rating Inventory of Executive Function (BRIEF): BRIEF consists of two rating forms: a parent questionnaire and a teacher questionnaire. Each questionnaire was designed to assess executive functioning in the home and school environments. They are useful in evaluating children with a wide spectrum of developmental and acquired neurological conditions like learning disabilities, ADHD and mental retardation. Both forms contain 86 items that have been divided into eight theoretically and empirically derived clinical scales that are purported to measure different aspects of executive functioning (Gioia, Isquith, Guy and Kenworthy, 2000):

Inhibit (IN): Ability to resist impulses and to stop one’s behavior at the appropriate time.

Shift (SH): Ability to make transitions, tolerate change, problem-solve flexibly, and switch or alternate one's attention from one focus or topic to another.

Emotional Control (EC): Ability to regulate one's own emotions.

Initiate (INI): Ability to begin a task or activity without being prompted to do so.

Working Memory (WM): Ability to hold information in mind in order to complete a task, encode and store information, or generate goals.

Plan/Organize (P/O): Ability to set a goal and determining the best way to reach that goal.

Organization of Materials (OM): Ability to order and organize things in one's environment.

Monitor (MO): Ability to check his or her own performance during or shortly after finishing a task and awareness of the effect that his or her behavior has on others.

Exploratory factor analysis for the original parent and teacher forms produced two Composite Index scores. The INI, WM, P/O, OM, and MO scales were determined to make up the Metacognitive Index (MI). IN, SH, and EC scales were indicated to make up the Behavioral Regulation Index (BRI). A Global Composite Index (GCI) is also provided by the BRIEF forms and consists of the total score across all of the clinical scales. High internal consistency (alphas = 0,80-0,98); test-retest reliability (r = 0,82 for parents and 0,88 for teachers); and moderate correlations between teacher and parent ratings (r = 0,32-0,34) were computed for original forms. The questionnaire takes approximately 10 to 15 minutes to complete.

Procedure

Firstly, original parent and teacher forms were translated into Turkish by the first author. Then two experts (clinical psychologist and neuropsychologist) who have good command of the source and target languages, familiarity with relevant cultures and knowledge of test structure checked these translations independently and informed the first author concerning the corrections. Once the corrections were completed, Turkish texts were retranslated into English by a certified translator whom was also a teacher of English language. When the retranslation was observed to be greatly similar to the original tests, resultant translations were sent to the authors of the original forms for the purpose of expert review and evaluation.

As a result of the positive feedback obtained from the authors, the researchers applied both forms to a number of children and adolescents to check the equivalence of two forms in terms of meaning, terms, experience and concepts. Finally, researchers came to the conclusion that the Turkish translations of both forms were appropriate and can measure executive functioning of Turkish children and adolescents.

Following the translation stage, approval to conduct the study was obtained from the authors of the original forms. Then, available special education centers and private child clinics were determined in Istanbul and Kocaeli. After that, these institutions were informed about the study and its importance for preventive educational purposes. Teachers or counselors who accepted to participate in and have students with ADHD-I, dyslexia or mild mental retardation were provided with a full description of the study, including the purpose and benefits by discussing in detail the elements of the BRIEF forms.

After providing the detailed description of the study and the BRIEF forms teachers were asked if they would be willing to contact with the parent(s) of the eligible children by phone, mail, and/or during their child's regularly scheduled visit and to have them complete BRIEF parent form after getting oral informed consent. Then, teachers were made aware that participation was voluntary and that they could withdraw at any time. Parents completed the demographic information form and Turkish translation of BRIEF parent form. Teachers responded Turkish translation of BRIEF teacher form. Teachers either contacted or delivered the questionnaires to the first author or she contacted the teachers and took the complete questionnaires. Follow-up calls were also made and emails were sent to teachers in order to increase the number of questionnaires completed.

Design and Statistical Analysis

This study was descriptive in which quantitative data were gathered with respect to the various dimensions of executive functions. The data analysis procedures were conducted and completed using SPSS 11.5. The reliability of the tests was determined with internal consistency and interrater reliability analysis. In relation to the validity item-factor correlations were computed and factor analyses were performed for both forms.

RESULTS

Reliability Study

Internal Consistency: Internal consistency of the scale scores was determined by calculating Cronbach's Alpha Reliability coefficients (α). Calculated alpha values were changing between 0,85 and 0,97 for Parent Form, 0,86 and 0,98 for the Teacher Form (Table 3).

Table 3: Cronbach's Alpha Reliability Coefficients for Turkish Version of BRIEF Forms.

Scales/Indexes	Parent Form	Teacher Form
IN	0,96	0,93
SH	0,87	0,96
EC	0,93	0,94
INI	0,93	0,95
WM	0,85	0,86
P/O	0,97	0,91
OM	0,94	0,86
MO	0,95	0,98
BRI	0,97	0,97
MI	0,92	0,90
GCI	0,96	0,93

Interrater Reliability: Interrater Reliability was determined via performing Pearson correlation analysis between parent and teacher ratings of the forms. Pearson correlation coefficient (r) was found between 0,00 and 0,74 (Table 4).

Table 4: Interrater Reliability Coefficients for Turkish Version of BRIEF Forms

Scales/Indexes	r
IN	0,00
SH	0,29*
EC	0,31*
INI	0,30*
WM	0,31*
P/O	0,34*
OM	0,74**
MO	0,67**
BRI	0,15
MI	0,56**
GCI	0,54**

**= $p < 0,01$, *= $p < 0,05$

Validity Study

Item-Total Correlations (Construct Validity): Item-total correlations in BRIEF parent form were found between 0,70- 0,90 for IN; 0,44- 0,78 for SH; 0,56- 0,81 for EC; 0,65- 0,79 for INI; -0,03- 0,83 for WM; 0,76- 0,92 for P/O; 0,67- 0,94 for OM; 0,71- 0,94 for MO; 0,36- 0,85 for BRI; -0,10- 0,77 for MI and -0,22- 0,87 for GCI (Table 5).

Table 5: Item-Total correlations for Turkish Version of BRIEF Parent Form

no	IN	no	SH	no	EC	no	INI	no	WM	no	P/O	no	OM	no	MO
38	0,79	5	0,78	1	0,73	3	0,65	2	0,75	11	0,76	4	0,77	14	0,94
41	0,74	6	0,61	7	0,56	10	0,73	9	0,78	15	0,81	29	0,89	21	0,71
43	0,88	8	0,44	20	0,80	16	0,77	17	0,51	18	0,92	67	0,83	31	0,75
44	0,86	12	0,54	25	0,81	47	0,78	19	-0,03	22	0,80	68	0,67	34	0,84
49	0,90	13	0,74	26	0,81	48	0,79	24	0,23	28	0,80	69	0,81	42	0,85
54	0,78	23	0,58	45	0,76	61	0,76	27	0,60	35	0,88	72	0,94	52	0,88
55	0,78	30	0,61	50	0,75	66	0,75	32	0,80	36	0,82			60	0,92
56	0,82	39	0,78	62	0,59	71	0,76	33	0,34	40	0,83			63	0,72
59	0,82			64	0,61			37	0,83	46	0,85				
65	0,70			70	0,75			57	0,54	51	0,84				
										53	0,90				
										58	0,82				
no	BRI	no	BRI	no	BRI	no	MI	no	MI	no	MI	no	MI	no	GCI
1	0,69	38	0,67	62	0,60	2	0,02	21	0,36	37	0,38	61	0,51	1	0,52
5	0,80	39	0,85	64	0,62	3	0,30	22	0,27	40	0,47	63	0,56	2	-0,13
6	0,47	41	0,71	65	0,68	4	0,62	24	0,03	42	0,67	66	0,35	3	0,52
7	0,47	43	0,81	70	0,78	9	0,36	27	0,28	46	0,37	67	0,71	4	0,70
8	0,36	44	0,68			10	0,45	28	0,18	47	0,66	68	0,48	5	0,81
12	0,40	45	0,79			11	0,19	29	0,72	48	0,52	69	0,65	6	0,39
13	0,78	49	0,82			14	0,72	31	0,51	51	0,41	71	0,39	7	0,45
20	0,74	50	0,82			15	0,20	32	0,18	52	0,77	72	0,77	8	0,33
23	0,69	54	0,74			16	0,49	33	0,11	53	0,46			9	0,19
25	0,76	55	0,75			17	0,56	34	0,71	57	-0,10			10	0,65
26	0,82	56	0,67			18	0,55	35	0,33	58	0,39			11	-0,07
30	0,59	59	0,85			19	0,27	36	0,38	60	0,71			12	0,32
no	GCI	no	GCI	no	GCI	no	GCI	no	GCI						
13	0,65	25	0,69	37	0,21	49	0,75	61	0,74						
14	0,87	26	0,71	38	0,59	50	0,68	62	0,51						
15	-0,07	27	0,09	39	0,74	51	0,16	63	0,68						
16	0,73	28	-0,10	40	0,23	52	0,86	64	0,52						
17	0,38	29	0,82	41	0,71	53	0,21	65	0,72						
18	0,26	30	0,50	42	0,79	54	0,63	66	0,59						
19	0,54	31	0,63	43	0,78	55	0,74	67	0,81						
20	0,61	32	0,00	44	0,68	56	0,73	68	0,64						
21	0,57	33	0,27	45	0,77	57	-0,21	69	0,73						
22	-0,03	34	0,85	46	0,10	58	0,08	70	0,63						
23	0,49	35	0,05	47	0,81	59	0,70	71	0,66						
24	-0,22	36	0,16	48	0,74	60	0,87	72	0,86						

Item-total correlations in BRIEF teacher form were found between -0,01- 0,92 for IN; 0,69- 0,92 for SH; 0,61- 0,85 for EC; 0,69- 0,94 for INI; 0,18- 0,72 for WM; 0,57- 0,87 for P/O; 0,30- 0,90 for OM; 0,84- 0,96 for MO; -0,07- 0,.89 for BRI; -0,44-0,87 for MI and -0,31- 0,72 for GCI (Table 6).

Table 6: Item-Total Correlations for Turkish Version of BRIEF Teacher Form

no	IN	no	SH	no	EC	no	INI	no	WM	no	P/O	no	OM	no	MO
9	0,70	4	0,92	1	0,83	3	0,74	2	0,51	12	0,59	11	0,38	15	0,87
38	0,77	5	0,77	7	0,66	10	0,77	8	0,59	17	0,57	16	0,34	22	0,84
42	0,85	6	0,80	26	0,85	19	0,94	18	0,18	23	0,85	20	0,30	33	0,93
43	0,87	13	0,89	27	0,84	34	0,93	21	0,47	29	0,87	67	0,88	36	0,96
45	0,77	14	0,84	48	0,75	50	0,88	25	0,65	35	0,62	68	0,86	44	0,95
47	0,92	24	0,76	51	0,82	63	0,69	28	0,69	37	0,65	71	0,89	46	0,92
57	-0,01	30	0,83	64	0,61	70	0,90	31	0,70	41	0,88	73	0,90	54	0,91
58	0,86	40	0,69	66	0,83			32	0,72	49	0,88			55	0,89
59	0,82	53	0,75	72	0,79			39	0,60	52	0,01			61	0,95
69	0,79	62	0,84					60	0,63	56	0,83			65	0,89
no	BRI	no	BRI	no	BRI	no	MI	no	MI	no	MI	no	MI	no	GCI
1	0,80	38	0,81	59	0,78	2	0,11	21	0,03	37	0,43	61	0,82	1	0,47
4	0,86	40	0,59	62	0,60	3	0,17	22	0,64	39	0,20	63	-0,09	2	-0,06
5	0,79	42	0,77	64	0,82	8	0,40	23	0,43	41	0,50	65	0,74	3	0,58
6	0,71	43	0,81	66	0,86	10	0,15	25	0,05	44	0,86	67	0,82	4	0,47
7	0,63	45	0,59	69	0,78	11	0,40	28	0,27	46	0,82	68	0,87	5	0,46
9	0,73	47	0,81	72	0,60	12	0,12	29	0,41	49	0,43	70	0,08	6	0,48
13	0,78	48	0,73			15	0,73	31	0,04	50	0,18	71	0,85	7	0,35
14	0,82	51	0,89			16	0,30	32	0,06	52	0,79	73	0,87	8	0,13
24	0,76	53	0,83			17	0,07	33	0,78	54	0,75			9	0,56
26	0,83	57	-0,07			18	-0,44	34	0,03	55	0,84			10	0,66
27	0,77	58	0,77			19	0,02	35	0,22	56	0,51			11	0,65
30	0,72	59	0,81			20	0,26	36	0,86	60	0,34			12	-0,16
no	GCI	no	GCI	no	GCI	no	GCI	no	GCI	no	GCI				
13	0,41	25	-0,10	37	0,25	49	0,01	61	0,63	73	0,55				
14	0,55	26	0,57	38	0,65	50	0,67	62	0,50						
15	0,64	27	0,58	39	-0,03	51	0,51	63	0,29						
16	0,55	28	-0,06	40	0,33	52	0,71	64	0,43						
17	-0,31	29	-0,03	41	0,13	53	0,67	65	0,50						
18	-0,11	30	0,34	42	0,67	54	0,68	66	0,63						
19	0,58	31	-0,29	43	0,64	55	0,53	67	0,56						
20	0,71	32	-0,28	44	0,66	56	0,17	68	0,51						
21	-0,04	33	0,58	45	0,57	57	-0,30	69	0,62						
22	0,60	34	0,59	46	0,52	58	0,71	70	0,59						
23	0,01	35	-0,14	47	0,79	59	0,72	71	0,56						
24	0,41	36	0,64	48	0,56	60	-0,11	72	0,45						

Factor Analysis: Factor analyses of BRIEF parent and teacher forms were performed by principal component analysis using Kaiser normalization method of varimax rotation. Firstly, suitability of the correlation matrix of BRIEF forms for factor analysis is checked by determining KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) parameter and using Bartlett test (Bartlett's Test of Sphericity). KMO parameters and presence of correlation between the scale items are showed that the obtained data is suitable for exploratory factor anysis (Table 7).

Table 7: Suitability of Data for Factor Analysis

		Parent Form	Teacher Form
	KMO	0,79	0,54
Bartlett test	Chi-Square Value df	425,85 28	411,25 28

$p < 0,00$

For both forms, scales which have eigen values greater than 1 and factor loadings bigger than 0,40 were included in the related factor. Two factors accounted for 79,59% of the variance in the model emerged for BRIEF Parent Form. Contrary to the original form it was seen that IN, SH, EC, INI, OM and MO loaded on the first factor; WM and P/O loaded on the second factor. Three factors emerged for BRIEF Teacher Form in the first analysis. When the analysis reperformed via imposing a two factor structure, two factors accounted for 77% of the variance in the model emerged for BRIEF Teacher Form. As opposed to the original form, it was seen that IN, SH, EC, INI, WM and MO loaded on the first factor; P/O, OM and MO loaded on the second factor (Table 8, 9).

Table 8: Descriptive Statistics and Factor Structure for Turkish Version of BRIEF Parent Form

Scales	$\overline{X}$	SD	Total	% of variance	Cumulative % variance	1. Factor	2. Factor
IN	14,74	4,67	5,11	63,87	63,87	0,93*	0,16
SH	11,76	3,39	1,26	15,73	79,59	0,84*	-0,29
EC	15,12	4,69	0,89	11,18	90,77	0,90*	-0,13
INI	12,90	4,19	0,27	3,36	94,13	0,94*	-0,15
WM	25,54	4,05	0,19	2,40	96,53	0,18	0,89**
P/O	25,98	7,91	0,19	2,36	98,90	-0,19	0,53**
OM	9,22	3,55	0,06	0,80	99,70	0,92*	0,24
MO	12,92	4,59	0,02	0,30	100,00	0,94*	0,04

* indicate loadings on the first factor whereas ** show loadings on the second factor.

Table 9: Descriptive Statistics and Factor structure for Turkish Version of BRIEF Teacher Form

Scales	$\bar{X}$	SD	Total	% of variance	Cumulative % variance	1. Factor	2. Factor
IN	13,48	4,80	4,030	50,370	50,37	0,79*	0,16
SH	13,56	5,18	2,131	26,632	77,00	0,96*	-0,03
EC	11,46	4,13	1,099	13,741	90,74	0,92*	0,05
INI	10,08	4,51	0,251	3,137	93,88	0,94*	0,06
WM	25,54	4,02	0,235	2,940	96,82	-0,56*	0,00
P/O	25,86	4,72	0,169	2,108	98,93	-0,63*	0,55**
OM	11,08	4,15	0,067	0,834	99,76	0,12	0,96**
MO	20,02	8,59	0,019	0,237	100,00	0,08	0,93**

* indicate loadings on the first factor whereas ** show loadings on the second factor.

DISCUSSION AND CONCLUSION

The present study reported (a) the adaptation of Turkish forms of BRIEF among clinically referred children and adolescents, and (b) evidence of initial reliability and validity for this instrument. Evidence of reliability for BRIEF was found in the following results: (a) calculated Cronbach's alpha values were changing between 0,85 and 0,97 for Parent Form, 0.86 and 0,98 for the Teacher Form, indicating that BRIEF provides high level of internal consistency. That means items in both forms were highly correlated with each other and homogenous concerning the psychological dimensions they were measuring (Öner, 1994); (b) Pearson correlation analysis between parent and teacher ratings of the forms were found between 0,00 and 0,74, revealing that strength and significance of the correlations were not high as were for the original forms. This result shows that parents and counselors might have different judgments about the same child, and this may stem from the fact that physical and social conditions are disparate for home, school and clinical settings (Offord et al, 1996).

As to determine validity of the Turkish forms item-total correlations were calculated and factor analysis was performed for both forms. Results showed that item-total correlations for BRIEF Parent form was lower than the original form, while correlations were at the same level for BRIEF Teacher form. It should be given attention that some items (2, 11, 15, 22, 24, 28, 57) in GCI and WM (19) in Parent Form took negative values. It was also seen that some items in IN (57), BRI (57), MI (18, 63) and GCI (2, 12, 17, 18, 21, 25, 28, 29, 31, 32, 35, 39, 57, 60) in Teacher form took negative

values. Although some researchers said that item-total correlations which were negative should be eliminated from the related scale (Geisinger, 1994; Tavşancıl, 2002), negative correlations reported in this study were the result of the small sample size (n=50). By taking into account this factor and assessments of two experts indicating the strong conformation of the Turkish forms regarding the meaning, terms and concepts of items with the related dimensions of executive functions, items took negative correlative value were not excluded from the scales.

Results of the principal component analysis pointed out that Turkish forms have two dimensions as original forms. However, obtained distribution of the scales into these dimensions were different from the original forms. This result might be the negative effect of small sample size and the fact that participants in the diagnostic groups were not matched for some socio-demographic features such as sex, age or SES.

Taken together, the results of this study provide the basis for the usefulness of Turkish versions of BRIEF parent and teacher forms with children having some neurodevelopmental disorders (Dislexia, ADHD-I, Mild Mental Retardation) in assessing executive dysfunction by measuring eight aspects of executive functioning including inhibition of impulses, mental shifting, emotional control, initiating a task, working memory, goal planning and organization and organization of materials.

SUGGESTIONS

Some limitations of the study as well as future research directions should also be stated. First of all, it should be given caution that assessments for determining executive dysfunction might be affected by environmental conditions and neurological, psychological and behavioral aspects of the individual. Therefore, results obtained from the application of two forms should not be used as the only criteria for any diagnosis. Rather, they should be used as a part of a more comprehensive neuropsychological assessment battery. In addition to this, by taking into account the fact that scores obtained from both forms might vary according to the age, sex and SES of the participants in the diagnostic groups, future researches should include wider and more homogeneous samples.

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APPENDIX

Institutions where the participants were recruited

Name of the institution	Diagnostic group
Nova Special Education And Counseling Center Gün Gelişim Special Education And Psychological Counseling Center Istanbul Mentally Retarded Foundation	Mild mental retardation
Private Dünya Psychological Counseling and Education Center	ADHD-I Dyslexia

Başvuru: 8.6.2011 Yayına Kabul: 18.11.2012