

Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 116 (2014) 403 – 408

Procedia
Social and Behavioral Sciences

5th World Conference on Educational Sciences - WCES 2013

A Study on Turkish Adaptation, Validity and Reliability of the Brief Autism Mealtime Behavior Inventory (BAMBI)

Bekir Fatih Meral^{a,b*}, Ahmet Fidan^b^aThe University of Kansas, Beach Center on Disability, 1200 Summyside Av. 3111 Haworth Hall, Lawrence, KS, 6604, USA^bSakarya University, Faculty of Education, Department of Special Education, Hendek/Sakarya, 54300, Turkey

Abstract

The purpose of this study is to determine the psychometric properties of the Brief Autism Mealtime Behavior Inventory. After ensuring linguistic equivalence of the scale, it was applied to 308 mothers who have children with autism to determine the mealtime behavior of the children with autism. The scale, which has 3 sub-domain and 5 liker type, consists of 18 items originally. After the validity and reliability work, 4 items were eliminated and 14 items remained. The results of Confirmatory Factor Analysis ($\chi^2/sd=3.6$, RMSEA=.09, SRMR=.07, GFI=.89, AGFI=.84, IFI=.90, CFI=.90) showed that the scale has an acceptable goodness of fit. The internal consistency coefficient ($\alpha=.79$) and values of the split-half reliability (Pearson $r=.86$ and Spearman's $\rho=.83$) were high. Item-total correlations of the scale were acceptable and t-tests between items' means of upper 27%-lower 27% points were significant. According to the results, it can be said that the scale can be used as a valid and reliable scale to determine the mealtime behavior of the children with autism in Turkey.

© 2013 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](http://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and/or peer-review under responsibility of Academic World Education and Research Center.

Keywords: Brief Autism Mealtime Behavior Inventory, autism, mealtime behavior problems, confirmatory factor analysis, reliability;

Introduction

Autistic disorder is a complicated developmental disability experienced in the first three years of life (Autism Society of America-ASA, 2006). Autistic disorder is the main sub group in common developmental disorder classification (it covers autistic disorder, Rett syndrome, childhood disintegrative disorder, Asperger's syndrome and common developmental disability/atypical autism which cannot be named in any other way) (DSM-IV-TR, 2007). Autistic disorder shows itself (a) in social interaction, (b) with delays in the language used in social communication or symbolic or fictions game and/or existence of an extraordinary functionality, (c) various obsessions. Depending on these disabilities, reluctance to get into social interaction with other people around, limitation in making eye contact, language and communication problems and as well as clear disabilities in symbolic and fictions activities such as games can be seen in children exhibiting autistic characteristics (DSM-IV-TR, 2007). It is reported that some of the children exhibiting autism and common developmental disability (in a way to include autism which

*Corresponding author. Tel.: +1-785-979-3433; fax: +1 785-864-5825

E-mail address: bfmeral@gmail.com – fatihmeral@ku.edu

cannot be named in any other way) have abnormal feeding/eating behaviors such as sensibility to the hardness/consistence of the food and selectivity in choosing certain foods (Ahearn, Castne, Nault, & Green, 2001).

Current diagnosis criteria of autism and common developmental disability do not include abnormal eating behaviors (Ritvo & Freeman, 1978). However, reports on feeding/eating problems exhibited by the children in this disability group emphasize that the children in this disability group show selectivity for foods according to variety or hardness/consistence (Burd, Shantz, Swearingen, Ahearn, & Kerwin, 1995), they refuse some liquid beverages (Farrell, Amari, & Hogapian, 1996) and they exhibit unusual mealtime behaviors (Powell, Hecimovic, & Christensen, 1992). Regarding the generality of feeding/eating problems in children with autism, many reasons such as not being able to focus on detail regarding variety and hardness/consistence in food, their determination not to eat the food, reactiveness, avoiding eating new food they are not used to, sensorial disabilities, disabilities in social harmony and not being able to tolerate foods biologically are suggested (Cumine, Leach, & Stevenson, 2000).

In the researches, it was found that feeding problems were more common in children with autism. When especially children with autism are compared with their normal peers, it was observed that they refuse more food, they need more special kitchen utensils (such as modified eating and drinking tools and accessories, gastronomy tube), it is necessary to offer food in more particular ways (such as offering food they like and food they don't like together), they can prefer less hard food (such as mashed food) and they eat a narrower variety of food (Schreck, Williams, & Smith, 2004). It can be said that mealtime problems are more common in individuals with autism than other developmental disability groups (Kodak & Piazza, 2008).

Many evaluation processes can be used to determine the variables related with feeding and mealtime problems in children. Early in the list, there are evaluation scales which may help determine feeding and meal time problems. The most prominent two of the related evaluation tools are Screening Tool of Feeding Problems (STEP) and Brief Autism Mealtime Behavior Inventory (BAMBI) scales. STEP was developed by Matson and Kuhn (2001) to define the feeding problems of individuals with autism and mental disability. This scale consists of 23 questions which aim at certain feeding and mealtime problems such as being choosy about/distinguishing between food (according to variety or consistence/hardness), eating fast, vomiting and pushing food. Scale consists of 5 sub-categories/sub-scales including risk of breathing obstruction, being choosy about food, problem behaviors during mealtime, feeding skills and feeding. BAMBI is a scale developed by Lukens (2005) and Lukens and Linscheid (2008) which consists of 18 questions about limitation in consuming different foods, food refusal, disruptive mealtime behaviors and behaviors related with autism (such as shortness of attention span, anger, self-injurious behavior).

No measuring tool has been seen which was developed or adapted to measure the mealtime and feeding problems of individuals with autism or intellectual disabilities in Turkey. The purpose of the study is to examine the psychometric properties of Brief Autism Mealtime Behavior Inventory (BAMBI) developed by Lukens (2005) and Lukens and Linscheid (2008) on children with autism in Turkey.

1. Method

1.1. Research group

The research includes 308 children with autism. Data collected from mothers of children with autism going to 10 Autistic Children Education Center providing service in 8 different provinces (Istanbul, Sakarya, Bursa, Denizli, Trabzon, Kütahya, Van, and Diyarbakir), three centers of which are in the same province (Istanbul). The data of the study are based on parent-proxy report application which takes getting information on target individual from related family into basis. Age average of children with autism was calculated as 9.18 ($ds=4.59$), height average as 131.41 ($sd=25.82$) and weight average as 36.54 ($sd=20.34$). 240 of children were male and 61 were female (7 missing values).

1.2. *Process*

Before applying Turkish form of Brief Autism Mealtime Behavior Inventory (BAMBI) to the sample in our country, written permission was obtained from Colleen Taylor Lukens (Pediatric Psychologist, Pediatric Feeding and Swallowing Center, The Children's Hospital of Philadelphia PA/USA) who developed the inventory.

Under linguistic equivalence studies of BAMBI, it was translated into Turkish by two professionals and an English teacher who were competent in English. Three independent translations were turned into a single Turkish form by making the related comparisons. Lastly, Turkish form and original English form were compared by a profession from English Teaching Department and necessary corrections were made and the scale took its final form for field. The data of Brief Autism Mealtime Behavior Inventory (BAMBI) were collected in three months. Data was analyzed with PASW Statistics 18.0 (SPSS Statistics) and LISREL 8.71 programs.

1.3. *Instrument*

Brief Autism Mealtime Behavior Inventory (BAMBI). Brief Autism Mealtime Behavior Inventory (hereafter referred to as BAMBI) is a measuring tool developed by Lukens (2005) and Lukens and Linscheid (2008) which aims to determine mealtime behaviors and feeding problems of children with autism. The highest score and the lowest score to be obtained from the 5-point grading type scale (1=Never/Very Rarely - 5=In Almost All Mealtimes) which includes 18 items in total are 18 and 90. There are 4 items (3, 9, 10 and 15) which requires reverse calculation in the scale. Three-factor structure of BAMBI which are Limited Variety, Food Refusal and Features of Autism explains 45% of the total variance. Cronbach's alpha internal consistency coefficient of the scale was calculated as .88. Criterion validity of the scale was calculated high and significant ($r_{108}=.77$, $p<.01$) over The Behavioral Pediatric Feeding Assessment Scale-BPFAS which was developed by Crist and Napier-Phillips in 2001 (Lukens, 2005; Lukens & Linscheid, 2008).

In the field form which included BAMBI, apart from the scale, there are questions about the age, height, weight and gender variables of teachers and a short instruction about the study.

2. **Findings**

2.1. *Reliability*

2.1.1. *Item total correlation calculation and significance of differences between 27% upper-lower group item averages*

It can stated that items with item total correlation of .30 and higher distinguish the individuals in a good level in terms of measured property and items between .20 and .30 can be included in the tests in case it is seen obligatory or those items should be corrected and items lower than .20 should not be included in the test (Büyüköztürk), 2008; Crocker & Algina, 2008). Accordingly, items with no 3, 9, 10 and 15 were excluded from the scale and the scale whose original had 18 items has 14 items. It was observed that item-total correlations of BAMBI ranged between .22 and .55 (see Table 1).

t-test was used in comparing item scores of %27 upper-lower groups of BAMBI determined according to total score. 27% upper-lower *t* (sd=165) values of BAMBI vary between -6.23 and -12.49 and the difference between 27% upper-lower groups ($p<.001$) is significant (see Table 1).

Table 1. Item total correlations and 27% upper-lower group item averages of BAMBI (N=308)

Items	r_{jx}	<i>t</i>
<i>Limited Variety sub-field</i>		
<i>I-10. My child is willing to try new foods.</i>	.15	-
I-11. My child dislikes certain foods and won't eat them.	.30	-7.75

I-13. My child prefers the same foods at each meal.	.41	-12.49
I-14. My child prefers 'crunchy' foods (i.e., nuts, cracker, chips).	.31	-7.86
<i>I-15. My child accepts or prefers a variety of foods.</i>	<i>.13</i>	-
I-16. My child prefers to have food served in a particular way (i.e., cut into small pieces, mashed or with straw, etc.)	.41	-9.91
I-17. My child prefers only sweet foods (i.e., candy, sweet cereals).	.22	-7.15
I-18. My child prefers foods prepared in a particular way (i.e., mostly fried foods, cold foods, raw vegetables).	.46	-12.26

Food Refusal sub-field

I-1. My child cries or screams during mealtimes.	.44	-9.28
I-2. My child turns his/her face or body away from food.	.54	-12.39
I-4. My child expels food that he/she has eaten.	.46	-8.46
I-7. My child is disruptive during mealtimes (i.e., pushing/throwing away plate, fork-spoon, food).	.50	-8.66
I-8. My child closes mouth tightly when food is presented.	.55	-10.48

Features of Autism sub-field

<i>I-3. My child remains seated at the table until meal is finished.</i>	<i>.15</i>	-
I-5. My child is aggressive during mealtimes (i.e., hitting, kicking, and pinching those sitting beside him/her).	.39	-6.44
I-6. My child displays self-injurious behavior during mealtimes (i.e., hitting/biting himself/herself).	.38	-6.23
<i>I-9. My child is flexible about mealtime routines (he/she is not obsessed with/strict about mealtimes, seating order, places of having the meal).</i>	<i>.09</i>	-
I-12. My child refuses to eat foods that require a lot of chewing (i.e., preferring only soft or mashed foods).	.40	-7.45

Answering choices: Never/Very Rarely=1, Rarely/Seldom=2, Occasionally/Sometimes=3, Often=4, In Almost All Meals=5

*** p< .001

2.1.2. Internal consistency reliability and split-half reliability

Cronbach's alpha (α) internal consistency coefficient of BAMBİ was calculated as .79. It is observed that the scale has an acceptable internal consistency (see Table 2). In order to determine split-half reliability values of BAMBİ, two split-half test correlation was calculated between odd numbered items (1, 5, 7, 11, 13, 17=6 items) and even numbered items (2, 4, 6, 8, 12, 14, 16, 18=8 items) of the inventory. Split-half reliability of BAMBİ was calculated as .86 (p<.01) according to Pearson r calculation and .83 (p<.01) according to Spearman Brown rho calculation. Findings indicate that split-half reliability of BAMBİ was good (see Table 2).

Table 2. Internal consistency and split-half reliability coefficients of BAMBİ (N=308)

Reliabilities	Values
Cronbach's alpha (α) internal consistency	.79
Pearson r split-half reliability	.86
Spearman Brown rho. split-half reliability	.83

** p<.01

2.2. Validity

2.2.1. Structure validity - confirmatory factor analysis

Structure validity of BAMBİ was calculated with "Confirmatory Factor Analysis (CFA). Critical N value which includes minimum number of participants for CFA was calculated as (CN)=133.53 in the research. Accordingly, it can be stated that the study group consisting of 308 participants was suitable for CFA.

In CFA, it is required that many fit index values used to determine the sufficiency of the examined model have certain interims (Hu & Bentler, 1999; Anderson & Gerbing, 1984; Cole, 1987; Marsh, Ballave, & McDonald, 1988; Gulbahar & Buyukozturk, 2008; Joreskog & Sorbom, 1993; Schermelleh-Engel & Moosbrugger, 2003; Simsek,

2007; MacCallum, Browne, & Sugawara, 1996; Byrne, 2006; Schermelleh-Engel, Moosbrugger & Muller, 2003). Related fit index values and fit values of BAMBI are given in Table 3.

Table 3. Fit values of BAMBI according to fit criteria and fit values (N=308)

Fit Criteria	Good Fit Values	Acceptable Fit Values	Fit Values of BAMBI
χ^2 /sd	<3	<5	3.6
RMSEA	.00<RMSEA<.05	.05<RMSEA<.08 or .10	.09
SRMR	.00<SRMR<.05	.05<SRMR<.08 or .10	.07
GFI	.95<GFI<1.00	.85 or .90<GFI<.95	.89
AGFI	.90<AGFI<1.00	.80 or .85<AGFI<.90	.84
IFI	.95<IFI<1.00	.90<IFI<.95	.90
CFI	.95<CFI<1.00	.90<CFI<.95	.90

According to CFA results, it was seen that Chi-Square value ($\chi^2=268.87$, $N=308$, $sd=74$, $p=0.00000$) was significant. In the research, it is observed that the model of BAMBI has an acceptable goodness of fit ($fit=3.6$) according to $\chi^2/sd=fit$ ($268.87/74=3.6$) calculation. Fit index values of the model based on CFA were calculated as $RMSEA=.09$, $SRMR=.07$, $GFI=.89$, $AGFI=.84$, $IFI=.90$ and $CFI=.90$. It is seen that factor loads of the factor vary between .30 and .71. Fit index values indicate that the model was fit and it achieved an acceptable fit with the data.

3. Results

In the study, it was aimed to determine the psychometric properties of BAMBI developed by Lukens (2005) and Lukens and Linscheid (2008) over the children with autism in Turkey. To this end, results of Confirmatory Factor Analysis, Cronbach's alpha (α) internal consistency coefficient, split-half reliability, item total correlation and the significance of the difference between 27% upper-lower item averages of BAMBI achieving linguistic equivalence were examined.

According to CFA results made under validity studies of the research, it was observed that fit values of suggested model of BAMBI are within acceptable fit index values range and the model of the scale has an acceptable fit.

Under reliability calculations of the study, it was determined that internal consistency reliability values of BAMBI were acceptable and split-half reliability was good. According to item total correlations of the scale, it was determined that prediction and representation of BAMBI items the total score was good, except for the 4 eliminated items. It was also seen that the differences between 27% upper-lower item averages of BAMBI were significant. It is a limitation not to be able to examine test-retest reliability and criterion related validity in the study. Therefore, related reliability and validity calculation may be included in further studies.

According to the findings of the research, it can be stated that Brief Autism Mealtime Behavior Inventory can be used as a valid and reliable measuring tool to determine the mealtime and feeding problems of individuals with autism in Turkey.

References

- Ahearn, W.H., Castne, T., Nault, K., & Green, G. (2001). An assessment of food Acceptance in children with autism or pervasive developmental disorder-not otherwise specified. *Journal of Autism and Developmental Disorders*, 31(5), 505-511.
- Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika*, 49, 155-173.
- Autism Society of America (ASA) (2006). *Defining autism*. Retrieved from <http://www.autismsociety.org/site/PageServer?pagename=aboutwhatis>.
- Byrne, B. M. (2006). *Structural equation modeling with EQS*. Mahwah, NJ: Lawrence Erlbaum.

- Burd, D., Shantz, J., Swearingen, W. S., Ahearn, W. H., & Kerwin, M. L. (1995, May). *The treatment of food selectivity*. Poster presented at the annual meeting of the Association for Behavior Analysis. Washington, DC.
- Buyukozturk, S. (2004). *Veri Analizi El Kitabı* [Data analysis manual]. Ankara: Pegem A Pub.
- Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology*, 55, 1019-1031.
- Crocker, L., & Algina, J. (2008). *Introduction to Classical and Modern Test Theory*. Ohio, USA: Cengage Learning Pub.
- Cumine, V., Leach, J., & Stevenson, G. (2000). *Autism in the early years*. London: David Fulton.
- DSM-IV-TR (2007). *Ruhsal Bozuklukların Tanımsal ve Sayımsal El Kitabı (2007)*. American Psychiatric Association/2000 [Manual of defining and classifying diseases in psychiatry, Diagnostic and Statistical Manual of Mental Disorders IV-TR] (4th ed.) (DSM-IV-TR), Translated by Koroglu E, Ankara: Hekimler Yayın Birliği.
- Farrell, D. A., Amari, A., & Hagopian, L. P. (1996, May). *Treatment of total liquid refusal in a 12-year-old male with chronic gastrointestinal problems, autism, and mental retardation*. Poster presented at the annual meeting of the Association for Behavior Analysis, San Francisco.
- Gulbahar, Y., & Buyukozturk, S. (2008). Degerlendirme Tercihleri Olceginin Turkceye Uyarlanması [Adaptation of assessment preferences inventory to turkish]. *Hacettepe Universitesi Egitim Fakultesi Dergisi*, 35, 148-161.
- Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structural analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.
- Joreskog, K., & Sorbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Lincolnwood, USA: Scientific Software International, Inc.
- Kodak, T., & Piazza, C.C. (2008). Assessment and behavioral treatment of feeding and sleeping disorders in children with autism spectrum disorders. *Child & Adolescent Psychiatric Clinics of North America*, 17, 887-905.
- LISREL, Joreskog, K., & Sorbom, D. (2004). *Interactive LISREL®* Lincolnwood, USA: Scientific Software International, Inc.
- Lukens, C.T. (2005). *Development and validation of an inventory to assess eating and mealtime behavior problems in children with autism* (Unpublished doctoral dissertation). The Ohio State University. UMI Number: 3192869
- Lukens, C.T., & Linscheid, T.R. (2008). Development and Validation of an inventory to assess mealtime behavior problems in children with autism. *J Autism Dev Disord*, 38, 342-352. doi: 10.1007/s10803-007-0401-5.
- MacCallum, R.C., Browne, M.W., & Sugawara, H.M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130-149.
- Matson, J.L., & Kuhn, D.E. (2001). Identifying feeding problems in mentally retarded persons: development and reliability of the Screening Tool of Feeding Problems (STEP). *Res Dev Disabil*, 22, 165-72.
- Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin*, 103, 391-410.
- Powell, T. H., Hecimovic, A., & Christensen, L. (1992). Meeting the unique needs of families. In D. E. Berkell (Ed.), *Autism: Identification, education and treatment* (pp. 187-224). Hillsdale, NJ: Erlbaum.
- Ritvo, E. M., & Freeman, B. J. (1978). National society for autistic children definition of the syndrome of autism. *Journal of Autism and Childhood Schizophrenia*, 8, 162-170.
- Schermelleh-Engel, K., Moosbrugger, H., & Muller, H. (2003). Evaluating the fit of structural equation models: Test of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8(2), 23-74.
- Schreck, K.A., Williams, K., & Smith, A.F. (2004). A comparison of eating behaviors between children with and without autism. *Journal of Autism Dev Disord*, 34, 433-8.
- Simsek, O.F. (2007). *Yapısal Eşitlik Modellemesine Giriş, Temel İlkeler ve LISREL Uygulamaları* [Introduction to structural equation modeling, basic principles and LISREL applications]. Ankara: Ekinoks Eğitim Pub.
- SPSS. (2009). *PASW® Statistics 18.0.0*. Chicago, IL: SPSS Inc.