

Linguistic Equivalence, Validity and Reliability Study of the Mind Excessively Wandering Scale

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ABSTRACT

Introduction: The main objective was to study the linguistic equivalence, validity and reliability of the transliterated Turkish version of Mind Excessively Wandering Scale (MEWS) developed by Prof. Philip Asherson in England (2016). Mind excessively wandering defines uncontrolled mental phenomena, which is proposed as the psychological counterpart of Default Mode Network in literature.

Method: Mind Excessively Wandering Scale, Adult Attention Deficit Hyperactivity Disorder Self-Report Scale, Barratt Impulsiveness Scale, Difficulties in Emotion Regulation Scale have been used. The sample group consists of 64 patients previously diagnosed as adult Attention Deficit Hyperactivity Disorder for validity, 60 students for transliterational equivalence, and 80 healthy controls for test re-test reliability.

Results: Transliteration equivalence study demonstrates that Turkish version of MEWS is highly correlated with the English version and is statistically significant. The sixth item in the scale was removed in order to ensure the

consistency model established by LISREL in the validity study according to the confirmatory factor analysis. When the sixth item was excluded, it was concluded that the structure of the scale was compatible. In the reliability study of the MEWS, the Cronbach's alpha value (α) of the scale was found to be 0.826. It is seen that the item with the highest distinctiveness feature is Item-10 (0.618) and the item with the lowest distinctiveness feature is Item-5 (0.318). In the linguistic equivalence study, no statistical difference was found between the English form and the Turkish versions of the scale.

Conclusion: As a result of the practical and statistical evaluations, our study demonstrated that the Turkish version of the MEWS is a valid and reliable measurement tool.

Keywords: Adult Attention Deficit Hyperactivity Disorder, mind excessively wandering, reliability, validity

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a disorder consisting of inattention, hyperactivity, and impulsivity symptom clusters, and which progresses with severe impairment in psychosocial functionality inappropriate for the individual's age and developmental period. Recently, cognitive symptoms and inner experiences are being examined along with behavioural symptom. One of the most important of these inner experiences is incessant mind activity, continuous movement of thoughts and the mind constantly being full of thoughts, as expressed by patients. These thoughts are usually uncontrollable. It is observed that many thoughts form at the same time. Short-term thoughts that move from one to another are defined as mind wandering (1,2). Mind wandering is an evolutionary experience and constitutes 50% of thought processes in a day. Conceptually considered, dreaming, mental thinking and creative thinking are spontaneous thoughts (3). Two types of mind wandering are defined.

1. Inner thoughts formed voluntarily: This is a situation people create completely voluntarily. For example, planning the menu for your party in the evening while driving to work.
2. Mind wandering that occurs spontaneously and completely involuntarily: This happens especially during class or when one needs to

Highlights

- **Diagnosis is the most difficult part in the assessment of Adult ADHD.**
- **Excessive mind wandering occurring spontaneously and involuntarily can be a predisposition marker.**
- **This scale provides statistically reliable measurement of Excessively Mind Wandering**
- **Excessive mind wandering relates to symptom severity of Adult ADHD.**

concentrate. Along with varying from person to person in intensity and volition, it is of completely unpredictable nature (4).

Voluntary excessive mind wandering provides a basic explanatory hypothesis for ADHD symptoms and impairment in functionality. Although it is believed that mind wandering provides a superiority for people in some cases (such as forming strategic thoughts while performing

a routine task) the ones that occur involuntarily and uncontrollably prevent performing ongoing tasks and focusing on the current cognitive task of the person (4,5).

Mind wandering is observed in several clinical cases such as mood disorders, anxiety disorders and psychotic disorders. Studies have shown that mind wandering can be a risk factor before bipolar disorder is diagnosed. Nevertheless, it is thought that mind wandering may be a predisposition marker rather than a condition specific to bipolar disorder. However, content of thoughts during manic or depressive episodes in the clinical sense are not suitable illness periods to measure mind wandering. Mind wandering can be considered a predisposing variable to this disorder rather than being a typical phenomenon of this disorder (6–8).

Anxiety disorders are characterized with repetitive negative thoughts and recurring concerns. In these disorders, impairments associated with default mode network (DMN) and frontoparietal control circuits have been demonstrated. However, studies on this subject are limited. The data are not enough to form a hypothesis unlike it is in ADHD (9).

Psychotic disorders; schizophrenia, schizoaffective disorder and bipolar disorder with psychotic characteristics are closely related to detachments in thought process and as well as to thought disorganization. Impairment in executive functions and issues in processing semantic information occur in psychotic disorders as well as in ADHD. In psychotic disorders, there is both extreme variability and extreme persistence of thought. This variability and persistence are closely related to the inadequacy of executive functions. Comparison studies with healthy controls have demonstrated that schizophrenia patients may be closely associated with DMN, both in resting and short-term memory tasks. It is thought that the DMN may be related to spontaneous mind wandering in psychotic disorders, just as in ADHD (3).

The first study on mind wandering in ADHD was the 1993 study by Shaw and Giambra, which examined thoughts unrelated to a simple attention task. The frequency of task-unrelated thoughts was found to be higher in university students with childhood ADHD compared to healthy controls in this study. In another study examining voluntary and involuntary mind wandering, spontaneous and voluntary mind wandering was compared in individuals diagnosed with ADHD. It was demonstrated that spontaneous mind wandering is more prevalent in individuals diagnosed with ADHD.

In another study in which the relation between ADHD symptoms and mind wandering was examined, the correlation between mind wandering and the frequency of thoughts that occur independently of task given both in a laboratory environment and in daily life was observed (1). Findings suggest that experiencing mind wandering subjectively is more valuable than measuring ADHD symptoms in the usual way (10). Functional studies on brain development have presented the hypothesis of developmental delay (11). According to this hypothesis, permanent developmental gaps are closely correlated with symptom pattern and impairment in functionality. The development of functional changes associated with resting brain networks, excessive, spontaneous and context-independent thoughts (as in excessive mind wandering) may be associated with symptoms of attention deficit throughout life. In relation to this, new biological studies on ADHD present findings correlated with DMN, frontoparietal, ventral attention circuits (12).

A recently published review study demonstrated that there are two main DMNs in ADHD (13). DMN being affected was found correlated to the symptoms of attention deficit especially in tasks related to attention (12).

Many studies which measure impairment in attention and executive functions prominent in ADHD with cognitive tasks were conducted.

These tasks generally demonstrate the inadequacies associated with maintaining attention in ADHD. Since these experiments in cognitive psychology are generally task-oriented; parameters that question the patients' reaction times, termination errors and impulsivity levels were taken as basis. Though, irrelevant thoughts in the background indicate a different aspect of this disorder. It was shown with recent functional magnetic resonance imaging (fMRI) studies that in ADHD population, DMN is closely correlated with involuntary spontaneous mind wandering. Evidence on ADHD being a neurodevelopmental disorder and a disorder associated with the maturation of the brain is getting stronger (14–16).

Delayed maturation has been shown in studies conducted with children diagnosed with ADHD. It was presented that these children have fewer connections in their DMN. Although new data are needed for these studies, it can be expressed that ADHD can put forth a hypothesis on both automatically and voluntarily occurring mind wandering. This hypothesis suggests that DMN being insufficiently suppressed is closely correlated with involuntary mind wandering and DMN being properly suppressed is closely correlated with brain development (14,17).

Mind wandering shows the shift of thought content from external sources and ongoing tasks to internal unrelated thoughts and feelings within a certain period of time (2). Continuous mind activity, besides especially including excessive mind wandering, was found to be more specific to individuals with ADHD (18,19). Mind wandering in ADHD differs from other individuals by being involuntary, uncontrollable and frequent. This situation indicates an important core issue in ADHD. Such mind wandering condition is independent, especially, from external sources of thoughts and completion of some mobile tasks. They are internally felt thoughts and emotions unrelated to tasks and external stimuli. In fact, as well as being a universal human experience, it is known that such thoughts, independent from the external world, occur at a rate of 24–50% in people in wakeful state (2,20). When these findings are assessed, it was determined that mind wandering being present in ADHD diagnosed individuals is highly likely and this may cause a fundamental issue. It was demonstrated that excessive mind wandering may be closely correlated with symptoms and impairments related to these symptoms (4). In this respect, a Likert-type scale called Mind Excessively Wandering Scale (MEWS) was created by Prof. Dr. Philip Asherson in England in order to present how mind wandering affects the pathogenesis of ADHD and in the meantime its potential role in diagnosis (21). This scale has been created with subjective experiences of patients in order to reveal mind wandering in ADHD.

Measurement tools or symptom screening lists to date are mostly established on behavioral assessments. This scale however creates a chance to assess mental phenomena in ADHD apart from physical symptoms. Adult ADHD diagnosis requires a difficult diagnostic process; it is a clinical diagnosis. It requires a detailed medical history and a good knowledge of mental development. In recent years, some scales related to Adult ADHD have been developed and adapted to Turkey. Studying mind wandering can enable questioning this in cases, and ADHD being more easily recognized and differentiated. It is also hoped to provide guidance in pharmacological treatment and psychotherapy.

Mind wandering is a term newly introduced to the literature. Studies on it started in other countries only a short time ago. However, there are no studies in this field in Turkey. It is thought that this study will enable new studies on mind wandering to be carried out in Turkey. The aim of this research is to perform the linguistic equivalence, validity and reliability study of the MEWS, developed by Philip Asherson in 2016 in England.

METHOD

Sample

Various different study groups were used in the linguistic equivalence, validity and reliability stages of the study. In the linguistic equivalence study, academicians who speak English and Turkish very well and who are thought to have a good proficiency level in both languages and who are also experts in psychology, psychiatry, psychological counselling and guidance, as well as senior students of İstanbul Kültür University English Language Teaching Department (total: 60 students) were taken as basis during the translation process.

In order to determine the test-retest reliability of the MEWS, 3rd and 4th grade students studying at İstanbul Kültür University, Faculty of Education, Psychological Counselling and Guidance Department (80 students) were taken as basis.

A total of 64 patients who applied to the İstanbul Kanuni Training and Research Hospital psychiatry outpatient clinic and were being followed-up were taken as the basis for adult patients with ADHD.

Measurement Tools Used

Demographic Data Form

It was prepared considering the necessary information specific to this study with the aim of collecting information about the sample. In the sociodemographic data form, it was aimed to determine sociodemographic characteristics with questions such as age, gender, marital status, occupational status, education level, alcohol and substance use, and whether there was a psychiatric application in childhood.

Mind Excessively Wandering Scale

It is a scale developed by Florence D. Mowlem, Caroline Skirrow, Peter Reid, Stefanos Maltezos, Simrit K. Nijjar, Andrew Merwood, Edward Barker, Ruth Cooper, Jonna Kuntsi, and Philip Asherson in England in 2016 with the aim of revealing the effect of mind wandering on the pathogenesis of ADHD and also to determine its potential role in diagnosis (4). This is a Likert-type self-evaluation scale consisting of 12 items. It aims to reveal mind wandering in ADHD. In view of ADHD patients' own description of their respective mental states, it tries to measure some characteristics such as jumping from one mental thought to another, trying to execute all these thoughts at the same time, jumping from one subject to another or trying to execute different lines of thought simultaneously. This scale aims to assess mental phenomenon in ADHD apart from behavioural symptoms. Scales created to this date are usually based on measuring behavioural characteristics of ADHD and therefore determining the severity of symptoms. This scale aims to measure cognitive symptoms in ADHD and other comorbid psychiatric disorders.

A validity and reliability study was conducted in England, where the scale was developed in 2016. The study of original scale's validity was conducted on two samples. One of these samples consisted of the cases in the MIRIAT (Mood Instability Research in ADHD) case-control study examining neuropsychological findings and emotional dysregulation in patients with ADHD. The other sample consisted of the findings of the cases in OCEAN (Oils and Cognitive Effects in Adults ADHD) project. In the original scale, ADHD symptoms were assessed by Barkley adult ADHD rating scale and Conners' adult ADHD rating scale. Affective Lability Scale Short Form (ALSSF) was used for emotional dysregulation. Weiss Functional Impairment Rating Scale was used in validity study. In the original study, the scale consisting of 15 items was converted into a 12-item short form as a result of the re-evaluation of the item factor loads and the ROC (receiver operating characteristic) analysis made to increase its sensitivity and specificity. The sensitivity of the 12-item short

form was 0.89 and its specificity was 0.90. In the construct validity study, data obtained with Varimax Rotation method were assessed as statistical process. Construct validity was tested using the independent group t test and the Mann Whitney U test. In the reliability study, Cronbach's alpha value was calculated in order to evaluate the internal consistency of the scale. Pearson correlation coefficient values were taken into account in the calculation of test-retest reliability. In order to find the highest cut off point, the cut off score of the diagnostic confirmation was calculated by performing ROC analysis. The Cronbach's alpha value was found to be 0.78 (4).

The necessary legal permission was obtained from the person who developed the scale which will be used within the scope of linguistic equivalence, validity and reliability study suitable for conditions in Turkey.

Difficulties in Emotion Regulation Scale (DERS)

The scale was developed by Gratz and Roemer (2004) to evaluate emotion regulation difficulties (22). The scale, which consists of a total of 36 items, is evaluated on a 5-point Likert scale (1=almost never, 5=almost always); high scores from the scale indicate difficulties in emotion regulation. The scale consists of six subscales. These are: lack of awareness in emotional reactions (awareness), lack of clarity of emotional responses (clarity), non-acceptance of emotional responses (non-acceptance), limited access to effective strategies (strategies), difficulty in controlling impulses when negative affect is experienced (impulsivity) and difficulties in engaging in goal-directed behavior when experiencing negative affect (goals). As can be seen, the scale covers characteristics ranging from awareness of emotional regulation stage to expression of emotions stage. In psychometric study of the original scale, internal consistency of the measuring tool was stated as 0.93; alpha consistency coefficient was stated as between 0.80 and 0.89. The test-retest reliability is 0.88. The adaptation study of the scale into Turkish was conducted by Ruganci and Gençöz (2010) (23). In this study conducted at a university sample, it was determined that the scale had the same factor constructs as the original scale; and it was seen that only one item was loaded on a different factor than the original scale. In the same study, while Cronbach's alpha coefficient of the scale was found to be 0.94, the subscales showed internal consistency coefficients between 0.75 and 0.90. In addition, the test-retest reliability was found to be 0.83 in the study. In this study, the internal consistency coefficient of the scale was found to be 0.71 (23).

Barratt Impulsiveness Scale (BIS-11)

It is a scale filled by the patient and used for assessing impulsiveness (9). It consists of 30 items and has 3 subscales:
Attentional or cognitive impulsivity,
Motor impulsivity,
Non-planning impulsivity.

Attentional impulsivity is described as quick decision making, motor impulsivity is described as acting without thinking, non-planning impulsivity is described as being focused in the moment and not thinking about the future. While Barratt impulsiveness scale (BIS-11) is being assessed, four different sub-scores are obtained: Total score, non-planning, attentional and motor impulsivity scores. The higher total BIS-11 score is, the higher the patient's impulsiveness level. The Turkish validity and reliability study of BIS-11 was conducted by Güleç et al. (24).

Adult ADHD Self-Report Scale (ASRS-v1.1)

This scale was developed by the World Health Organization based on DSM-IV ADHD diagnostic criteria to screen for ADHD symptoms in adults (25). The validity and reliability study of the Turkish version was conducted by Doğan et al. (26). A total of 18 items in the scale intends to determine how often each symptom emerged in the last six months. Nine

items of this 5-point Likert type (0=never, 1=rarely, 2=sometimes, 3=often, 4=very often) self-report scale assess inattention, the other nine items assess hyperactivity/impulsiveness. Those who score 24 or more on any of these subscales are considered to have ADHD with high probability, those who score 17–23 are considered likely to have ADHD, and those who score 0–16 are considered not to have ADHD. In the Turkish validity study of the scale, the internal consistency coefficients for the whole scale and its subscales were found to be 0.78–0.88, and the test-retest reliability coefficient was found to be 0.73–0.89.

Data Collection

In this study, many measurement tools were used to achieve the objectives. First, in order to be able to apply the scales used within the framework of the study, necessary legal permissions were obtained from İstanbul Kültür University, the Head of the English Language Teaching Department, from the İstanbul Kültür University Department of Psychological Counselling and Guidance, and from the Adult Psychiatry Department of İstanbul Kanuni Training and Research Hospital; the study was approved by the Ethics Committee of İstanbul Kanuni Training and Research Hospital on 31.03.2018 with the number 2018/3.

Necessary arrangements were made regarding the days and hours of applications which will be made as a group. It was conducted by the researcher with the group application technique on predetermined days and hours. Before the application, importance and goals of the study was explained to individuals who will apply the test in order to collect valid and reliable data, and a previously prepared informed form was signed. In addition, the points to be considered in the application of tests used are also expressed.

Since none of the tests used in our study have time limits, no certain time was given. Those who finished their application submitted their tests. Attention was given to ensure that the test environment and application was in compliance with scientific rules and away from external stimuli such as heat, light and sound.

Apart from general group applications, tests were individually applied in applications taking place in İstanbul Kanuni Training and Research Hospital, Psychiatry Outpatient Clinics and clinic. Later on, every test was graded according to their answer key.

Data Analysis

Inversion method was used to determine the linguistic equivalence of the Mind Excessively Wandering Scale. Among English and Turkish applications, Pearson correlation coefficients and related group t test results were assessed at item level. It is expected that the value achieved as a result of the Pearson correlation analysis to be less than 0.05 and the p values to be statistically significant. In our study, in order to determine the construct validity of the Mind Excessively Wandering Scale (MEWS), data achieved from patients diagnosed with adult ADHD were evaluated through Confirmatory Factor Analysis (CFA) to determine the relationship between the constructs included in the scale and the direction of the relationship. Data obtained were analyzed with Lisrel 8.51, which makes statistical analyses and used in especially structural equation modelling. Aiming this, Kolmogorov-Smirnov and Shapiro-Wilk analyses were conducted to determine whether the data obtained at the first stage are distributed normally in identifying construct validity. Because the scale was a single factor construct in its original form, a single factor CFA model was created.

To determine the criterion validity in our study; tests which could be closely related to the Mind Excessively Wandering Scale and could measure some relevant features were determined, and the correlation of MEWS with these features was examined. Along with MEWS; ASRS, BIS-11 and DERS was used. For this purpose, first it was examined with

Kolmogorov-Smirnov and Shapiro-Wilk analyses to see whether the data collected with ASRS, BIS-11 and DERS scales showed normal distribution. Later, Pearson Product – Moment correlation analysis was performed to determine relation between each scale used and MEWS.

In the reliability study of MEWS, Cronbach's alpha analysis was performed in order to determine internal consistency reliability. In addition, in order to find the test-retest reliability of the Mind Excessively Wandering Scale, MEWS was applied to 3rd and 4th grade students studying at the Psychological Counselling and Guidance Department of İstanbul Kültür University, Faculty of Education, with an interval of two weeks. Correlation between values obtained from both applications was calculated.

RESULTS

Linguistic Equivalence Study of Mind Excessively Wandering Scale

In determining linguistic equivalence level, "Back Translation Method" was used and following steps were pursued.

Translation process: Translation of the original scale form from English to Turkish was made by 6 experts in this field (psychologist, psychological counsellor, psychiatrist) who speak both languages well.

Evaluation of Translation: The Turkish form created was examined by 4 field experts, and a temporary Turkish form was created based on the criterion of being able to speak Turkish in the best way.

Back Translation: In this stage, the Turkish form created was translated from Turkish to English by 6 individuals consisting of field experts who are proficient in both Turkish and English.

Evaluation of Back Translation: Obtained English translations were examined by 4 field experts, compliance with the original scale was considered, and the English form obtained from back translations was created.

Peer Review: The Turkish form created by translating the original scale into Turkish, and the English form obtained from the back-translations and the original scale were sent to two experts for peer review. One of these experts is an academician in the English Language and Literature department and the other is an academician in the Psychological Counselling and Guidance Department, and both experts are proficient in both Turkish and English languages. For each item of the form given for the expert opinion, appropriate or not appropriate statements were included and the experts were asked to mark whether each item was appropriate or not. The experts were divided into two groups as language and field experts, and their review was assessed. For each item, 80% of appropriateness was sought and items under this score were corrected according to the suggestions of the experts. After this process, the final Turkish form was created.

Later, the final Turkish form created with the original form of the scale was applied with two weeks' interval to a total of 60 people, 21 of them being 3rd grade students of Kültür University English Language Teaching who are fluent in both languages, and 39 of them being academicians. Necessary permissions were taken from Kültür University, the purpose of the study was explained to the practitioners and the principle of volunteering was taken as basis. Pearson correlation coefficients and related group t-test results were examined at item level between English and Turkish applications. P values less than 0.05 obtained as a result of Pearson correlation analysis are expected to be statistically significant.

For linguistic equivalence study of the scale, correlation analysis was made and Pearson correlation coefficient between the English and Turkish form was calculated.

Table 1. Pearson product-moment correlation and correlated groups t-test analyses for linguistic equivalence on the Mind Excessively

	Items	n	\bar{x}	SD	r	p	t	p
1.	Eng_01	60	0.7333	0.799	0.854	<0.001	-2.399	0.020**
	Tur_01		0.8667	0.791				
2.	Eng_02	60	0.9833	0.770	0.770	<0.001	-0.725	0.471
	Tur_02		1.0333	0.801				
3.	Eng_03	60	1.3500	0.840	0.803	<0.001	0.497	0.621
	Tur_03		1.3167	0.812				
4.	Eng_04	60	0.7833	0.865	0.542	<0.001	-1.454	0.151
	Tur_04		0.9333	0.799				
5.	Eng_05	60	1.0167	0.833	0.551	<0.001	-2.124	0.038**
	Tur_05		1.2500	0.950				
6.	Eng_06	60	1.0167	0.873	0.707	<0.001	-1.932	0.058
	Tur_06		1.1833	0.873				
7.	Eng_07	60	0.8500	0.840	0.679	<0.001	-1.308	0.196
	Tur_07		0.9667	0.882				
8.	Eng_08	60	0.9500	0.832	0.659	<0.001	0.362	0.718
	Tur_08		0.9167	0.888				
9.	Eng_09	60	0.8000	0.683	0.697	<0.001	0.228	0.821
	Tur_09		0.7833	0.761				
10.	Eng_10	60	0.6833	0.791	0.654	<0.001	1.835	0.072
	Tur_10		0.5333	0.724				
11.	Eng_11	60	1.0167	0.892	0.638	<0.001	0.351	0.727
	Tur_11		0.9833	0.833				
12.	Eng_12	60	0.7500	0.727	0.554	<0.001	0.184	0.854
	Tur_12		0.7333	0.756				
Total	Eng_total	60	10.9333	60.854	0.896	<0.001	-1.355	0.180
	Tur_total		11.5000	7.261				

*p<001; **p<05; n: Number of cases; \bar{x} : Arithmetic mean; p: P value of significance; r: Pearson moment correlation; SD: Standart deviation; t: Related t test

When Table 1 is examined, it is seen that there is a significant and strong relation between items belonging to the English and Turkish form. The item with the lowest correlation among the items was the fourth item ($r=0.542$; $p<0.001$), while the item with the highest correlation was the first item ($r=0.854$; $p<0.001$). It can be said that there is no significant difference between the scores obtained with the English and Turkish forms of the other 10 items, excluding the first item ($t=-2.399$; $p<0.05$) and the fifth item ($t=-2.124$; $p<0.05$). With the analysis of the overall scale, it can be said that there is a statistically significant and very strong relationship between the English form and the Turkish form, and that there is no significant difference between the total scores obtained with the two forms ($t=-1.355$; $p>0.05$). In consideration of all these, it can be said that the linguistic equivalence of the scale is ensured by the presence of a significant and strong relationship between both the items and the total scores of the forms, as well as the absence of a significant difference between the items of the two forms except for the 1st and 5th items.

Validity Study of Mind Excessively Wandering Scale

In our study, primarily, in order to determine the construct validity of the scale, the data obtained from 64 patients diagnosed with Adult ADHD were evaluated by CFA in order to determine the relationship and direction of the relationship between structural equation modelling and the constructs included in the scale.

With Kolmogorov-Smirnov and Shapiro-Wilk analyzes, it was determined that the data collected from 64 subjects with the MEWS showed a normal distribution. In its original form, the MEWS has a single-factor construct. Accordingly, while the validity study of the linguistic equivalence scale was carried out with CFA, a single factor CFA model was established. In order to ensure the appropriateness of the model established in CFA, the sixth item in the scale was discarded and CFA was performed again. As a

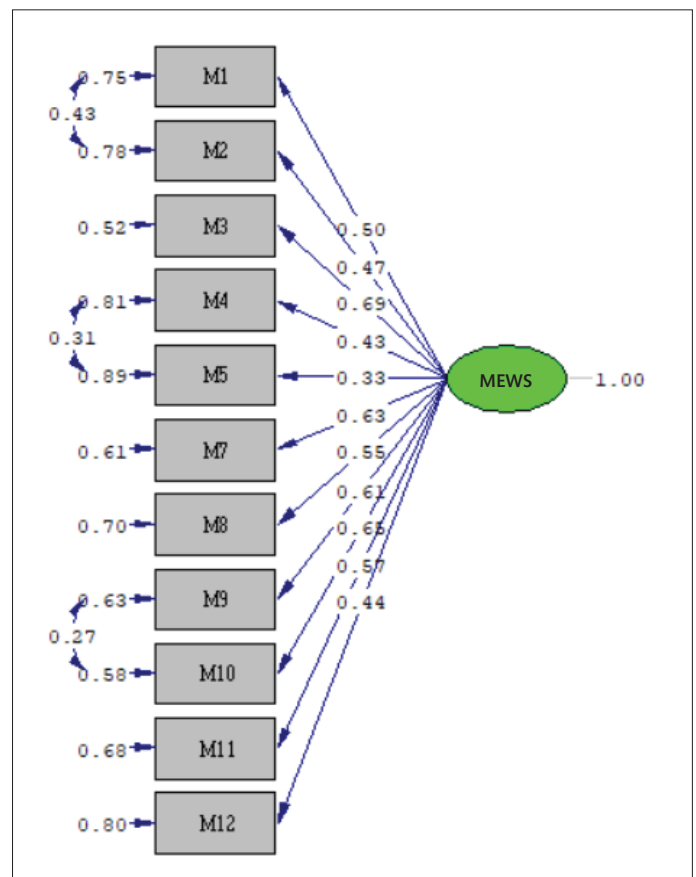


Figure 1. Standardized parameters belonging to Mind Excessively Wandering Scale.

result of these findings, the “second part correction indexes” suggested by the CFA analysis were applied. The suggested relations between items specified in the second part correction index were established and the analysis was repeated. The t-values for repeated analysis are given in Figure 1. Figure 1 shows the highest factor load (0.690) in item 4 whereas the lowest factor load (0.330) appears in item 5 in the MEWS.

When Table 2 is examined, Mind Excessively Wandering variable was explained the most in Item-3 ($R^2=0.48$) and the least in Item-5 ($R^2=0.11$). As a result of the calculations made with CFA, the sixth item of the original scale was removed and the construct validity of the MEWS was accepted.

Criterion Validity Study of the Mind Excessively Wandering Scale

In order to determine the criterion validity of the MEWS, ASRS, BIS-11 and DERS (Difficulties in Emotion Regulation Scale) was used in our study.

It was determined as a result of Kolmogorov-Smirnov and Shapiro-Wilk analyses that the data collected with ASRS, BIS-11 and DERS scales to be used in the study of equivalence validity of MEWS shows normal distribution values ($p>0.05$).

A significant correlation of 0.263 was found between MEWS and ASRS scale attention deficit subscale ($p<0.05$). No significant relation between MEWS and ASRS scale grand total score and hyperactivity/impulsivity sub-dimension was found ($p>0.05$). Accordingly, it can be said that individuals who have symptoms such as difficulty in focusing and maintaining attention, distraction from tasks taken on, looking like they're not listening, difficulty in organizing tasks and activities, not being

able to focus on details, making careless mistakes, avoiding tasks that require sustained mental effort have excessive mind wandering.

A significant correlation was found between MEWS and BIS-11 Attention Impulsivity ($p<0.05$), Motor Impulsivity subscale ($p<0.05$) and grand total ($p<0.05$). No significant relationship between the MEWS and the BIS-11 Nonplanning subscale was found. According to the positive relation between Attention Impulsivity subscale of the BIS-11 and the MEWS; scale; symptoms such as racing thoughts, problems with concentration and attention, quick shift of attention, intolerance to cognitive confusion, inadequacy in task and focus can be seen in individuals with excessive mind wandering. According to the positive relation between the Motor Impulsivity subscale of BIS-11 and the MEWS; it can be said that individuals who have excessive mind wandering show characteristics such as quick reaction, hasty behavior, and acting without thinking. However, it can be said that there is no relationship between planning impulsivity, which is a subscale of the BIS-11 measuring the lack of future orientation, and excessive mind wandering.

A significant correlation was found between the MEWS, and the Clarity ($p<0.05$), Strategies ($p<0.05$), Goals ($p<0.05$) subscales and overall total ($p<0.05$) of the DERS scale. No significant relationship was found between the MEWS and the DERS Awareness, Acceptance, and Impulsivity subscales.

Reliability Study of Mind Excessively Wandering Scale

The results of the Cronbach's alpha analysis performed to determine the internal consistency value of MEWS are presented in Table 3.

The Cronbach's alpha value (α) of the MEWS was found to be 0.826. Also, when the item-total correlations column is examined, it is seen that the item with the highest distinctiveness feature is Item-10 (0.618) and the item with the lowest distinctiveness feature is Item-5 (0.318). Moreover, it can be said that the values of all items are appropriate in terms of distinctiveness.

In our study, in order to find the test-retest reliability of the MEWS, it was applied to 3rd and 4th grade students studying at İstanbul Kültür University Faculty of Education, Psychological Counselling and Guidance Department, with an interval of two weeks. The correlation between values obtained from both applications was examined.

In order to determine the reliability of the MEWS, dependent groups t-test analysis was conducted between the two applications carried out within the scope of the test-retest reliability study. In the reliability

Table 2. Mind Excessively Wandering Scale, Statistics of Confirmatory Factor Analysis

Item	Factor Loads	t-value	R ²
Item-1	0.500	3.84	0.25
Item-2	0.470	3.55	0.22
Item-3	0.690	5.66	0.48
Item-4	0.430	3.25	0.19
Item-5	0.330	2.39	0.11
Item-7	0.630	5.01	0.39
Item-8	0.550	4.29	0.30
Item-9	0.610	4.81	0.37
Item-10	0.650	5.16	0.42
Item-11	0.570	4.42	0.32
Item-12	0.440	3.35	0.20

Table 3. Mind Excessively Wandering Scale, findings on the internal consistency characteristic

N	α	Items	Scale Average When Item Is Omitted	Scale Variance When Item Is Omitted	Fixed Item-Total Correlation	Cronbach's Alpha When Item Is Omitted
64	0.826	Item-1	23.28	17.697	0.510	0.811
		Item-2	23.17	17.700	0.479	0.814
		Item-3	22.89	17.781	0.612	0.803
		Item-4	22.89	18.956	0.404	0.820
		Item-5	22.92	19.406	0.318	0.826
		Item-7	23.20	17.117	0.591	0.803
		Item-8	22.94	18.472	0.457	0.816
		Item-9	23.13	17.317	0.608	0.802
		Item-10	23.31	16.599	0.618	0.800
		Item-11	22.95	18.395	0.474	0.814
		Item-12	22.75	19.397	0.367	0.822

Table 4. Independent groups t-test results of the Mind Excessively Wandering Scale (MEWS) test-retest reliability study

	Groups	n	\bar{x}	ss	Sh \bar{x}	r	p	t-test		
								t	Sd	p
MEWS	First application	80	10.64	5.73	0.640	0.914	0.000	1.199	79	0.234
	Second application		10.33	4.99	0.559					

\bar{x} : Arithmetic mean; p: P value of significance; r: Pearson moment correlation; SD: Standard deviation; Sh \bar{x} : Arithmetic mean of standard error; t: T test

studies performed with the test-retest method, it is expected that there will be a significant relation between the two applications in which the measurement tool was used as a result of the Pearson product-moment correlation analysis, and that there will be no significant difference between the two applications as a result of the independent groups t-test analysis. In line with this explanation, when Table 4 was examined, it was found that there was a significant relationship ($p < 0.05$) between the two applications of the MEWS and there was no significant difference ($p > 0.05$) between the two applications.

DISCUSSION

The aim of this study is to study the linguistic equivalence, validity and reliability of the main MEWS.

Our study revealed that mind wandering is distinctive in ADHD cases, and that it is directly proportional to the severity of ADHD symptoms. Studies have shown that mind wandering is more prevalent in ADHD population and that mind wandering scores are associated with ADHD symptoms (1,4). When these studies are assessed, it can be concluded that mind wandering is a core phenomenon in ADHD. Considering that ADHD symptoms are distributed in a wide spectrum in the general population, the presence of this phenomenon can be considered distinctive in cases where the symptoms are severe (12). Mind wandering can be explained in terms of disrupting functionality significantly, causing distraction in ongoing cognitive tasks, and negatively affecting the completion of cognitive tasks. This condition leads to disruptive effects not only in cognitive tasks, but also in social interaction and interpersonal relations (27). Mind wandering is associated with inadequacy in executive functions, and it can be said that psychostimulant treatment reduces the regulation insufficiency and normalizes the flow of thought in these patients (28). From this perspective, mind wandering can be accepted as a mental aspect that reflects the complex thought processes in ADHD, and it can be said that it has a disruptive effect on both attention tasks and behavioral situations that require inhibition.

Today, there are limited studies in the world literature investigating mind wandering in ADHD. In our country, there is no study conducted in this field. Studies have focused especially on mind wandering, ADHD and DMN activities (16,29). In consideration of these studies, when the relations between mind wandering and ADHD symptoms are assessed on the basis of symptom clusters, it can be said that the diagnosis of ADHD may be related to mind wandering and its neuronal projections.

ADHD is a disorder that creates a lot of variability in terms of thought activity. Studies conducted so far were far from shedding light upon where spontaneous thought processes, in ADHD, correspond to. Yet, ADHD is a disorder characterized by significant variability in thought processes along with significant neuronal changes. FMRI studies conducted with various neuropsychological tasks demonstrate that in ADHD, the prefrontal cortex and dorsal attention network function inadequately, therefore this insufficient function does not suppress the DMN appropriately. Developmental studies have particularly revealed that the dorsal attention network changes and matures over time (30).

When the hypothesis demonstrated by DMN is considered, mind wandering corresponds to a state that occurs with the activation of DMN and decreases with psychostimulant treatment. However, new studies are needed to reveal the direct relevance of DMN with mind wandering. It has been demonstrated in previous studies that mind wandering significantly impairs functionality in ADHD regardless of the severity of ADHD symptoms (21,31). In spite of ADHD being the most common neuropsychiatric disorder of childhood; the course, incidence and frequency of mind wandering in normal development have not been revealed yet. Therefore, although current studies and our study are mostly based on adults, it may be misleading to think that this phenomenon may be unique to adults.

We can think that excessive mind wandering is a behavioral consequence of inadequate functioning of DMN and networks controlling executive functions. Excessive mind wandering has also been demonstrated to be associated with variability in DMN circuits (32). In addition, the relationship between excessive mind wandering and activation in the DMN was also associated with excessive mind wandering frequency (33).

Considering the relationship between ADHD and mind wandering, studies investigating the effects of psychostimulant treatment on mind wandering are needed. In some studies, the decrease in mind wandering in cases treated with methylphenidate indicates that this phenomenon is a direct biological condition (34). Apart from that, it has been reported that mindfulness exercises can regulate mind wandering and that this effect can be as effective as medication (35).

Limitations

Adult ADHD cases are often comorbid. In our study, these comorbid cases were excluded because they could have created a different distribution in terms of mind wandering. This exclusion increased the internal consistency of the study. However, it may have partially affected the external validity of the sample and caused the sample population we chose to partly diverge from the natural distribution of ADHD.

Another limitation is that this study was conducted with the number of patients reached. A much larger sample will better demonstrate how the excessive mind wandering phenomenon is distributed in ADHD. This study is limited to the answers to the tests which are given by adults over the age of 18 and used for research purposes and the measurement tools chosen to determine the criterion validity.

CONCLUSION

Mind wandering is a term newly introduced to the literature. Studies on mind wandering are limited and there is no study in this field in our country. The fact that the validity and reliability study of the MEWS was conducted will enable mind wandering to enter the literature as a concept and be used as a measurement tool in new studies in this field.

In recent years, some scales related to adult ADHD have been developed and adapted to Turkey. However, no biological parameter has been identified that distinguishes adult ADHD symptoms. In adult ADHD, the characteristics and distinctive features of the symptoms presented by

cases are prominent. Studying mind wandering can enable this to be questioned in cases, and for ADHD to be recognized and distinguished more easily. It is also hoped that it will also be a guide for pharmacological treatment and psychotherapy.

It is not yet known how mind wandering change with age and how it progresses developmentally. However, the presence of mind wandering in ADHD will help the diagnosis of ADHD in cross-sectional assessment. Also, the variation-by-age of mind wandering as a symptom of ADHD can be handled in further studies.

It has been demonstrated that DMN deactivation and reaction time variability are associated with ADHD symptoms. In this circumstance, it can be hypothesized that DMN deactivation will reduce risk-taking behaviors. Future studies can give more illuminating information on this subject.

The response of mind wandering to pharmacological treatment and the extent to which they change can be an independent field of examination. Studies to be made on this subject can test the use of pharmacological treatment in the evaluation of changes in mind wandering to assess the effect of it. Studies on mindful awareness of mind wandering (mindfulness-noticing one's own mind wandering) have revealed that psychological treatments, especially mindfulness-based therapies, can reduce mind wandering (1,35). New studies will reveal how ADHD symptoms with mind wandering respond to such mindfulness-based interventions.

MEWS can be used additionally to measure symptoms of ADHD, and it can indirectly provide knowledge about the neuronal functioning in order to assess both medicine effect and outcomes of psychotherapy interventions.

Ethics Committee Approval: The study was approved by the Ethics Committee of Istanbul Kanuni Training and Research Hospital on 31.03.2018 with the number 2018/3.

Informed Consent: Before the application, importance and goals of the study was explained to individuals who will apply the test in order to collect valid and reliable data, and a previously prepared informed form was signed.

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