



Psychometric Properties of the Irrational Beliefs Scale for Insomnia (IBSI) in Turkish Emerging Adults

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Título: Propiedades Psicométricas de la Escala de Creencias Irracionales para el Insomnio (ECII) en Jóvenes Adultos Turcos.

Resumen: El estudio actual tuvo como objetivo evaluar las propiedades psicométricas de la Escala de Creencias Irracionales para el Insomnio (ECII) en jóvenes adultos turcos. El instrumento de medición busca evaluar creencias irracionales midiendo cuatro creencias irracionales fundamentales (exigencia, catastrofización, intolerancia a la frustración y evaluación global del valor). Se incluyó un total de 762 jóvenes adultos (556 mujeres, 206 hombres) entre las edades de 19 y 28 años en todas las fases del estudio. Los resultados indicaron que la ECII, compuesta por 4 dimensiones y 24 ítems, es válida y fiable según los resultados del Análisis Factorial Exploratorio (AFE), Análisis Factorial Confirmatorio (AFC) y análisis de red. El alfa de Cronbach calculado y el ω de McDonald mostraron que el instrumento era satisfactorio. Los resultados proporcionan evidencia sólida de que la ECII es un instrumento válido y fiable para jóvenes adultos turcos.

Palabras clave: Creencia irracional. Insomnio. Adulto joven. Desarrollo.

Abstract: The present study aimed to assess the psychometric properties of the Irrational Beliefs Scale for Insomnia (IBSI) in Turkish emerging adults. The measurement instrument aims to assess irrational beliefs by measuring four core irrational beliefs (demandingness, awfulizing, frustration intolerance, and global evaluation of worth). A total of 762 emerging adults (556 female, 206 male) between the ages of 19 and 28 were included in all stages of the study. The results indicated that the IBSI, consisting of 4 dimensions and 24 items, is valid and reliable according to the results of EFA, CFA, and network analysis. The calculated Cronbach's α and McDonald's ω showed that the instrument was satisfactory. The results provide strong evidence that the IBSI is a valid and reliable instrument for Turkish emerging adults.

Keywords: Irrational belief. Insomnia. Emerging adult. Development.

Introduction

Although sleep is a fundamental physiological necessity for humans, as it is for all other living organisms (Assefa et al., 2015), our understanding of sleep's functions remains limited. Present literature focuses on the two most universally acknowledged functions of sleep: recovery of the body and brain, and conservation of energy. Additionally, sleep deprivation, particularly when prolonged, leads to significant physiological complications (Krueger et al., 2016; Yetkin, 2021).

Various prevalence rates for insomnia and related sleep problems have been reported (Siegel, 2022). In the United States, one-third of the population reports sleep problems with about 9% experiencing daily sleep deprivation (Ancoli-Israel & Roth, 1999). Similarly, in Canada, 19% are dissatisfied with their sleep, and 13% meet all criteria for insomnia (Morin et al., 2011). Prevalence rates in European countries vary, with 19% to 29% in France (Leger et al., 2000) and 11.7% in Norway (Pallesen et al., 2001). In South Korea, 17% reported experiencing insomnia symptoms at least three nights per week (Ohayon & Hong, 2002). China's insomnia prevalence is 15% (Cao et al., 2017), with a noticeable increase during the COVID-19 pandemic, reaching up to 25% in some areas (Huang et al., 2020; Zitting et al., 2021). Post-pandemic, approximately one in five people suffer from in-

somnia, highlighting the urgency for standard treatment methods (Pudlo et al., 2022). Previous studies have found insomnia prevalence rates ranging from 3.2% to 42% in various populations (Liljenberg et al., 1988; Kokou-Kpolou, et al., 2020). Notably, among university students, an emerging adult group, the average prevalence is 18.5%, significantly higher than the general population (Jiang et al., 2015). These remarkable prevalence rates, especially in emerging adults, indicate that insomnia is a common health problem among university students and that more attention should be paid to insomnia in university students (Jiang et al., 2015). The findings on insomnia rates in Türkiye are both remarkable and varied, mirroring trends observed in other countries (Şahin et al., 2020; Şahiner-Önal & Hisar, 2018). It's crucial to highlight that globally, insomnia is a growing concern, affecting up to 51% of people, as indicated by Benbir et al. (2015). This increasing prevalence underscores the importance of sleep as a fundamental human need and elevates insomnia to a critical public health issue. Insomnia's impact on physical and mental health demands significant research and attention (Korkmaz-Arslan, et al., 2020). Furthermore, while the clinical population faces serious challenges with insomnia and related sleep disorders, varying rates are also observed in the nonclinical population. This suggests that addressing insomnia should be a widespread health priority, encompassing a broad range of populations to effectively mitigate its impact.

The DSM-5 dedicates a significant section to sleep-related disorders, defining insomnia as the difficulty in initiating or maintaining sleep, even in a conducive sleep environment (American Psychiatric Association [APA], 2022). Similarly, the ICD-11 criteria describe insomnia as problems in

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initiating or maintaining sleep despite adequate opportunities and conditions, emphasizing the daytime consequences of these sleep disturbances (Sateia, 2014). Individuals with insomnia experience a range of physical and psychological challenges (Yetkin & Aydın, 2014). Notably, insomnia impairs cognitive and physical functioning and is linked to diminished daytime functioning across emotional, social, and physical domains (Roth, 2007). It's also associated with decreased well-being, independent of physical illness and psychiatric disorders (Hamilton et al., 2007). Furthermore, insomnia correlates with various psychological issues such as emotion dysregulation (Palagini et al., 2017), depression (Lustberg & Reynolds III, 2000), addiction (Liu et al., 2022), and even violent tendencies (Evli et al., 2023). These associations suggest a significant link between insomnia and a range of psychological problems (Sahebi et al., 2021). Overall, this comprehensive understanding of insomnia, as defined by DSM-5 and ICSID, along with its extensive impact on both physical and psychological health, underscores the necessity of addressing this pervasive condition.

In recent years, there has been increasing interest in research on cognitive models of insomnia (Espie, 2007). The cognitive model of insomnia focuses on confirming that people with insomnia have a strong and intense concern about the negative consequences of insomnia and the direct impact of insomnia on daily life. In particular, the effects of insomnia are thought to cause a serious deficit in the perception of performance loss and, according to the cognitive model of insomnia, the result is the manifestation of psychological distress (Harvey, 2002). In addition, ways of thinking about sleep, in other words beliefs about sleep, are reported to exacerbate the problems associated with insomnia (Castillo et al., 2023; Morin et al., 2002). When research on cognitive models of insomnia is examined, processes related to the day and night effects of sleep come to the fore. When individuals associate the effects of insomnia with daytime processes, dysfunctional beliefs come into play (Harvey, 2002). In addition, recent studies show that cognitive behavioural therapies are highly effective in addressing dysfunctional beliefs about insomnia, following the cognitive model of insomnia (Eidelman et al., 2016; Thakral et al., 2020).

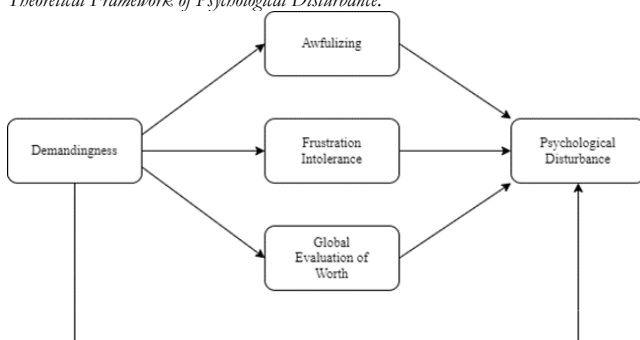
In addition to the growing body of literature on the cognitive model of insomnia, the theoretical framework of REBT provides a solid framework for insomnia. According to REBT, psychological disturbances are fed by 4 core irrational beliefs (see Figure 1). These are demandingness, frustration intolerance, awfulizing, and global evaluation of worth (Dryden, 2013). The common characteristic of irrational beliefs is that they are usually absolute, rigid, and inflexible (DiGiuseppe et al., 2013), and they generally do not contribute to the achievement of individual goals and cause unhealthy emotions and psychological disturbance (Turner, 2016). Specifically, demandingness has a unique place for Albert Ellis. Demandingness is the basis of other psychological disorders (Ellis, 1997). Individuals' wishes and desires become absolute and obligatory over time (Ellis, 1995), and

demandingness transforms into irrational beliefs of "should, must, must have, have to, need to" (DiGiuseppe et al., 2013). Individuals tend to encounter negative or unpleasant events in their lives and avoid situations that require a reduction in their comfort zone. The tension that arises particularly in the face of unpleasant life events is defined as frustration intolerance (Ellis, 2003). Individuals with irrational beliefs of frustration intolerance in their lives often experience ongoing psychological discomfort as they attempt to maintain their comfort zone or avoid unpleasant events (Dryden, 2011). Awfulizing is an individual's exaggerated evaluation of an issue and usually takes simple forms such as "terrible, bad, horrible". When individuals reflect on their awful beliefs, they usually act as if the worst-case scenario has occurred (DiGiuseppe et al., 2013). The value of the human being is suspended in the REBT framework, and it is recognized that individuals are changeable, capable of learning and making mistakes. Therefore, it is accepted that a holistic assessment of the human being is much more complex than it appears, and the assignment of human value is avoided (Dryden, 1994). According to this approach, it is only a person's behaviour that should be evaluated and therefore devaluation should be avoided (Dryden, 2019).

Previous research confirms the existence of measurement instruments that can reveal the cognitive model of insomnia and satisfy the severe and increasing need (Adan et al., 2006; Morin et al., 2011; Espie et al., 2000). The Dysfunctional Beliefs and Attitudes about Sleep (DBAS), a widely used instrument to measure the cognitive model of insomnia, includes 5 sub-dimensions. However, this instrument had some shortcomings (Espie et al., 2000). On the other hand, the Dysfunctional Beliefs and Attitudes about Sleep Brief Version (DBAS-16) reflects 4 dimensions including perceived consequences of insomnia, worry/helplessness about insomnia, sleep expectations and medication. In addition, the Sleep Beliefs Scale (SBS) is divided into 3 factors: sleep-incompatible behaviors, sleep-wake cycle behaviors, and thoughts and attitudes about sleep (Adan et al., 2006). The current literature provides some measures of the cognitive model of insomnia. The cognitive beliefs addressed in these instruments are similar to, but independent of, the REBT theoretical framework. Furthermore, when the structural features of the scales are considered, it is apparent that the scales have a conceptual structure that deals with the behavioural consequences of thoughts rather than thinking styles. This situation provides a framework that is disconnected from the theory in terms of identifying the effectiveness of therapy or the cognitive thinking styles that need to be intervened on, especially in treatment-oriented approaches. From this point of view, we believe that a scale that directly addresses thoughts about insomnia according to the theoretical background would be effective. However, none of these provide a comprehensive measure of beliefs about insomnia based on cognitive behavioural theories such as Ellis' theory.

Recent literature in cognitive-behavioral theories offers various conceptualizations and measurement instruments related to catastrophizing (Clemente et al., 2023; Jansson-Fröjmark et al., 2020; Morin et al., 2007; Tan et al., 2017). In this domain, measures of insomnia catastrophizing are continually evolving, with new instruments being developed (Jansson-Fröjmark et al., 2012) and existing ones adapted into different languages (Ballesio et al., 2018; Kabadayı et al., 2021). While catastrophizing is a significant concept in Rational Emotive Behavior Therapy (REBT), it does not encompass all irrational beliefs. Our study distinguishes itself by exploring the psychometric properties of an insomnia measure grounded in the well-established principles of REBT. We use the theoretical framework of REBT, which has been shown to be effective in treating insomnia (Qin et al., 2023; Sakakini et al., 2020). Specifically, we utilize Ellis' theory to develop a comprehensive assessment tool for insomnia-related problems, following the cognitive model of insomnia. This instrument, the Insomnia Belief Scale (IBSI), aims to thoroughly measure various aspects of insomnia-related sleep patterns, including difficulties with falling asleep, maintaining sleep, and the adverse daytime consequences of poor sleep. It does so through the dimensions of demandingness, frustration intolerance, awfulizing, and global development of value. This instrument can be used to more effectively measure the diagnostic and treatment outcomes of interventions in mental health studies based on the theoretical principles of REBT. The primary objective of our study is to establish the validity and reliability of the IBSI, thereby contributing a novel and comprehensive instrument for assessing insomnia within the framework of REBT.

Figure 1
Theoretical Framework of Psychological Disturbance.



Methods

Participants

The present study followed a systematic series of steps. The steps followed involved participants with different characteristics. The present study included four separate (independent) groups of participants for focus group interview (Sample I), pilot study (Sample II), EFA (Sample III) and CFA (Sample IV). A total of 762 (556 female, 206 male)

emerging adults participated in the focus group interview, pilot, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) stages. All the participants in the study first provided consent to answer the instruments. In the first step, a focus group interview was conducted with participants with insomnia symptoms for the IBSI items. Five female participants were registered for the focus group interview. The mean age of the participants was 21.6 years (range = 21-22). The focus group interview participants for the IBSI items had different characteristics (see Appendix 1). In the second stage, a pilot study was performed to check the suitability of the items of the scale. In this step, 25 participants (20 female, 5 male) participated in the pilot study. The mean age of the participants was 26.08 (range = 20-29). Sixteen of the participants were undergraduate students, 8 were graduate students and 1 was an undergraduate student. Twenty of the participants were single, 4 were married and 1 was divorced. None of the participants received medical or psychological support for insomnia symptoms. Sixteen of the participants evaluated their sleep quality as normal, 4 as poor, and 5 as good. 22 of the participants belonged to a nonclinical group, while 3 participants had insomnia symptoms. The factor structure of the scale was revealed in the third stage and after the completion of the pilot study, 391 participants ($M_{age} = 21.01$, $SD = 1.35$, range = 18-25) were included in the EFA. Finally, CFA was conducted to confirm the factor structure of the scale and after the completion of the EFA studies, 341 participants ($M_{age} = 21.05$, $SD = 1.95$, range = 18-29, sleep duration = 7.06) were included in the CFA with a study group independent of the EFA. Demographic information on the participants was presented (see Appendix 2).

Measures

Insomnia Severity Index (ISI): ISI was developed by Bastien, Vallières and Morin (2001). Turkish version of ISI Boysan et al. (2010) adapted by the measurement instrument consists of 5 general items and is answered as a 5-point Likert scale. The instrument includes different response procedures for each item. Items include “How satisfied/dissatisfied are you with your recent sleep habits?” and “How worried/stressed are you about your recent sleep problems?”. The ISI was determined as Cronbach's $\alpha = .79$ (Boysan et al., 2010). In the present study, Cronbach's $\alpha = .73$ and McDonald's $\omega = .74$.

Depression Anxiety Stress Scales (DASS): DASS was developed by Lovibond and Lovibond (1995). The Turkish version of DASS was adapted by Sarıçam (2018). The measurement instrument consists of 21 items and 3 sub-dimensions. The measurement instrument is in a 4-point Likert type. Instrument items are answered as 0 = never and 3 = always. Sample items from the scale are “I realized that I never experience positive emotions?” and “I felt that life is meaningless?”. Depression, anxiety and stress scores are calculated separately. In the clinical sample, Cronbach's $\alpha = .87$ for the depression subscale, Cronbach's $\alpha = .85$ for the anxiety subscale,

and Cronbach's $\alpha = .81$ for the stress subscale (Sarıçam, 2018). In the present study, Cronbach's $\alpha = .88$ and McDonald's $\omega = .88$ for depression subscale, Cronbach's $\alpha = .84$ and McDonald's $\omega = .85$ for anxiety subscale, and Cronbach's $\alpha = .83$ and McDonald's $\omega = .83$ for stress subscale.

Scale Development Procedure

The scale development process consists of a series of systematic steps (Carpenter, 2018). In this study, based on the current need, the scale development process started with a systematic literature review. In the first stage, a literature review, creation of an item pool, focus group interview, expert opinion, and pilot study were conducted. The pilot study was followed by the determination and verification of the factor structure.

Literature Review

We determined that there is no measurement instrument developed based on irrational beliefs about insomnia in the literature.

Expanding Item Pool

Three researchers with graduate degrees in counseling psychology participated in the process of creating the item pool. The researchers had expertise in scale development and psychology. Each of the researchers had been actively conducting research and practice in the field of psychological counseling for at least 5 years. Researchers created items related to each dimension. After analyzing the obtained items, the top 10 potential items were selected for each dimension. Thus, a total of 4 dimensions and an item pool of 40 items were created for IBSI.

Focus Group Interview

The announcement titled “*We Are Ready to Listen to You for Your Sleep Problems?*” was made for the focus group interview to reach the final draft version containing the items in the item pool. After the announcement, 12 participants who were between the ages of 18-29 and who had insomnia symptoms and volunteered to be interviewed were determined. 5 of the participants with different characteristics were included in the interview to enrich the heterogeneity of the group, and a total of 5 hours of online focus group interview was conducted. According to the results of the focus group interview, 10 items were added to the item pool, making a total of 50 items at the pool. Examples of items written based on focus group is “Insomnia shouldn't affect my life (Item-4), Being sleep deprived is like torture for me (Item-10), When my sleep pattern is disturbed, I feel inadequate (Item-24)”. As a result of the focus group interview, a total of 50 items were obtained, 12 items for “*demandingness*”, 12

items for “*awfulizing*”, 13 items for “*frustration intolerance*”, and 13 for “*global evolution of worth*”.

Expert Opinion

The 50-item draft item pool was presented to 4 experts who have researched cognitive-behavioral and rational-emotional behavior therapy and the cognitive model of sleep. Then, each item in the item pool was submitted to the opinion of an academician in the division of Turkish Education in terms of meaning and language integrity. Experts were asked to provide feedback on the scale's instructions, the Likert-type response format, and all items in the item pool. Each expert was requested to evaluate the degree to which each item represented the corresponding sub-factor. Experts rated the items as “appropriate” or “not appropriate” for representing the structure of the respective sub-factor. For items deemed “not appropriate,” experts provided suggestions for revisions. The researchers reviewed items that were evaluated as “not appropriate” by at least one expert. After the expert opinions were analyzed in detail, a final item pool of 47 items was obtained, including 13 items for demandingness, 12 items for awfulizing, 13 items for frustration intolerance, and 9 items for global evolution of worth. The items excluded from the draft IBSI and agreed by the experts were as follows “*I question myself when I am sleep deprived*”, “*I feel inadequate when I cannot fall asleep*”, “*I hate myself when I have nightmares*”.

Data Collection

The authors applied to the social and human sciences ethics committee after structuring the study (Date: 05.04.2022; Decision number: 2022/71). Subsequently, the application for research permission was accepted by the Division of Counseling and Guidance. Permission was obtained from the responsible authors to use the measurement instruments for criterion validity. The data of the study were collected at the stages of focus group interview, pilot study, exploratory factor analysis and confirmatory factor analysis, respectively. Each participant involved in only one stage of the study. The questionnaire included questions that included DSM-5 diagnostic criteria. Clinical and nonclinical participants were categorized according to their responses. Criteria for participation in the focus group discussion; Suffering from insomnia and volunteering to participate in a focus group interview. In other stages of the research, volunteering for the research was the main inclusion criterion. The data of the research were obtained in 10 months from the first stage to the final stage. Then, the data were obtained with Google Forms. Consent was obtained from the participants throughout the entire data collection process.

Data Analysis

We used SPSS and JASP statistical programs for the data of the present study. In the preliminary analysis, firstly, the data were prepared for the analysis procedure. Maximum-minimum scores, outliers and missing data were checked. We applied EFA (Lloret-Segura et al., 2014), CFA (Ferrando & Lorenzo-Seva, 2014), and network analysis for the factor structure of the measurement instrument. To provide evidence of validity based on internal structure through EFA and CFA, we focused on Kaiser–Meyer–Olkin test (KMO) and Bartlett's test. The criterion for the KMO test should be above .60 (Pallant, 2007) and the criterion for the Bartlett test should be a p -value less than .05 (Bartlett, 1954). Subsequently, the factor loadings and uniqueness scores of the items in 4 dimensions are found. For item factor loadings, perfect values above .71, very good values above .63, good values above .55, acceptable values above .45, and poor values above .32 were taken as criteria (Comrey & Lee, 1992). For uniqueness, scores approaching 0 should be considered. In EFA, uniqueness scores for items are expected to be far from 1. When deciding on the factor structure, we wanted to provide more additional evidence with Scree Plot and network analysis findings. The break in the Scree Plot and the position of the items in the network structure are important indicators. To verify the factor structure, the fit indices were focused on while deciding CFA. The criteria of model fit as goodness of fit index (GFI), comparative fit index (CFI), Tucker-Lewis index (TLI) scores of .95 and above, root mean square error of approximation (RMSEA) between .05 and .08, and standardized root mean square residual (SRMR) between .05 and .10 (Bentler, 1980; Brown, 2006; Browne & Cudeck, 1993; Schermelleh-Engel & Moosbrugger, 2003). Network analysis provides information about the network structure in the network plane. In networks, observed items are defined as nodes, and predicted relationships are defined as edges (Love et al., 2019). On the edges, blue colors indicate positive and red colors indicate negative relationships. As the edges expand, they provide data about the increasing relationship (Wagenmakers & Kucharsky, 2020). We wanted to provide important supporting evidence to the findings obtained with EFA. Cronbach's α and McDonald's ω values are reported for reliability. Criteria for Cronbach's α and McDonald's ω values were determined as .70 and above. To explore correlations, Pearson correlation was used for test-criterion validity. Numerous significant relationships were expected between the variables.

Results

Preliminary Analysis

All descriptive statistics were calculated in the quantitative stages of the study (pilot study, exploratory factor analysis, confirmatory factor analysis). Descriptive statistics were included in the appendix section of the manuscript due to its size (see Appendix 3).

Pilot Study

A pilot study was performed for the draft IBSI. Volunteer participants, aged 18-29, completed the questionnaire in the pilot study. The results of the pilot study confirmed the existence of many significant relationships between the items, as expected. Moreover, each of the items demonstrated normality for the draft IBSI.

Exploratory Factor Analysis

To establish the IBSI factor structure, 420 participants completed the questionnaire. After preliminary analysis of the data set, 29 data were excluded due to outliers. The remaining 391 data were analyzed using EFA. EFA was performed using a 4-factor maximum likelihood analysis based on the correlation matrix (model fit indices; $X^2/df = 2.71$, CFI = .94, SRMR = .03 and RMSEA = .066). The Oblimin ratio was preferred because the factors were assumed to be related. The KMO value was determined to be .91 and the Bartlett test value to be 5636.458/276 ($p = .000$). Based on the EFA results, evaluations for each item in the scale were based on factor loadings, and the scale structure was thoroughly examined. Items were removed if they had high loadings on multiple factors, a factor loading below .40, or if the difference between loadings on two factors was less than .15. The main criteria for item removal were significant loading magnitude and cross-loadings, with theoretical alignment also being critical. Items with the highest inter-item correlations were examined to ensure that the scale includes distinct items, preventing artificially inflated reliability. Additionally, each factor was required to have at least three items throughout the deletion process (Carpenter, 2018; Worthington & Whittaker, 2006). The EFA results indicated that the best 6 items for each dimension should be included in the scale with satisfactory factor loading (see Table 1). The uniqueness values of the items should be further away from 1 and close to zero or lower. The instrument was found to have all items with acceptable uniqueness scores.

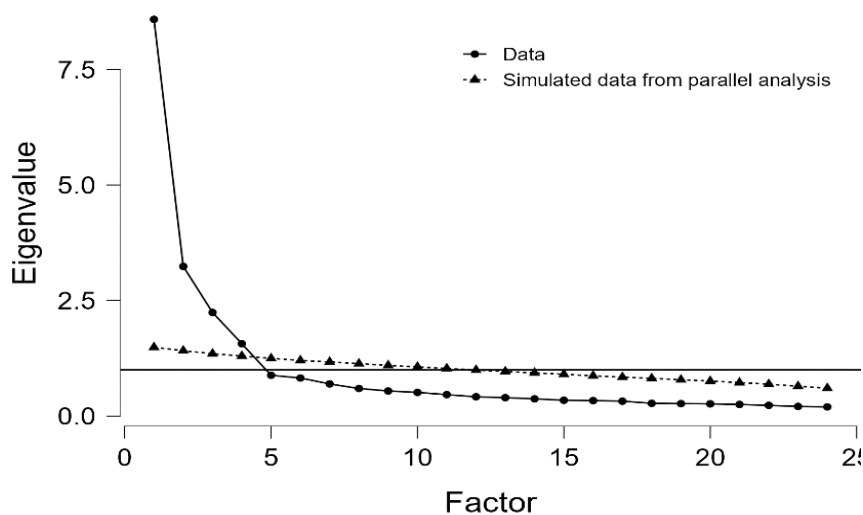
Table 1
Item Factor Loadings and Uniqueness Scores

Items	Awfulizing		Global evolution of worth		Frustration intolerance		Demandingness		Uniqueness
	EFA	CFA	EFA	CFA	EFA	CFA	EFA	CFA	
B3	.90	.81							.27
B5	.84	.79							.29
B10	.82	.83							.32
B1	.76	.79							.32
B6	.73	.83							.35
B8	.68	.81							.45
D4			.90	.78					.22
D8			.87	.71					.32
D6			.83	.75					.40
D3			.79	.66					.39
D9			.73	.79					.42
D2			.65	.60					.41
C6					.83	.83			.31
C5					.81	.67			.35
C7					.76	.65			.49
C10					.73	.80			.43
C11					.64	.62			.52
C13					.59	.72			.49
A2							.75	.55	.42
A8							.72	.51	.49
A1							.68	.47	.55
A4							.66	.82	.54
A5							.59	.79	.62
A12							.59	.38	.66
Variance (%)	35.76	-	13.49	-	9.33	-	6.52	-	
Total variance (%)							65.10		

Note. The table only shows item factor loadings of .32 and above.

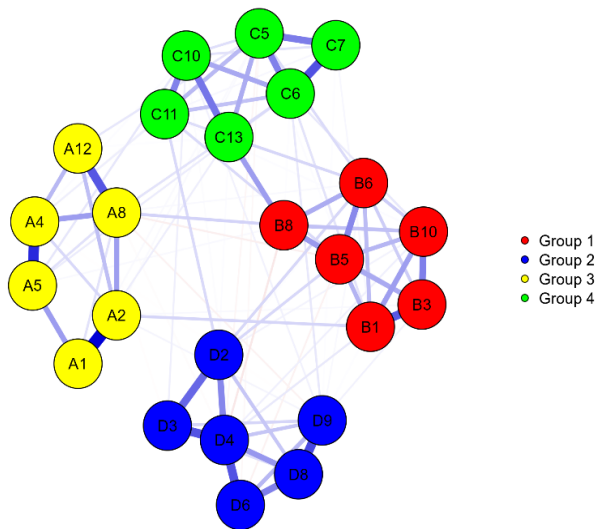
As shown in Table 1, the factor loads for each dimension are .55 and above. The results show that the item factor loads for each dimension are at the least good level. In addition, the explained variance rate has a significant ratio of 65.10% for the total IBSI. Furthermore, the uniqueness values are close to 0.00 and far from 1.00. The items of the expressed uniqueness scores meet the criteria. Scree plot evi-

dence is also presented to examine 4 dimensions in EFA (see Figure 2). The eigen scores of each dimension also show consistent results. The eigen scores for the 4 dimensions of the instrument are 8.58, 3.24, 2.24 and 1.56. Even the eigen score for the 5th possible dimension is below 1.00 (Next possible dimension 5 for = .88).

Figure 2
Scree plot of IBSI

Network analysis was used to provide additional evidence supporting the factor structure of the IBSI (see Figure 3). In the network analysis, yellow colors symbolize the dimension of demandingness, red colors symbolize awfulizing, green colors symbolize frustration intolerance, and blue colors symbolize the global evolution of worth. First, it is noteworthy that the items related to each dimension are located on the network plane by a factor. Secondly, there are significant positive relationships between the items within the dimensions. Moreover, as expected, the theoretical relevance of irrational beliefs is the apparent relationship between items within dimensions.

Figure 3
Network Analysis of IBSI



Note: Group 1 = demandingness, Group 2 = awfulizing, Group 3 = frustration intolerance, Group 4 = global evolution of worth

Table 3
Pearson correlation coefficients among variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Demandingness	—									
2. Awfulizing	.29**	—								
3. Frustration Intolerance	.31**	.54**	—							
4. Global Evolution of Worth	.16*	.38**	.27**	—						
5. IBSI	.60**	.81**	.76**	.63**	—					
6. ISI	.06	.36**	.38**	.32**	.40**	—				
7. Depression	.01	.27**	.27**	.40**	.34**	.51**	—			
8. Anxiety	.05	.29**	.29**	.40**	.37**	.54**	.70**	—		
9. Stress	.06	.34**	.32**	.37**	.39**	.54**	.76**	.78**	—	
10. Sleep time	.03	.04	-.09	.08	.02	-.18*	-.03	-.05	-.06	—

Note. * $p < .01$, ** $p < .001$

We also tested network analysis with variables (see Figure 4). We analyzed data with the correlation estimator using JASP. Each node is labelled with variable and only significant relationships are shown as edges. Blue colors indicate, as expected, significant positive correlations between variables. The red color confirms the significant negative relationship between insomnia severity and sleep time. The thicker

Confirmatory Factor Analysis

CFA with maximum likelihood estimation was used for the four-dimensional IBSI. (See Appendix 4). As shown, the factor model ($X^2/df = 1.83$, CFI = .95, TLI = .95, GFI = .97, SRMR = .06, and RMSEA = .05). In summary, the fit indices obtained because of CFA were found to be at least acceptable.

Reliability

Cronbach's α and McDonald's ω were calculated in EFA and CFA. Reliability scores obtained from IBSI total and sub-dimensions in the EFA and CFA processes were satisfactory (see Table 2).

Table 2
Reliability results of the IBSI

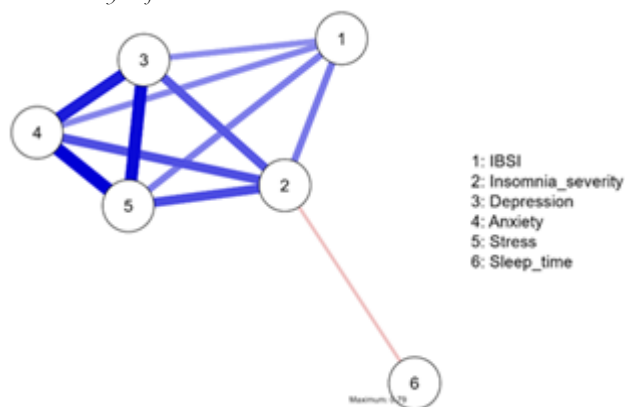
Dimension	EFA		CFA	
	α	ω	α	ω
Demandingness	.83	.83	.79	.79
Awfulizing	.92	.92	.92	.92
Frustration Intolerance	.88	.88	.85	.85
Global Evolution of Worth	.91	.91	.87	.87
Total IBSI	.92	.92	.90	.89

Test-Criterion Validity

For test-criterion validity, we analyzed the correlation between IBSI and ISI, depression, anxiety, and stress (see Table 3). The correlation between IBSI, ISI, depression, anxiety, and stress was analyzed, and the results showed positive correlations between many variables as expected.

edges between anxiety, depression and stress reflect the strength of the relationship. Furthermore, the IBSI confirms significant positive correlations with depression, stress, anxiety, and insomnia severity. In summary, the findings of the network analysis strongly support the correlation coefficients.

Figure 4
Network Analysis of Variables



Intergroup Differences

For differences in IBSI total scores and between groups, the differences between the clinical group who had insomnia symptoms, and the nonclinical group are shown in detail by independent samples *t*-test (see Table 4).

Intergroup differences showed that there was a significant difference between the clinic group with insomnia symptoms and the non-clinic group without insomnia symptoms on IBSI ($t = 5.62, p < .05$, Cohen's $d = .750$), awfulizing ($t = 5.24, p < .05$, Cohen's $d = .698$), frustration intolerance ($t = 5.21, p < .05$, Cohen's $d = .695$) and global evolution of worth ($t = 4.74, p < .05$, Cohen's $d = .632$). However, there was no significant difference in the demandingness dimension between the clinic group with insomnia symptoms and the non-clinic group considered healthy without insomnia symptoms ($t = .13, p > .05$, Cohen's $d = .017$).

Table 4
Differences Between Clinic and Nonclinical Groups

	Groups	N	Mean	SD	<i>t</i>	df	<i>p</i>	Cohen's <i>d</i>
IBSI	Clinic	71	81.17	14.90	5.62	339	< .001	.750
	Nonclinical	270	69.77	15.29				
Demandingness	Clinic	71	21.49	6.06	.13	339	> .05	.017
	Nonclinical	270	21.41	4.84				
Awfulizing	Clinic	71	22.45	5.24	5.24	339	< .001	.698
	Nonclinical	270	18.25	6.20				
Frustration Intolerance	Clinic	71	23.63	4.30	5.21	339	< .001	.695
	Nonclinical	270	19.82	5.75				
Global Evolution of Worth	Clinic	71	13.59	6.69	4.74	339	< .001	.632
	Nonclinical	270	10.29	4.77				

Note. Student's *t*-test, * $p < .05$

Discussion

The present study focused on the validity and reliability of the IBSI in Turkish emerging adults. The IBSI mainly measures irrational beliefs about insomnia, focusing on irrational beliefs, the key role in the theory of rational emotive behavior. The scale development steps were as follows. Comprehensive literature review, item pooling, focus group interview, expert opinion on items, pilot study, main study for EFA, and then main study for CFA.

First, it was noteworthy that some of the items in the item pool were revised through the focus group interview. Items were of higher quality in a focus group interview with identified emerging adults with different characteristics of insomnia. The authors reached a common consensus for the draft IBSI. Second, item statistics and correlations between items from the pilot study yielded significant positive correlations as expected. Third, Bartlett's test ensured that there was a sufficient sample size in the main study for the EFA. The findings revealed a 4-dimensional (demandingness, awfulizing, frustration intolerance, global evolution of worth) and 24-item structure for the IBSI in the EFA. Specifically, item factor loadings ranged from .59-.75 for demandingness, .68-.90 for awfulizing, .59-.83 for frustration intolerance, and

.65-.90 for global evolution of worth. The factor loadings of these items have the lowest "good" level score according to the criteria proposed by Comrey and Lee (1992). The uniqueness scores of these items were far from 1.00 and close to 0.00. In addition, the Scree Plot and network analysis of the factor structure also provided additional evidence of whether the IBSI theoretically satisfies the 4-dimensions. Scree Plot showed that the breakdown occurs after 4 dimensions. Furthermore, the low-eigenvalue produced for the fifth dimension of IBSI is also evidence for the 4-dimensional structure of the instrument. According to the network analysis, it confirmed that the items are located together in the network plane as expected and that the items show positive correlations. Fourth, CFA was performed to confirm the factor structure of the IBSI. The results showed that the fit indices satisfy at least the acceptable level or higher.

Reliability is a point that cannot be ignored for measurement instruments. In the present study, Cronbach's α and McDonald's ω scores were calculated for reliability. The findings of both EFA and CFA studies showed that the Cronbach's α and McDonald's ω scores of IBSI and its sub-dimensions were satisfactory.

Test-criteria validity has shown many significant correla-

tions between the IBSI and insomnia severity, depression, anxiety, and stress as demandingness, awfulizing, frustration intolerance, and global evolution of worth. These correlational results should be considered as evidence of the theoretically expected significant relationships. However, it was noteworthy that while there were positive significant relationships between the demandingness dimension and awfulizing, frustration intolerance, global evolution of worth, and IBSI, there was no significant relationship between insomnia severity, depression, anxiety, and stress. While interpreting these findings, the theoretical focus should be on the difference between demandingness and desires.

From the perspective of intergroup differences, there is an important aspect of the demandingness dimension that should be considered theoretically. According to the theory, it is not as straightforward as it seems to distinguish between demandingness and desire. Ellis distinguishes between demands and preferences. In terms of preferences, wants and desires cannot be evaluated as rational or irrational. Consequently, individuals experience psychological disorders only when their wants and desires turn into excessive demands (DiGiuseppe et al., 2013). While these discourses are more pronounced in English in terms of grammatical structure, Turkish is different in terms of language structure. Instead of obligations, wishes and preferences increase the likelihood of similar meaning. As an example, instead of “*I would like ...*” can mean “*I should ...*” and “*I must ...*” in the cognitive structure of the Turkish language. Therefore, it should not be considered a surprising result that there was no significant difference in the demandingness dimension between the clinic group with insomnia symptoms and the non-clinic group considered without insomnia symptoms. For the current situation, more in-depth qualitative studies are needed in Turkish emerging adulthood groups.

Limitations

The present study has some notable limitations. First, no test-retest was performed for the IBSI. Second, a cut-off score for the IBSI was not determined. Determining a cut-off score is outside the scope of the present study. Therefore, it should be considered an important limitation of the study. Third, measurement invariance based on gender was not included in the present study. A final limitation, the IBSI will fill a potentially important gap in the Turkish literature. However, the fact that no study has yet been conducted on the validity and reliability studies for the English language is an important limitation and provides important clues for the following research.

Conclusion

The present scale development study for the IBSI has been carried out for validity and reliability. We share the instrument to inspire researchers (see Appendix 5). The demandingness dimension should be considered carefully in

the present study. The correlation results showed that there was a positive medium correlation with the IBSI for demandingness. However, demandingness did not show a significant relationship with depression, anxiety, and stress. Ellis highlights the risk that wishes and desires become demands over time (Ellis et al., 2010). Moreover, some people become more demanding in their living conditions but do not develop serious mental disorders. However, there are still various negative consequences of demandingness in different forms (self-deception, withdrawal, alcohol, and drug abuse, etc.) (Ellis, 1997). Consequently, the responses of the nonclinical population may essentially involve more idealized wishes and desires for insomnia. At the same time, the non-clinical population may have resorted to alternative unhealthy coping strategies.

The present study provides an opportunity for following studies on the demandingness dimension. Future studies would benefit from exploring rational and flexible beliefs (the nature of wants and desires) about insomnia in clinical and nonclinical populations. An important limitation of this study was the use of focus group interviews with clinical cases. Future studies should further explore and differentiate demandingness in clinical and nonclinical populations, particularly in line with the cognitive model of insomnia. At the same time, understanding the mechanism by which high demandingness leads to dysfunctional outcomes in nonclinical populations would make a particular contribution.

Frustration intolerance is characterized by a response to threats and tensions that eliminate some form of comfort (Ellis, 2003). Avoidance of unpleasant life events is associated with frustration intolerance and consequently causes psychological distress (Dryden, 2011). Everyone spends sleepless nights for a variety of reasons, but the discomfort that can result from an irrational desire for comfort and sleep is supported by the belief that insomnia is only frustration intolerance. In this perspective, it is important to identify frustration intolerance beliefs about insomnia. Mental health professionals can help the clients by identifying the frustration intolerance beliefs of their clients during unpleasant and unwanted nights.

Global evolution of worth is a specific dimension of the cognitive model of sleep. Global evolution of worth focuses on self-acceptance and accepts the human capacity to make mistakes and errors (DiGiuseppe et al., 2013). Devaluation is particularly closely related to low self-esteem (Chamberlain & Haaga, 2001; Thompson & Waltz, 2008). Therefore, the global evolution of the worth dimension may be a predictor of potentially serious emotional and behavioral disorders such as depression, self-harm, suicide, and low self-esteem in clinical and nonclinical populations. Thus, the devaluation dimension of insomnia may have an important function in both clinical cases and research.

The awfulizing dimension is shorter than the instruments in the field and covers general attitudes. There are important conceptualizations of the cognitive model of insomnia in the literature (Jansson-Fröjmark et al., 2012; Tan et al., 2017).

None of them include Ellis' model. The awfulizing dimension may have an important application in literature, as it is 6 items, short and practical.

The findings of the study provided significant evidence that the IBSI was valid and reliable. The IBSI, which consists of 6 items and 4 dimensions, has several potential benefits for the Turkish literature. It is a theoretically and potentially sound instrument for measuring increased insomnia and insomnia-related cognitive problems. As far as we know, it is the first REBT-based measurement instrument that is appropriate for the cognitive model of insomnia in Turkish literature. The measurement instrument based on cognitive behavioral and rational emotive behavior theory will be an important tool for those researching insomnia in Türkiye. As in many countries, cognitive behavioral therapy is the most common psychotherapy approach in Türkiye. The instru-

ment can be used in both clinical and nonclinical groups of emerging adults aged 18-29 years. Moreover, mental health practitioners can identify irrational beliefs for insomnia in therapy in line with the cognitive model of insomnia. This could contribute to a more effective helping model. It should not be overlooked that the instrument potentially needs validity and reliability studies in different cultures, especially in the English language. Moreover, IBSI should be encouraged for adaptation studies in different languages and cultures.

Complementary information

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Appendix 1. Characteristics of Focus Group Interview Participants

	Age	How long have you been having sleep problems?	Your average daily sleep duration in the last 1 month	How would you rate your sleep quality?
Participant 1	21	More than 6 months	Less than 6 hours	Sleep quality is bad
Participant 2	22	Last 6 months	More than 8 hours	Sleep quality is very bad
Participant 3	22	Last 1 week	Less than 6 hours	Sleep quality is bad
Participant 4	22	Last 1 month	More than 8 hours	Sleep quality is bad
Participant 5	21	Last 1 month	Less than 6 hours	Sleep quality is bad

Appendix 2. Characteristics of Participants

Variable	Level	EFA		CFA	
		Counts	%	Counts	%
Gender	Female	290	74.2	241	70.7
	Male	101	25.8	100	29.3
Marital Status	Married	2	.50	8	2.3
	Single	387	99.0	327	95.9
	Divorced	2	.50	6	1.8
Level of Education	Undergraduate Student	37	96.2	321	94.1
	Undergraduate Degree	12	3.1	13	3.8
	Graduate Student	3	.8	7	1.8
Sleep Aid	Yes	7	1.8	9	2.6
	No	384	98.2	332	97.4
Sleep Quality	Poor	95	24.3	64	18.8
	Okay	211	54.0	199	58.4
	Good	85	21.7	78	22.9
Insomnia Symptoms	Nonclinical	360	84.7	270	79.18
	Clinic	31	15.3	71	20.82
Total		391	100	341	100

Appendix 3. Descriptive analysis

In <https://revistas.um.es/analesps/libraryFiles/downloadPublic/17231>

Appendix 4. Results of CFA for IBSI

Fit Indices	Index	Decision
Factor model (χ^2 / DF)	1.83	Good
Comparative Fit Index (CFI)	.95	Good
Tucker-Lewis Index (TLI)	.95	Good
Goodness of fit index (GFI)	.97	Good
Standardized root mean square residual (SRMR)	.06	Okay
Root mean square error of approximation (RMSEA)	.05	Good

Appendix 5

Irrational Beliefs Scale for Insomnia (IBSI)

Instructions: This form contains items to determine your beliefs about sleep and insomnia. Please select the option that nicely describes you.

<i>Not at all suitable for me</i>	<i>Somewhat suitable for me</i>	<i>Moderately suitable for me</i>	<i>Very suitable for me</i>	<i>Suitable for me</i>
1	2	3	4	5

	Items	1	2	3	4	5
1	I must have a sleep routine.					
2	My sleep pattern should never be disturbed.					
3	I should never have trouble falling asleep.					
4	I should be able to fall asleep whenever I want to fall asleep.					
5	I should never have trouble waking up in the morning.					
6	Insomnia shouldn't affect my life.					
7	If I can't sleep, my whole day will be ruined.					
8	If I'm sleep deprived, I can never be productive during the day.					
9	If I'm sleep deprived, I'll be nervous all day.					
10	Being sleep deprived is like torture for me.					
11	Starting a busy day without sleep is terrible.					
12	If I'm sleep deprived, I can never concentrate during the day.					
13	I can't stand having my sleep constantly interrupted at night.					
14	Not being able to sleep when I want to be unbearable for me.					
15	Trying to sleep without proper conditions is unbearable.					
16	I can't stand tossing and turning in bed because I can't sleep.					
17	I can't stand nightmares disturbing my sleep.					
18	I can't stand being stuck between sleep and wakefulness at night.					
19	When I'm sleep deprived, I think I'm useless.					
20	Not being able to sleep lowers my self-esteem.					
21	Not being able to sleep shows how inadequate I am.					
22	Difficulty waking up is a sign of inadequacy.					
23	It lowers my self-confidence when others see me sleep deprived.					
24	When my sleep pattern is disturbed, I feel inadequate.					

Appendix 6. Pearson's correlation

In [https://revistas.um.es/analesps/\\$\\$Scall\\$\\$/api/file/file-api/download-library-file?libraryFileId=17221](https://revistas.um.es/analesps/$$Scall$$/api/file/file-api/download-library-file?libraryFileId=17221)