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Investigation of the Turkish Psychometric Properties of Bedtime Procrastination and While-in-Bed Procrastination Scales for Adolescents

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Abstract

Bedtime procrastination and while-in-bed procrastination is one of the important problems frequently encountered in adolescents. This study was carried out to examine the psychometric properties of the Turkish version of the Bedtime Procrastination and While-in-Bed Procrastination Scales for adolescents. This methodological study was conducted with 348 adolescents aged 12–18 between March and April 2023. Cronbach's alpha and omega coefficients were employed to test the psychometric properties, split-half and item-total correlation methods to test the reliability, and confirmatory factor analysis to test the construct validity of the scales. It was determined that the Bedtime Procrastination scale Cronbach's alpha and omega coefficients of this scale were 0.93. The While-in-Bed Procrastination Scale Cronbach's alpha value of this scale was 0.86, and the omega coefficient was 0.84. As a result of the confirmatory factor analysis, it was found that the fit indices of both scales were greater than 0.90 and that the RMSEA was less than 0.08. The Bedtime Procrastination and While-in-Bed Procrastination Scales for adolescents, whose Turkish psychometric properties were examined in this study, are valid and reliable measurement tools. These scales can be used to evaluate whether adolescents procrastinate going to bed and sleeping while in bed and what activities they are engaged in before going to sleep, to reduce inadequate sleep habits, and to develop sleep-focused education programs.

Keywords Adolescent · Sleep deprivation · Bedtime procrastination · While-in-bed procrastination · Validity · Reliability

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Introduction

Sleep, one of the basic requirements of life, is a crucial part of a healthy life and is necessary for maintaining health (Bruce et al., 2017). Gaining good sleep habits in childhood and adolescence is effective in maintaining healthy sleep habits in adulthood (Willgerodt & Kieckhefer, 2013). In particular, adolescence is a period in which the individual physically, hormonally, and psychosocially transitions from childhood to adolescence. In addition to many problems, it is known that adolescents have problems with sleep during this period (Tarokh et al., 2016). Early detection of sleep problems is crucial in taking necessary measures (Bruce et al., 2017).

Adolescents' sleep disorders increase yearly, negatively affecting physical and mental health (Kansagra, 2020; Tarokh et al., 2016). In particular, their inability to take enough sleep may be due to academic and increasing social activities, as well as the characteristics of this developmental period, characterized by a natural tendency to sleep late and wake up late with increasing age. Particularly, some biological changes occurring with the transition to adolescence may lead to shifts in circadian rhythm (Illingworth, 2020; Kansagra, 2020). When this situation is combined with early school hours, a wide range of sleep problems may occur in adolescents, such as a shortening in total sleep time, difficulty in waking up in the morning, inability to fall asleep at night, daytime sleepiness, and deterioration in sleep quality (Bruce et al., 2017; Nuutinen et al., 2013; Sharman & Illingworth, 2020; Willgerodt & Kieckhefer, 2013).

Bedtime procrastination and while-in-bed procrastination constructs have recently drawn attention as behavioral problems in adolescent sleep disorders (Kroese et al., 2014; Magalhães et al., 2020). Bedtime procrastination is defined as going to bed late, that is, delaying going to bed due to engagement in some activities and sleeping less than recommended or required. While-in-bed procrastination is defined as delaying sleeping while in bed, i.e. delaying sleeping due to engagement in some activities while in bed and sleeping inadequately (Kroese et al., 2014; Magalhães et al., 2020). In short, bedtime procrastination focuses on individuals' behaviors before going to bed, whereas while-in-bed procrastination focuses on individuals' behaviors after going to bed (Magalhães et al., 2020). Procrastination leads to undesirable consequences in the field of health behavior (obesity, eating disorders, depression, anxiety, low self-esteem, etc.) and academic behavior (delaying the fulfillment of some academic tasks such as studying or doing homework), and as a result, it affects the well-being of the adolescent (Hale et al., 2018; Kansagra, 2020; Pychyl & Sirois, 2016; Sharman & Illingworth, 2020).

It has been highlighted in the literature that the use of electronic media, which has become a pervasive part of today's life, affects adolescents' sleep habits and, consequently, learning, school performance, and quality of life (Hale et al., 2018; Medic et al., 2017; Lund et al., 2021). In the last few years, electronic devices, such as mobile phones, computers, tablets, or music players, and activities, such as playing video games or watching videos on television or YouTube, have become widespread. These activities have led to bedtime procrastination (Gradisar et al., 2013; Magalhães et al., 2020; Royant-Parola et al., 2018).

According to a sleep survey by the National Sleep Foundation, 95% of the participants reported that they used electronic devices (Gradisar et al., 2013). Some studies on the correlation between electronic device use and adolescent sleep found a negative relationship between these two variables (Hysing et al., 2015; Lund et al., 2021; Royant-Parola et al., 2018). Data is indisputable that as the use of electronic devices increased, sleep duration decreased. Other studies on adolescents indicated that watching TV in the evening and using mobile phones, computers, and the Internet was associated with the time spent in bed and reduced sleep time (Hale et al., 2018; Nuutinen et al., 2013). In fact, the presence of media technology in adolescents' rooms is an indicator of shortening sleep duration and gaining worse sleep habits (Munezawa et al., 2011). Also, in studies conducted with adolescents, it was determined that mobile phone use increased when the lights were off and, as a result, they reported more fatigue the next day (Munezawa et al., 2011; Royant-Parola et al., 2018; Vernon et al., 2018). Magalhães et al. (2020) reported that 53.2% of adolescents slept seven hours or less a night, while 10.3% slept as much as recommended. It was also reported in this study that there was a strong negative relationship between procrastination and sleep hours (r=-0.403; $p<0.005$). In other words, as bedtime was delayed, sleep hours decreased. No correlation was found between while-in-bed procrastination and sleep duration. Finally, adolescents in this study were asked whether they delayed sleep time before going to bed or while in bed. The results showed that 59.5% did it while in bed and the rest before going to bed (Magalhães et al., 2020).

There is limited research into whether adolescents delay going to bed or sleeping while in bed and what activities they are engaged in before going to bed or falling asleep (Magalhães et al., 2020). This may be due to the lack of tools to measure bedtime and while-in-bed procrastination. More studies are needed due to the limited literature on this subject. Therefore, this study was conducted to examine whether the Turkish version of the Bedtime Procrastination and While-in-Bed Procrastination Scales were valid and reliable tools to evaluate whether adolescents delayed going to bed or sleeping while in bed, and what activities they were engaged in before going to bed or falling asleep.

Method

Participants

A methodological, correlational, and cross-sectional design was used (DeVellis, 2016). The research population consisted of adolescents aged between 12 and 18 residing in two cities in the western and eastern regions of Turkey between March and April 2023. The sample size in scale development and adaptation studies are considered as follows: ≥100, inadequate; ≥200, moderate; ≥300, good; ≥500 very good; ≥1000, excellent (Kartal & Bardakçı, 2018; Özdamar, 2016). For this reason, 348 adolescents were included in the sample using the convenience sampling method (Golzar & Tajik, 2022; Stratton, 2021). A link to the study was shared on the researchers' social media accounts. Data were collected from people who volunteered to participate.

The mean age of the adolescents in the study was 14.69±2.44 years, 53.7% (n=187) of them were female. Of the adolescents, 39.4% (n=137) had no siblings, but 32.8% (n=114) did. The majority of the mothers (63.5%, n=221) and fathers (71.8%, n=250) were university graduates. It was determined that 63.2% (n=220) had equal income and expenses, and 27.6% (n=96) had higher income than their expenses. Also, 66.1% (n=230) of the adolescents slept between 6 and 8 h on average, and 32.5% (n=113) slept more than 8 h a night. According to the findings, 86.8% (n=302) of the adolescents had their own bed, and 49.7% (n=173) of them stayed with their siblings. Regarding the activities the adolescents did before going to sleep, 70.4% (n=245) read books, 15.2% (n=53) watched television, and 10.6% (n=37) listened to music. It was found that 71.6% (n=249) of the adolescents felt relaxed when they got up in the morning, but 25.9% (n=90) did not, 71.6% (n=249) exercised regularly, and 91.4% (n=318) did not use regular medication (Table 1).

Measures

Data were collected using an adolescent and parent descriptive information form and the Bedtime Procrastination and While-in-Bed Procrastination Scales for adolescents.

The Adolescent and Parent Descriptive Information Form This form included questions about the adolescent's age, gender, number of siblings, the education level of mother and father, economic status, average hours of sleep a night, whether they have a bed of their own, who they stayed with them in their bedroom, what they do before going to bed, whether they feel relaxed when get up in the morning, whether they exercise regularly, and whether they use medication regularly.

The Bedtime Procrastination Scale for Adolescents This scale was developed by Kroese et al. (2014) to evaluate whether adults delayed sleep time. It consists of nine items and a five-point Likert-type scale, with responses ranging from 1=never to 5=always. Cronbach's alpha coefficient was 0.92. Scores on the scale range between 9 and 45. A high score on the scale indicates that sleep time is delayed. The adolescent version of the original scale was adapted by Magalhães et al. (2020). Scores on this adapted version vary from 8 to 40. Items 2, 6, and 8 on the scale are reversed. Cronbach's alpha coefficient of the adapted version was found to be 0.85. As a result of the explanatory factor analysis, Bartlett's sphericity χ^2 test was determined as 1112.525.47 (p<0.001), and Kaiser-Meyer-Olkin (KMO) value was 0.875. This version of the scale consisted of a single sub-dimension and explained 49.35% of the total variance. It was concluded that the adapted scale was a valid and reliable measurement tool to evaluate adolescents' bedtime procrastination.

The While-in-Bed Procrastination Scale for Adolescents This scale was developed by Magalhães et al. (2020) to evaluate whether adolescents delayed sleeping while in bed and to find out what activities they did before going to sleep. It consists of seven items, all in a five-point Likert type, and the response options range from 1=never to 5=always. Cronbach's alpha coefficient was 0.73. Scores on the scale range from 7 to 35. A high score on the scale indicates that sleep time is delayed. As a result of

Table 1 Descriptive characteristics of the participants

Sociodemographic characteristics	Mean ± SD	Min.-Max.
Adolescents age*	14.69 ± 2.44	12–18
	n	%
Adolescents gender		
Female	187	53.7
Male	161	46.3
Number of siblings		
None	137	39.4
1	114	32.8
2	58	16.7
3 and above	39	11.2
Mother's education level		
Illitarete	7	2.0
Primary and secondary education	38	10.9
High school	82	23.6
University	221	63.5
Father's education level		
Illitarete	1	0.3
Primary and secondary education	8	2.3
High school	89	25.6
University	250	71.8
Economical situation		
Income equals expenses	220	63.2
Income is higher than expenses	96	27.6
Income is less than expenses	32	9.2
Average sleep time per night		
4–6	5	1.4
6–8	230	66.1
8 and more	113	32.5
Having your own bed		
Yes	302	86.8
No	46	13.2
Who does she stay with in the room where she/he sleeps		
I stay alone	169	48.6
I'm staying with my siblings	173	49.7
I'm staying with my elders	6	1.7
Activities before sleeping		
I read books	245	70.4
I watch TV	53	15.2
I listen to music	37	10.6
Other	13	3.7
Feeling rested when you wake up in the morning		
Yes	249	71.6
Sometimes	9	2.6
No	90	25.9
Regular exercise status		
Yes	249	71.6
No	99	28.4

Table 1 (continued)

Sociodemographic characteristics	Mean ± SD	Min.-Max.
Regular medication use		
Yes	30	8.6
No	318	91.4

*Mean: Mean, SD: Standard Deviation, Min.-Max: Minimum and Maximum Values

explanatory factor analysis, Bartlett's χ^2 test of sphericity was determined as 441.909 ($p < 0.001$), and Kaiser-Meyer-Olkin (KMO) value was 0.805. The scale consisted of a single sub-dimension, and explained 38.49% of the total variance. It was concluded that the developed scale was a valid and reliable measurement tool to evaluate while-in-bed procrastination of sleep time.

Procedures

Language equivalence is the first stage of an adaptation process. In the study, first, the original forms of the scales were translated from English to Turkish. Three independent linguists who did not know the content of the study translated them. Afterward, the researchers evaluated these translations, and the Turkish form of the scales was rearranged. The edited Turkish form was translated back into English by a linguist independent of the individuals who did the first translation. The scales obtained were submitted to the author who developed the original scales to get feedback. Then, the necessary corrections were made, the scales were adapted to Turkish, their equivalence with the English form was achieved, and as a result, the translation phase ended.

Another stage of the adaptation process is obtaining expert opinion. After the scales were translated into Turkish, some experts were consulted for content validity. To do this, 10 experts who were academics in the field of pediatric nursing were consulted. For the content validity of the scales, a content validity evaluation form was created following the Davis technique. The original and translated versions of the scales and this evaluation form were given to the experts. They were asked to rate each item as 1 = not appropriate at all, 2 = needs a lot of correction, 3 = needs little correction, and 4 = very appropriate. According to Davis technique, the content validity index (CGI) and the content validity ratio (CVR) are calculated, and the criterion value is accepted as 0.80 (Jonhson & Christensen, 2014; Tabachnick & Fidell, 2015). The content validity index was calculated after the expert opinion was obtained about the bedtime procrastination scale. Accordingly, the item-level CVI was found to vary between 0.85 and 1.00, and the scale-level CVI was 0.95. Following expert opinions, the content validity indices of the While-in-Bed Procrastination Scale were found between 0.89 and 1.00 for the item level and 0.98 for the scale level. In this study, the content validity index of the scales were found as ≥ 0.80. In line with the experts' opinions, the items on the scales were reviewed, the necessary changes were made, and the researchers rearranged and finalized the items on the scales.

The piloting stage followed the language equivalence of the scales and expert evaluations. At this stage, the scales were applied to 20 adolescents who were not included in the main sample. These individuals were asked to evaluate each item on

the scales regarding intelligibility, clarity, and relevance. In the pilot application, it was determined that there were no incomprehensible items on the scales.

The data were collected online using the Google Forms application. The study was announced on some smartphone applications (Whatsapp, Messenger, and Telegram) and social media applications (Facebook, Instagram, and Twitter). The purpose and content of the study were explained, and informed consent was obtained from the adolescents and parents. Adolescents and their parents who volunteered to participate in the study were allowed to move on to the following pages of the data collection tool after they checked the voluntary participation checkbox. No personal data were collected during data collection.

Data Analysis

Data were analyzed on the IBM SPSS Statistics 29 software package. Mean, standard deviation, frequency, and percentage statistics were used in the analysis of descriptive data. The content validity index and content validity ratio were employed to evaluate scores given by the experts, and the validity analyse of the scale was evaluated with confirmatory factor analysis (CFA).

The distribution of the data was examined for skewness and kurtosis, and it was determined that the data was normally distributed between ±2. Before performing the confirmatory factor analysis, multicollinearity was examined with VIF and tolerance, and it was determined that the VIF values were less than 10 and the tolerance values were greater than 0.2, and there was no multicollinearity. For CFA, multiple normality was examined, the critical (CR) ratio was below 10, and multiple normality was determined to be below 10. has been determined to be provided. As a result of the analyses, it was determined that the data met the assumptions for both reliability and validity analyses.

In order to reveal the factor pattern of the scale, maximum likelihood estimation method and covariance matrix were used to determine factors in CFA. Acceptable fit indices for a good CFA model should be $\chi^2/df \leq 3$, RMSEA 0.05–0.08, GFI, CFI, IFI, RFI, NFI, and TLI > 0.90 (DeVellis, 2016; Karagöz, 2016; Tabachnick & Fidell, 2015). In addition, internal consistency was evaluated with Cronbach's alpha and omega coefficients and split-half method, and Pearson correlation analysis was used to do an item analysis in SPSS. In the literature, Cronbach's alpha and omega coefficients are considered unreliable between 0.00 and 0.40, low-reliability between 0.40 and 0.60, quite reliable between 0.60 and 0.80, and highly reliable between 0.80 and 1.00 (Jonhson & Christensen, 2014; Karagöz, 2016; Seçer, 2018; Tabachnick & Fidell, 2015). In the literature, it is suggested that the correlation level between the two halves should be at least 0.70, Cronbach alpha values of both halves should be > 0.70, and that the Spearman-Brown and Guttman split-half coefficients should be > 0.80 (Kartal & Bardakçı, 2018; Özdamar, 2016; Tabachnick & Fidell, 2015). The minimum value required for the item-total score correlation is 0.30, and it is recommended to remove items with a correlation value of less than 0.30 from a scale. The correlation value should be as close to one and positive as possible (Jonhson & Christensen, 2014; Karagöz, 2016). In addition, t test was used for contrast group

comparison was used to determine the relationship between the factors of the scale (DeVellis, 2016; Tabachnick & Fidell, 2015).

The validity and reliability analysis studies were conducted on the SPSS 29.0 software, and the confirmatory factor analysis was performed on the AMOS 24.0 software. Statistical results were considered significant at 95% confidence and $p<0.05$ levels.

Ethical Considerations

The permission of the scale owner was obtained via e-mail to do the validity and reliability study of the Turkish version. The approval of the Scientific Research and Publication Ethics Committee of the university (date: 03.03.2023, decision no: 2023/26−1) and the informed written consent of the adolescents and their parents were obtained.

Results

Findings Regarding the Validity of the Scale

Confirmatory factor analysis was performed to determine the construct validity of the scale.

As a result of the CFA conducted for the construct validity measurement of the Turkish version of the eight-item Bedtime Procrastination Scale, χ^2/DF value was found as 1.822 ($\chi^2=23{,}680$, DF = 13, $p<0.05$), which showed the model was appropriate. Model fit indices were RMSEA = 0.069, SRMR = 0.0264, GFI = 0.97, CFI = 0.99, IFI = 0.99, RFI = 0.99, NFI = 0.98, and TLI = 0.98. As a result of the CFA performed to test the construct validity of the Turkish version of the seven-item While-in-Bed Procrastination Scale, the χ^2/DF value was 1.432 ($\chi^2=11.452$, DF = 8, $p<0.05$), which indicated it was an appropriate model. Model fit indices were found as RMSEA = 0.050, SRMR = 0.0251, GFI = 0.98, CFI = 0.99, IFI = 0.99, RFI = 0.95, NFI = 0.98, and TLI = 0.99 (Table 2).

As a result of the CFA, the factor loads varied between 0.75 and 0.91 for the Bedtime Procrastination Scale (Fig. 1) and between 0.35 and 0.92 for the While-in-Bed Procrastination Scale (Fig. 2).

Table 2 Model fit indicies of the bedtime procrastination and while-in-bed procrastination scales for adolescents ($n=348$)

Scales	RMSEA	GFI	CFI	IFI	RFI	NFI	TLI	χ^2	DF	χ^2/DF
Bedtime procrastination Scale	0.069	0.97	0.99	0.99	0.96	0.98	0.98	23.680	13	1.822
While-in-bed procrastination scale	0.050	0.98	0.99	0.99	0.95	0.98	0.99	11.452	8	1.432

RMSEA: Root Mean Square Error of Approximation; GFI: Goodness of Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; NFI: Normed Fit Index; TLI: Trucker-lewis Index; χ^2: Chi-Square; DF: Degree of Freedom

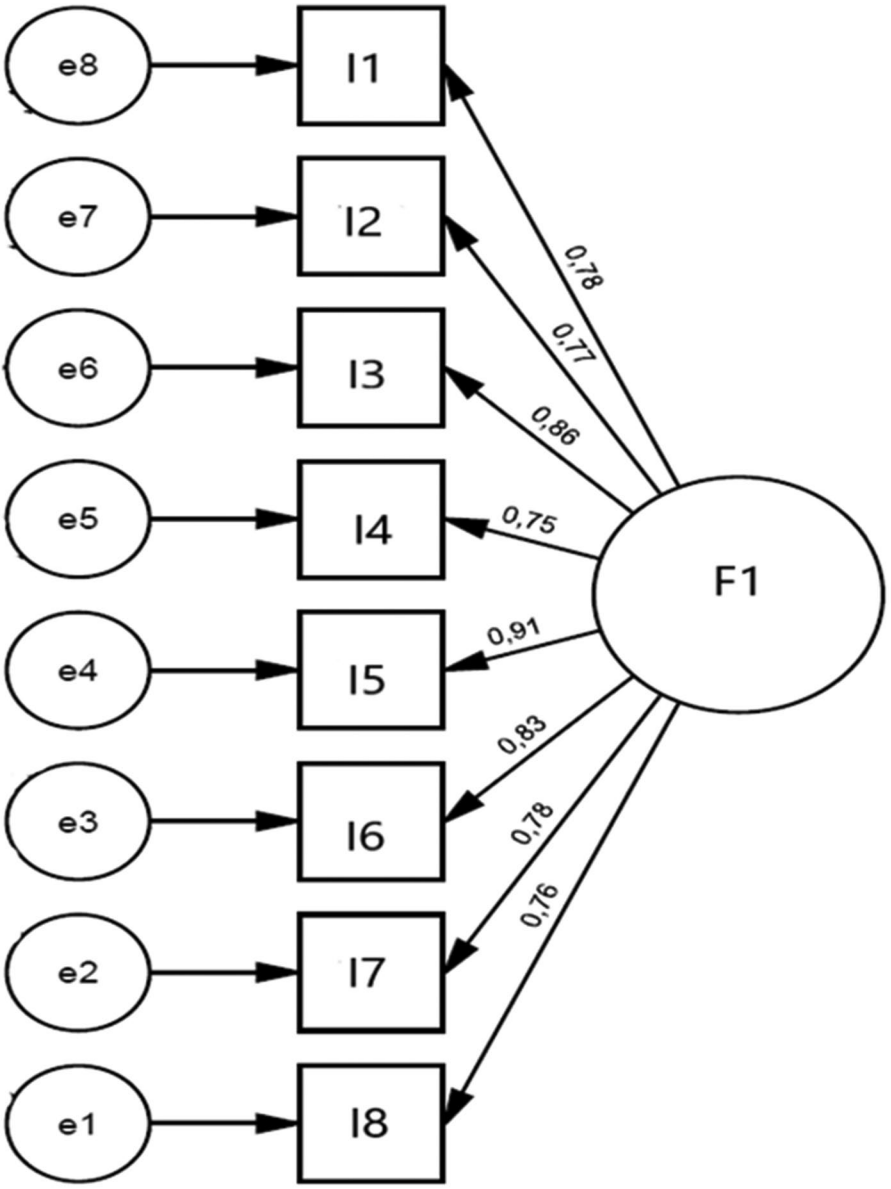

Fig. 1 The CFA results of the bedtime procrastination scale

Findings Regarding the Reliability of the Scales

Both Cronbach's alpha reliability and the omega coefficients of the Bedtime Procrastination Scale were found as 0.93. As a result of the split-half analysis, Cronbach alpha value of the first half was found as 0.88, and the alpha value of the second half was 0.86. In addition, the Spearman-Brown coefficient was 0.93, the Guttman

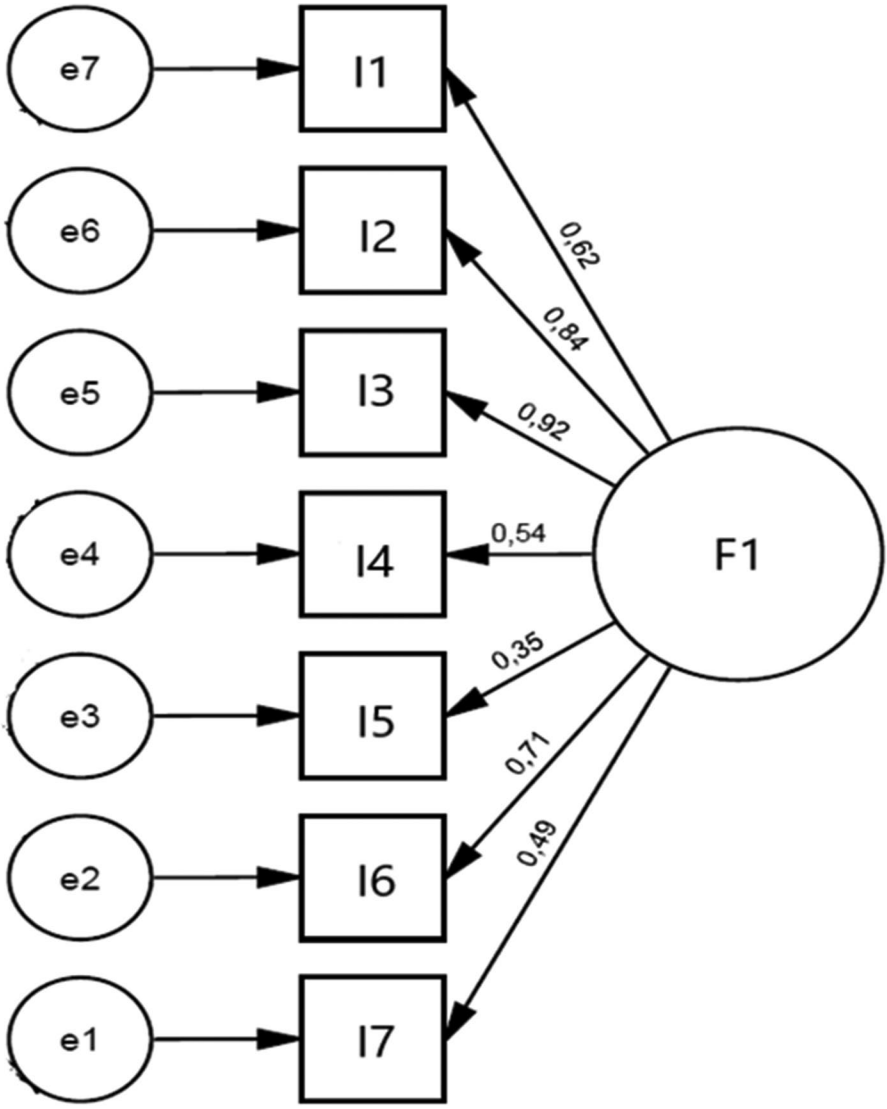

Fig. 2 The CFA results of the while-in-bed procrastination scale

Split-Half coefficient was 0.93, and the correlation between the two halves was 0.88 (Table 3). Hotelling's T^2 value was found to be 121.313 ($F = 17.031$, $p < 0.001$). Cronbach's alpha reliability and the omega coefficients of the While-in-Bed Procrastination Scale were found as 0.86 and 0.84, respectively. As a result of split-half analysis, Cronbach's alpha values of the first and second halves were found as 0.70. Also, the Spearman-Brown coefficient was 0.92, the Guttman split-half coefficient was 0.91, and the correlation between the two halves was 0.86 (Table 3). Hotelling's T^2 value was found as 360.331 ($F = 59.190$, $p < 0.001$).

Table 3 Reliability analysis results of the bedtime procrastination and while-in-bed procrastination scales for adolescents ($n=348$)

	Bedtime procrastination scale	While-in-bed procrastination scale
Cronbach α	0.93	0.86
Cronbach α of first-half	0.88	0.70
Cronbach α of second-half	0.86	0.70
Spearman-Brown	0.93	0.92
Guttman Split-Half	0.93	0.91
Correlation between the two halves	0.88	0.86

Table 4 Item-total score correlations of bedtime procrastination and while-in-bed procrastination scales for adolescents ($n=348$)

Scales	Items	Item-total score correlations (r)*
Bedtime procrastination scale	I1	0.76
	I2	0.75
	I3	0.80
	I4	0.71
	I5	0.82
	I6	0.79
	I7	0.74
	I8	0.79
While-in-bed procrastination scale	I1	0.59
	I2	0.67
	I3	0.77
	I4	0.61
	I5	0.44
	I6	0.69
	I7	0.58

* $p<0.001$

It was determined that the item-total score correlations ranged from 0.71 to 0.82 for the Bedtime Procrastination Scale and 0.44 to 0.77 for the While-in-Bed Procrastination Scale ($p<0.001$) (Table 4).

The total score of the Bedtime Procrastination Scale of adolescent who exercise regularly was found to be 12.36 ± 5.01, and that of adolescent who did not exercise regularly was 21.91 ± 5.02. The total score of the While-in-Bed Procrastination Scale of adolescent who exercise regularly was determined as 11.07 ± 3.38, and that of adolescent who did not exercise regularly was 16.58 ± 4.40. The difference between the mean scores of the Bedtime Procrastination and While-in-Bed Procrastination Scales of adolescents who do and do not exercise regularly are respectively; It was determined as $t=16.020$, $p<0.001$, $t=11.208$, $p<0.001$ and was found to be significant ($p<0.05$). It was determined that the group that exercised regularly did not procrastination their bedtime and while-in-bed compared to the group that did not exercise regularly ($p<0.001$) (Table 5).

The total score of the Bedtime Procrastination Scale of adolescent who medication use regularly was found to be 21.43 ± 4.97, and that of adolescent who did

Table 5 Comparison of the mean scores of the bedtime procrastination and while-in-bed procrastination scales in the adolescents that exercise regularly and those that do not ($n=348$)

M: Scale total score mean; SD: standart deviation

Scales	Regular exercise status	n	M±SD	t	p
Bedtime procrastination scale	Yes	249	12.36±5.01	16.020	<0.001
	No	99	21.91±5.02		
While-in-bed procrastination scale	Yes	249	11.07±3.38	11.208	<0.001
	No	99	16.58±4.40		

Table 6 Comparison of the mean scores of the bedtime procrastination and while-in-bed procrastination scales in the adolescents that medication use regularly and those that do not ($n=348$)

Scales	Regular medication use	n	M±SD	t	p
Bedtime procrastination scale	Yes	30	21.43±4.97	7.111	<0.001
	No	318	14.48±6.43		
While-in-bed procrastination scale	Yes	30	17.56±4.38	6.724	<0.001

M: Scale total score mean; SD: standart deviation

not medication use regularly was 14.48±6.43. The total score of the While-in-Bed Procrastination Scale of adolescent who medication use regularly was determined as 17.56±4.38, and that of adolescent who did not medication use regularly was 12.17±4.17. The difference between the mean scores of the Bedtime Procrastination and While-in-Bed Procrastination Scales of adolescents who do and do not medication use regularly are respectively; It was determined as t=7.111, $p<0.001$, t=6.724, $p<0.001$ and was found to be significant ($p<0.05$). It was determined that the group that did not use regular medication did not procrastination their bedtime and while-in-bed compared to the group that used regular medication. ($p<0.001$) (Table 6).

A strong correlation was found between the total score averages of the two scales ($r=0.73$, $p<0.001$).

Discussion

This study conducted the validity and reliability analyses of the Bedtime Procrastination and While-in-Bed Procrastination Scales for Adolescents and adapted them to Turkish population.

In this study, model fit indices (χ^2/df, RMSEA, GFI, CFI, IFI, RFI, NFI, TLI) were used to determine the construct validity of the Turkish versions of both scales, and the construct validity for both scales was confirmed. CFA fit indices must be above 0.90, RMSEA must be below 0.08, and degrees of freedom divided by chi-square must be below five (Karagöz, 2016; Tabachnick & Fidell, 2015). In this context, the model fit indices for both scales in this study were examined, and it was determined that the Turkish version had a perfect fit. All these results confirmed the single-factor original structure of the scales. Since CFA was not performed for both scales in the original study, we could not compare our results (Magalhães et al., 2020). As a result of CFA,

it was seen that the original structure of the scales was measured in a similar way in Turkey, the item-subdimension relationship was sufficient and it could adequately explain the concept it wanted to measure. It has been observed that the scales can be used in Turkey.

Cronbach's alpha and omega coefficients of both scales were found as >0.80 in the present study, showing high reliability (Jonhson & Christensen, 2014; Karagöz, 2016; Seçer, 2018; Tabachnick & Fidell, 2015). Conversely, Magalhães et al. (2020) found Cronbach alpha reliability coefficients for both scales as >0.70. Considering these results, it was determined that the Cronbach alpha coefficient of our study was higher than that of the original study. High alpha values indicate that the items in the scale measure a similar concept, that the items are compatible with each other and with the general scale, and that the items measure a similar concept as a whole. This result showed that the reliability of the scale was good.

In the split-half test reliability analyses of the scales, the correlation between the two halves (above 0.70), Cronbach's alpha coefficient (above 0.70), Spearman-Brown coefficient and Guttman split-half coefficient (above 0.80) were evaluated and found to be high. These results showed that the scales were reliable and had acceptable internal consistency (Kartal & Bardakçı, 2018; Özdamar, 2016; Tabachnick & Fidell, 2015). Since split-half analysis was not performed for both scales in the original study, we could not compare our results (Magalhães et al., 2020). The split-half analysis requires the scale items to be divided into two according to some characteristics, the two halves to be evaluated as different scales, and both the alpha values of the two halves and the correlation between the two halves to be calculated. As a result of the analysis, high alpha values and a good level of correlation between the two halves are expected. High alpha and good correlation indicate that the items are consistent with each other and measure similar concepts. In this study, the high split-half alpha values and correlation coefficients in the two scales showed that the scale could consistently measure the concept it wanted to measure.

The item-total score correlation values of all items on both scales in this study were found to vary between 0.44 and 0.82, and it was found that there was no item with a correlation value of less than 0.30. In this study, it was determined that there was a strong relationship between the total score averages of the two scales. Thus, it was determined that all the items on both scales were related to each other, the items measured the subject adequately, and that the reliability of the items on the scale was high (Jonhson & Christensen, 2014; Karagöz, 2016). Since the item-total score correlation analysis was not performed for both scales in the original study, we could not compare our results (Magalhães et al., 2020).

In testing its validity in this study, the adolescents' regular exercise status and regular medication use status were used for contrast group comparison. A statistically significant difference was found between the scale total score averages according to the children's regular exercise status and medication use ($p<0.001$). It has been determined that adolescents who exercise regularly and do not use medication do not procrastination their bedtime and while-in-bed. These results showed that the scale has good discrimination power, can adequately measure the area it is intended to measure, and can discriminate between opposing groups (DeVellis, 2016; Tabach-

nick & Fidell, 2015). These results prove that the scale is both a reliable and valid measurement tool.

It was determined that the study was similar to the original scale, but since the scale was not adapted to other cultures, it could not be compared or discussed with other studies.

Limitations

The limitation of this study is that the random sampling method was used to recruit subjects, that is, only adolescents who agreed to fill out the scales were included in the study. The validity and reliability studies of the scales were performed on the adolescent population. This is another limitation of the study. For this reason, it is thought that conducting the scales on other age groups would be beneficial as well. Another limitation of the study is that the test-retest technique was not used. However, in order to increase reliability, a split-half analysis was performed.

Implications

This study may provide implications for healthcare professionals working in pediatric clinics (nurses, doctors, etc.), school nurses, and those doing research in this field. These scales can be used to evaluate whether adolescents delay going to bed and sleeping while in bed and what activities they do before going to sleep. Also, negative behaviors such as inadequate sleep habits can be reduced, and sleep-focused education programs can be developed. In addition, they can be employed to predetermine the increasing insomnia cases among adolescents. Moreover, it can be said that the small number of items on the measurement tools provides an advantage for researchers and participants for application. Applying these scales in different cultures will contribute to the body of knowledge in this field and provide the opportunity to follow the changes and improvements in this field comparatively. It is also recommended that the study be conducted with clinical samples.

Conclusion

This study examined the psychometric properties of the Bedtime Procrastination and While-in-Bed Procrastination Scales for Adolescents. We found that both scales were valid and reliable measurement tools appropriate for Turkish culture. Therefore, they can be considered useful measurement tools for healthcare professionals working in pediatric clinics (nurses, doctors, etc.), school nurses and those doing research in this field.

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Data Availability The data that support the findings of this study are available from researchers and university, but restrictions apply to the availability of these data, which were used under license for the current study and so are not publicly available. The data are, however, available from the authors upon reasonable request and with the permission of the Ethics Committee.

Declarations

Conflict of Interest The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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