



# Sleep Problems in Turkish Children with Conduct Disorder: A Single-centre, Cross-sectional, Case-control Study

## Davranım Bozukluğu Olan Türk Çocuklarında Uyku Sorunları: Tek-merkezli, Kesitsel, Olgu-kontrol Çalışması

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### Abstract

**Objective:** This study aimed to determine the sleep habits and sleep problems of patients with conduct disorder (CD) and to compare them with healthy controls.

**Materials and Methods:** This cross-sectional study included 45 children diagnosed with CD and 50 healthy controls. Sleep was evaluated by children's sleep habits questionnaire (CSHQ). Qualitative variables between groups were compared using chi-square test, whereas quantitative variables were compared using t-test. Correlation analyses were conducted to evaluate relationships between the quantitative variables. Linear regression analysis was conducted to evaluate the predictors of severity of CD symptoms. P was set at 0.05.

**Results:** The average ages of children in CD and control groups were 11.04±1.20 and 10.00±1.55 years, respectively. Moreover, 71.1% in the CD group were boys (vs. 78.0% in the control group). The groups were comparable in terms of socio-demographic features (all p>0.05). Scores of all CSHQ subscales were significantly elevated in the CD group compared with the control group (p<0.001). Clinically significant sleep problems were significantly elevated in the CD group (p<0.001). In the regression analysis, bedtime resistance and daytime sleepiness emerged as significant predictors of the severity of CD.

**Conclusion:** Sleep problems may be common among Turkish children with CD, and bedtime resistance and daytime sleepiness may indicate severity of symptoms. Multimodal treatment for CD among children may address sleep problems.

**Keywords:** Conduct disorder, sleep habits, child

### Öz

**Amaç:** Çalışmamızın amacı, davranım bozukluğu (DB) olan hastaların uyku alışkanlıklarını ve uyku sorunlarını belirlemek ve bunları sağlıklı kontrollerle karşılaştırmaktır.

**Gereç ve Yöntem:** Bu çalışma, sağlıklı bir kontrol grubu ile kesitsel bir çalışmadır. DB tanısı alan 45 çocuk ve 50 sağlıklı kontrol çalışmaya dahil edildi. Uyku alışkanlıkları, çocukların uyku alışkanlıkları anketi (ÇUAA) ile değerlendirildi. Gruplar arası nitel değişkenler ki-kare testi ile kantitatif değişkenler t-testi ile karşılaştırıldı. Nicel değişkenler arasındaki ilişkileri değerlendirmek için korelasyon analizleri yapılmıştır. DB semptomlarının şiddetini belirleyen faktörleri değerlendirmek için doğrusal regresyon analizi yapılmıştır. P<0,05 değeri istatistiksel olarak anlamlı kabul edildi.

**Bulgular:** DB'li çocukların ve kontrollerin ortalama yaşları sırasıyla 11,04±1,20 ve 10,00±1,55 yıldır. DB'li çocukların %71,1'ini erkekler oluşturmuştur (kontrollerin %78,0'i). Gruplar sosyo-demografik özellikler açısından benzerdir (p>0,05). Tüm ÇUAA alt ölçeklerinin puanları, kontrollere kıyasla DB grubunda anlamlı olarak yükseldi (p<0,001). DB'li hastalarda klinik olarak anlamlı uyku problemleri daha yüksekti (p<0,001). Regresyon analizinde, yatma zamanı direnci ve gündüz uykululuğu davranış bozukluğunun şiddetinin anlamlı yordayıcıları olarak ortaya çıktı.

**Sonuç:** DB'si olan Türk çocuklarında uyku sorunları yaygın olabilir ve yatma zamanı direnci ve gündüz uykululuk semptomlarının şiddetini gösterebilir. Çocuklarda DB için çok boyutlu tedavi uyku problemlerini de ele almalıdır.

**Anahtar Kelimeler:** Davranım bozukluğu, uyku alışkanlıkları, çocuklar

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## Introduction

Conduct disorder (CD) is defined as a repetitive and persistent pattern of violation of basic rights of others and/or major age-appropriate norms and rules of society as indicated by aggression to people and animals, destruction of property, deceitfulness/theft and delinquency/truancy (1). It often arises in childhood or adolescence (2) and the prevalence of CD may vary between 1.0-16.0% in childhood (1). The etiology is considered to be multi-factorial with a genetic predisposition interacting with environmental stressors (2). The risk may be higher among disadvantaged families and children with CD may be involved frequently in legal, health and social welfare services (3). Diagnostic and Statistical Manual of Mental Disorders-fifth edition (DSM-5) denotes a more malignant subtype with symptoms appearing before the age of 10 while the more benign adolescent-onset subtype is defined with emergence of symptoms after 10 years of age (1). However, the importance of this criterion as well as the similar criterion of limited prosocial emotions are being currently debated (4).

Sleep is a periodic, reversible reduction of awareness and responsivity to environmental stimuli which is critical for brain development (5). Sleep problems may be common especially among young children and may affect up to 20.0% (6). Sleep problems display complex, bidirectional relationships with various pediatric psychopathologies and their rates in children with psychiatric disorders may be elevated (7). Especially, bed-time resistance, problems in falling and sustaining sleep, parasomnias and daytime sleepiness and fatigue may be common among children with psychiatric disorder (8). The relationships between sleep problems and psychopathology may be due to symptoms of psychopathology, problems in family functioning, parenting style, sleep practices, psychopathology among parents or negative life events (6,8).

Sleep problems have also been reported to be elevated among children with disruptive behavior disorders, including CD (9-11). Reduced sleep duration and quality have also been found to be associated with elevated levels of aggression, impulsivity, peer bullying and victimization (12-14). The relationships between sleep problems and delinquency may be independent of psychopathic symptoms and parenting practices (15). The relative importance of attention deficit and hyperactivity disorder (ADHD) comorbidity and effects of treatment on sleep problems among children with CD is still being debated (10). Therefore; the primary aims of this study were;

- a) To determine sleep habits and sleep problems of patients who were followed up in our clinic with the diagnosis of CD,
- b) To compare sleep habits and sleep problems of patients with CD and healthy controls and,
- c) To evaluate the effect of comorbid ADHD diagnosis on sleep problems among children with CD.

## Materials and Methods

### Study Design, Date, Setting and Ethical Issues

The study was conducted between February and May 2020. Ethics committee approval was granted for the study from Bolu

Abant İzzet Baysal University Clinical Trials Ethics Committee (IRB date: 16.03.2020, no: 118). Verbal and written consents of the mothers and their children who participated in the study were obtained prior to study entry. All study procedures were conducted following the Declaration of Helsinki and local laws and regulations.

### Participants

The inclusion criteria for the CD group were age 8 between 12 years, CD diagnosis according to the DSM-5 criteria and interviews according to the schedule for affective disorders and schizophrenia for school age adolescents present and lifetime version-Turkish version (K-SADS-PL), being treatment naive, lack of comorbidity except ADHD and Oppositional Defiant Disorder (ODD), lack of chronic medical/neurologic conditions requiring treatment (i.e. epilepsy, diabetes etc.), and providing informed consent for study participation.

The exclusion criteria included anxiety disorders, drug/alcohol abuse, bipolar disorder, major depressive disorder, obsessive-compulsive disorder, post-traumatic stress disorder, intellectual disability, psychotic symptoms and major known medical disorders of the central nervous system (e.g. epilepsy). Intellectual disability was excluded according to developmental and academic history and clinical evaluations.

The same child psychiatrist interviewed both children and their mothers. The potential participants included 118 children applying our clinic with CD symptoms within the study period. We excluded children who were not diagnosed with CD (n=24) and those refusing participation (n=6) and evaluated 88 children with CD. Thirty-six of 88 children had comorbid psychiatric disorders (intellectual disability=12; major depressive disorder=7; anxiety disorders=10; bipolar spectrum disorder n=4; obsessive-compulsive disorder=2; post-traumatic stress disorder=1). Seven children with missing data were also excluded from the study leading to 45 treatment-naive children with CD aged 8-12 years in the patient group.

The control group consisted of children between 8 and 12 years of age who came to the pediatric clinic of the hospital for well-child visits. Pediatrics clinics are a free and routine service in our country, and children come to this clinic from the general population. Pediatricians identified children 8-12 years old and asked the parents for potential participation. Exclusion criteria for the healthy control group were; children diagnosed with a psychiatric disorder and those receiving psychopharmacological treatments, children with chronic medical and neurological disorders or those with a past history of psychiatric treatment. During the study period, 54 healthy children applied to the study center and four of them refused participation in the study. As a result, 50 children were included in the control group.

### Data Collection

**Socio-demographic data form:** We created this form to collect information about the socio-demographic characteristics of children and parents. The form includes questions about the child's age, gender, family's socio-economic level, academic status and peer relationships of the child, and parents' age, educational, marital and vocational status. Academic success was evaluated according to the latest report cards from school

while we depended on children's reports for peer relationships. The clinicians completed the form.

**K-SADS-PL:** This is a semi-structured interview developed to investigate current and lifetime psychopathology in children and adolescents aged 6 to 18 years. K-SADS-PL was created according to DSM-5 (American Psychiatric Association, 1994) diagnostic criteria (16). Turkish translation and its validity and reliability study was conducted by Gökler and colleagues (17).

**DSM-5 based screening and assessment scale for disruptive behavior disorders parent form (DBSAS-DBD):** This form evaluates symptoms of inattention, hyperactivity/impulsivity, oppositionality and, CDs as per DSM-5 criteria. Each item (9 for attention deficit, 6 for hyperactivity, 3 for impulsivity, 8 for oppositional defiant disorder, and 15 for CD) is rated on a three-point likert-type scale (0=none, 1=occasionally, 2=much, and 3=very much). When subscales are evaluated, 2 to 3 points per item are assessed as symptomatic (1), while 0 to 1 are assessed as non-symptomatic (18). The validity and reliability study of this scale was established previously (19).

**Children's sleep habits questionnaire (CSHQ)-short form:** This form was used to evaluate sleep habits and problems in children and a total CSHQ score of 41 has been reported to be a sensitive cut-off for clinically significant sleep problems (20). It determines the need for further investigation by reviewing general sleep problems rather than making a specific diagnosis. Parents are asked to evaluate the child's sleep habits over the previous week. Parents completed the Turkish version of CSHQ at baseline in this study (21).

#### Statistical Analysis

We used the Statistical Program for Social Sciences (SPSS 22.0, IBM Inc., Armonk, NY) program for statistical analysis.

The socio-demographic and clinical categorical variables were reported as counts and frequencies. Chi-square test was used to compare categorical variables across groups. Assumptions of normality were tested with the Kolmogorov-Smirnov test. Quantitative variables were compared across groups with t-test due to normality. Pearson correlation analysis was used to determine the correlation between continuous variables. We performed linear regression analysis to evaluate which sleep problem predicted behavioral problems. P-value was accepted as <0.05 (two-tailed).

#### Results

Within the study period, 45 children with CD and 50 healthy control children were enrolled. The groups did not differ significantly in terms of children's age, gender and maternal age. Maternal education levels and occupation differed significantly across groups ( $p=0.003$ ,  $p=0.040$ , respectively). Children with CD reported greater academic and peer problems compared to controls ( $p<0.001$ ,  $p<0.001$ , respectively) (Table 1).

Comparison of CD and control groups in terms of CSHQ and DBSAS-DBD was shown in Table 2 and Table 3. According to the cut-off score of 41, 66.7% ( $n=30$ ) of the children with CD group had clinically significant sleep problems while this rate was 16.0% ( $n=8$ ) in healthy control children. The rate of clinically important sleep problems was significantly elevated among the CD group ( $p<0.001$ ) (Table 4). The diagnosis of CD increased the odds of significant sleep problems 10.5 times (95% confidence interval=4.0-27.9,  $p<0.05$ ). Among children with CD, 21 had comorbid ADHD (46.7%). Children with ADHD comorbid with CD displayed significantly elevated levels of sleep anxiety compared to children with CD only (Table 4).

	CD (n=45)	Control (n=50)	p
Age* (mean ± SD)	11.04±1.20	10.00±1.55	0.104
Gender** n (%)			
Female	13 (28.9%)	11 (22%)	0.485
Male	32 (71.1%)	39 (78%)	
Maternal age* (mean ± SD)	38.24±7.68	37.10±6.53	0.445
Maternal education**			
<8 years	39 (86.7%)	29 (58%)	0.003
>8 years	6 (13.3%)	21 (42%)	
Maternal working status n (%)			
Housewife	35 (77.8%)	29 (58%)	0.040
Working	10 (22.2%)	21 (42%)	
School success** n (%)			
Good	4 (8.9%)	18 (36%)	<0.001
Moderate	19 (42.2%)	20 (40%)	
Bad	22 (48.9%)	12 (24%)	
Peer relation** n (%)			
Good	8 (17.8%)	48 (96%)	<0.001
Bad	37 (82.2%)	2 (4%)	

\*Evaluated with t-test, \*\*Evaluated with chi-square test, CD: Conduct disorder, SD: Standard deviation

There was a positive statistically significant correlation between DBSAS-DBD CD subscale and all subscales of the CSHQ (bed-time resistance:  $r=0.586$ ,  $p<0.001$ ; sleep latency:  $r=0.375$ ,  $p<0.001$ ; sleep duration:  $r=0.291$ ,  $p=0.007$ ; sleep anxiety:  $r=0.420$ ,  $p<0.001$ ; night waking:  $r=0.337$ ,  $p=0.002$ ; parasomnia:  $r=0.400$ ,  $p<0.001$ ; sleep-disordered breathing:  $r=0.219$ ,  $p=0.443$ ; daytime sleepiness:  $r=0.526$ ,  $p<0.001$ ). Lastly, we performed a linear regression analysis to evaluate the predictive value of sleep problem domains in CD severity. In this analysis only the bed-time resistance and daytime sleepiness emerged as significant predictors of DBSAS-DBD CD scores (Table 5).

## Discussion

This single-center, cross-sectional, case-control study aimed to compare sleep habits and problems between children with CD and healthy controls and to evaluate the effects of comorbid ADHD on sleep problems. We found that treatment-naïve children with CD had significantly elevated sleep problems

compared to control children and that the presence of comorbid ADHD significantly elevated sleep anxiety among children with CD. Bed-time resistance and daytime sleepiness emerged as the only significant predictors of CD severity.

The main finding of our study is that children with CD display elevated levels of sleep problems compared to healthy controls. The association between disruptive behavior disorders and sleep problems is complex (13,22). Both reduced sleep quantity and quality have been found to be associated with externalizing disorders such as CD (10,11). This relationship seems to be bidirectional and complex (23) and seems to emerge by early childhood (11). According to some studies severity of oppositional and conduct symptoms may correlate with sleep problems (11). Our findings are in agreement with previous work demonstrating that conduct problems are associated with global reports of sleep problems.

Another finding of our study was elevated levels of sleep anxiety in children with ADHD and CD compared to those with CD alone. Although it is known that comorbidity among various

**Table 2. Comparison of children with CD and control children in terms of sleep habits**

	CD (n=45)	Control (n=50)	t	p
Bedtime resistance	10.77±3.15	6.10±1.3	10.429	<0.001
Sleep latency	1.82±0.90	1.10±0.30	5.333	<0.001
Sleep duration	4.59±1.77	3.22±1.01	5.316	<0.001
Sleep anxiety	6.34±1.52	4.20±0.45	8.650	<0.001
Night waking	4.77±1.58	3.22±0.42	6.681	0.001
Parasomnias	10.32±2.80	7.16±1.67	7.898	0.004
Sleep disordered breathing	3.89±1.51	3.25±1.45	2.701	0.146
Daytime sleepiness	14.59±4.11	10.06±2.31	11.236	<0.001

CD: Conduct disorder

**Table 3. Comparison of CD and control group in terms of DSM-5 based screening and assessment scale for disruptive behavior disorders parent form scores**

	CD (n=45)	Control (n=50)	t	p
DBSAS-DBD-AD	4.23±3.13	1.50±1.47	5.091	<0.001
DBSAS-DBD-HA	3.22±3.00	1.48±1.45	3.251	0.002
DBSAS-DBD-ODD	2.70±2.67	1.72±1.26	2.077	0.043
DBSAS-DBD-CD	3.95±2.40	0.44±0.79	8.542	<0.001

DBSAS-DBD: DSM-5 based screening and assessment scale for disruptive behavior disorders parent form, AD: Attention deficit, HA: Hyperactivity, ODD: Oppositional defiant disorder, CD: Conduct disorder

**Table 4. Comparison of sleep habits in conduct disorder group according to comorbid ADHD comorbidity**

	No comorbidity (n=24)	Comorbid ADHD (n=21)	t	p
Bedtime resistance	10.08±2.81	11.61±3.40	-1.618	0.113
Sleep latency	1.96±0.95	1.64±0.81	1.140	0.261
Sleep duration	4.92±1.77	4.21±1.74	1.350	0.184
Sleep anxiety	6.54±2.17	8.32±2.64	-2.429	0.020
Night waking	4.75±1.48	4.82±1.74	-0.103	0.918
Parasomnias	10.17±2.70	10.51±2.98	-0.389	0.699
Sleep disordered breathing	3.88±1.36	3.90±1.71	-0.054	0.957
Daytime sleepiness	14.71±4.47	14.57±3.73	0.206	0.838

ADHD: Attention deficit and hyperactivity disorder

**Table 5. Variables related to DBSAS-DBD-conduct disorders scores for children in linear regression analysis**

Variables	B	SEB	$\beta$	p	95% CI
Bedtime resistance	0.715	0.145	0.891	<0.001	0.426-1.004
Sleep latency	0.336	0.269	0.103	0.365	-0.399-1.070
Sleep duration	0.091	0.187	0.054	0.626	-0.280-0.463
Sleep anxiety	0.151	0.146	0.132	0.305	-0.140-0.442
Night waking	-0.520	0.264	-0.291	0.052	-1.045-0.005
Parasomnias	0.069	0.141	0.072	0.625	-0.212-0.350
Sleep disordered breathing	0.092	0.230	0.044	0.691	-0.366-0.550
Daytime sleepiness	0.177	0.066	0.316	0.009	0.045-0.310

R<sup>2</sup>=0,480, F (8.85)=8.894, p<0.001, CI: Confidence interval, DBSAS-DBD: DSM-5 based screening and assesment scale for disruptive behavior disorders parent form

neurodevelopmental disorders may increase the risk of sleep problems, the results on relative contributions of comorbid ADHD on sleep problems among children with CD have been inconsistent (9,10). Aronen and colleagues reported that children with disruptive behavior disorders (including CD) who have comorbid ADHD slept significantly less than those without ADHD comorbidity (24). Children with disruptive behavior disorders and ADHD may also display greater resistance at waking in the morning and going to bed at night than those with ADHD alone (9). Those children may also be under elevated risks for sleep-related respiratory problems (24,25). Contrarily, Hvolby et al. (10) reported that the primary driver of sleep problems in oppositional children and those with CD is comorbid ADHD. In partial accordance with those results, we found that ADHD comorbid with CD significantly elevates sleep related anxiety (10). This finding may be due to hyperactive/impulsive symptoms interfering with sleep or greater familial conflict over sleep times or both. The contribution of those variables as well as the effects of treatment should be elucidated with further, prospective studies.

In regression analyses, bed-time resistance and daytime sleepiness emerged as significant predictors of CD symptom severity. Although the cross-sectional nature of our study precludes hypotheses on causality, this finding may be explained by greater bed-time resistance reducing sleep quantity and quality which in turn may culminate in daytime sleepiness (26). Previous studies also found that greater bed-time resistance was associated with elevated levels of oppositional behaviors and CD symptoms (11).

Our findings should be evaluated within the context of limitations. Firstly, those results are valid for treatment naïve children with CD applying for treatment at the study center and may have limited external validity for clinical samples at other centers or those from the community. Secondly, dependence on parent reports for sleep problems may lead to reporting and recall bias and objective methods of evaluating sleep parameters such as actigraphy/polysomnography may have enriched the results. Third, we did not evaluate for parenting dimensions, family functioning and parental psychopathology which may affect sleep variables. Fourth, mothers of control

children had greater levels of education and participation in work force which may have confounded the results. Fifth, over-representation of male participants may have affected the results. Although this male predominance may increase external validity due to CD being more frequent in male children, it may also reduce internal validity due to sample heterogeneity. Sixth, lack of blinding and lack of evaluations for intellectual functioning may also be listed among limitations. We also did not evaluate the effects of treatment on sleep parameters and treatment effects may be examined in future studies. Lastly, peer relationships were evaluated with self-reports which may also be affected by bias.

## Conclusion

Regardless of those limitations, our results suggest that sleep problems in cCD were elevated compared to healthy control children, and bed-time resistance and daytime sleepiness may predict the severity of CDs. Although cross-sectional design precludes evaluation of causality, it may be prudent to evaluate sleep quality and sleep problems in children with CD at baseline and after initiating treatment in regular intervals.

## Ethics

**Ethics Committee Approval:** The study was approved by the local research ethics committee (Bolu Abant İzzet Baysal University Clinical Trials Ethics Committee, IRB date: 16.03.2020, no: 118).

**Informed Consent:** Consent form was filled out by all participants.

**Peer-review:** Internally peer-reviewed.

## Authorship Contributions

Concept: Y.İ., G.G.Ö., M.S., B.B., Design: Y.İ., G.G.Ö., M.T., Data Collection or Processing: Y.İ., M.S., B.B., Analysis or Interpretation: Y.Ö., A.E.T., Literature Search: G.G.Ö., M.S., B.B., M.T., Writing: Y.İ., Y.Ö., A.E.T.

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## References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Diagnostic And Statistical Manual Of Mental Disorders. 5th ed. American Psychiatric Association, New YROK, 2013.
2. Fairchild G, Hawes DJ, Frick PJ, Copeland WE, Odgers CL, Franke B, Freitag CM, De Brito SA. Conduct disorder. *Nat Rev Dis Primers* 2019;5:43.
3. Rivenbark JG, Odgers CL, Caspi A, Harrington H, Hogan S, Houts RM, Poulton R, Moffitt TE. The high societal costs of childhood conduct problems: evidence from administrative records up to age 38 in a longitudinal birth cohort. *J Child Psychol Psychiatry* 2018;59:703-10.
4. Halliburton AE, Ridenour TA, White BA, Deater-Deckard K. Clinically differentiating life-course-persistent and adolescence-limited conduct problems: Is age-of-onset really enough? *J Appl Dev Psychol* 2017;52:34-45.
5. Franco P, Putois B, Guyon A, Raoux A, Papadopoulou M, Guignard-Perret A, Bat-Pitault F, Hartley S, Plancoulaine S. Sleep during development: sex and gender differences. *Sleep Med Rev* 2020;51:101276.
6. Newton AT, Honaker SM, Reid GJ. Risk and protective factors and processes for behavioral sleep problems among preschool and early school-aged children: a systematic review. *Sleep Med Rev* 2020;52:101303.
7. Meltzer LJ. Future Directions in Sleep and Developmental Psychopathology. *J Clin Child Adolesc Psychol* 2017;46:295-301.
8. Gregory AM, Sadeh A. Annual Research Review: Sleep problems in childhood psychiatric disorders - A review of the latest science. *J Child Psychol Psychiatry Allied Discip* 2016;57:296-317.
9. Becker SP. ADHD and sleep: recent advances and future directions. *Curr Opin Psychol* 2020;34:50-6.
10. Hvolby A, Christensen J, Gasse C, Dalsgaard S, Dreier JW. Cumulative incidence and relative risk of sleep problems among children and adolescents with newly diagnosed neurodevelopmental disorders: A nationwide register-based study. *J Sleep Res* 2021;30:e13122. doi: 10.1111/jsr.13122.
11. Coto J, Garcia A, Hart KC, Graziano PA. Associations between disruptive behavior problems, parenting factors, and sleep problems among young children. *J Dev Behav Pediatr* 2018;39:610-20.
12. Sosnowski DW, Klierer W, Lepore SJ. The role of sleep in the relationship between victimization and externalizing problems in adolescents. *J Youth Adolesc* 2016;45:1744-54.
13. Carvalho F, Vilaça J, Carvalho AL, Pontes T, Carvalho S. Sleep quality and bullying - prevalence in a cohort of Portuguese students. *Int J Adolesc Med Health*. 2020 Jun 6:/ijamh.ahead-of-print/ijamh-2020-0018/ijamh-2020-0018.xml. doi: 10.1515/ijamh-2020-0018. Epub ahead of print
14. Short MA, Weber N. Sleep duration and risk-taking in adolescents: A systematic review and meta-analysis. *Sleep Med Rev* 2018;41:185-96.
15. Backman H, Laajasalo T, Saukkonen S, Salmi V, Kivivuori J, Aronen ET. Are qualitative and quantitative sleep problems associated with delinquency when controlling for psychopathic features and parental supervision? *J Sleep Res* 2015;24:543-8.
16. Kaufman J, Birmaher B, Brent D, Rao U, Flynn C, Moreci P, Williamson D, Ryan N. Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): Initial reliability and validity data. *J Am Acad Child Adolesc Psychiatry* 1997;36:980-8.
17. Gökler B, Ünal F, Pehlivan Türk B. Reliability and Validity of schedule for affective disorders and schizophrenia for school age children-present and lifetime version-Turkish version (K-SADS-PL-T). *Turk J Child Adolesc Ment Health* 2004;11:109-16.
18. Turgay A. The DSM-IV Based child and adolescent behavior rating scale. Ontario, Canada, 1995.
19. Ercan ES, Amado S, Somer O, Cikoglu S. Development of a test battery for attention deficit hyperactivity and disruptive behavior disorders. *Turk J Child Adolesc Ment Heal* 2001;132-44.
20. Owens JA, Spirito A, McGuinn M. The Children's Sleep Habits Questionnaire (CSHQ): psychometric properties of a survey instrument for school-aged children. *Sleep* 2000;23:1-9.
21. Fiş NP, Arman A, Ay P, Topuzoğlu A, Güler As, Gökçe-İmren S, Ersu R, Berkem M. Çocuk uyku alışkanlıkları anketinin türkçe geçerliliği ve güvenilirliği. *Anadolu Psikiyat Derg* 2010;11:151-60.
22. Vazsonyi AT, Ksinan Jiskrova G, Ksinan AJ. Sleep, low self-control, and deviance: direct and indirect links across immigrant groups and socioeconomic strata. *J Adolesc* 2018;68:40-9.
23. Gradisar M, Gregory AM, Tikotzky L. Is sleep the red flag to psychopathology's bull? *J Child Psychol Psychiatry Allied Discip* 2020;61:1055-7.
24. Aronen ET, Lampenius T, Fontell T, Simola P. Sleep in children with disruptive behavioral disorders. *Behav Sleep Med* 2014;12:373-88.
25. Constantin E, Low NCP, Dugas E, Karp I, O'Loughlin J. Association between childhood sleep-disordered breathing and disruptive behavior disorders in childhood and adolescence. *Behav Sleep Med* 2015;13:442-54.
26. Wilsmore BR, Grunstein RR, Fransen M, Woodward M, Norton R, Ameratunga S. Sleep habits, insomnia, and daytime sleepiness in a large and healthy community-based sample of New Zealanders. *J Clin Sleep Med* 2013;9:559-66.