Journal of Pediatric Urology (2026) 22, 105954

Original Research

The association between problematic media use, sleep disturbances, and enuresis in children

[a]Health Sciences University Eskisehir City Hospital, Pediatric Urology Clinic, Eskisehir, Türkiye

[b]Bilecik Seyh Edebali University, Faculty of Health Science, Department of Public Health Nursing, Bilecik, Türkiye

* Correspondence to: Health Sciences University Eskisehir City Hospital, Pediatric Urology Clinic, Eskisehir, Turkey.
lakapies26@gmail.com (Ç. Arslan Alıcı)
eylulgulnurerdogan@gmail.com (E.G. Erdoğan)

Keywords
Children; Digital media; Enuresis; Problematic media use; Sleep disorders

Received 29 December 2025
Revised 2 March 2026
Accepted 8 April 2026
Available online 12 April 2026

Çiğdem Arslan Alıcı [a,*], Eylül Gülnur Erdoğan [b]

Summary

Background
Enuresis is a common pediatric urological condition in which sleep-related mechanisms (sleep fragmentation and impaired arousal) may contribute to nocturnal bladder control problems. In parallel, problematic digital media use has emerged as a potentially modifiable exposure that may disrupt sleep in children.

Objective
To investigate the relationship between problematic media use and sleep disorders in children diagnosed with enuresis and to identify sociodemographic and behavioral factors associated with increased sleep problems.

Materials and methods
This cross-sectional study was conducted with the parents of 186 children aged 6–12 years who presented to the pediatric urology clinic with enuresis. Parents completed the Problematic Media Use Scale-Parent Form (PMUS-PF) and the Sleep Disorder Scale for Children (SDSC). One parent per child participated in the study The analyses used descriptive statistics, Mann–Whitney U, Kruskal–Wallis, t-test, ANOVA, and Spearman correlation tests.

Results
The average age of the children is 8.1 ± 2.0, with 62.9% being boys and 37.1% being girls. A moderate positive correlation was found between problematic media use and sleep disorders ($r = .445$, $p < .001$); this relationship was particularly evident in the subscales of sleep initiation and maintenance disorders ($r = .401$; $p < .001$), sleep–wake transition disorders ($r = .342$; $p < .001$), and excessive sleepiness disorders ($r = .283$; $p < .001$). According to the variable of children's average daily internet usage time, statistically significant differences were found between the PMUS-PF total score and the SDSC total score, and the subscale scores for "Sleep Initiation and Maintenance Disorders" and "Sleep–Wake Transition Disorders" ($p < .05$). It was found that children who used the internet for more than 5 h per day had higher scores on the aforementioned scale and subscale compared to other groups.

Conclusion
Problematic media use is associated with sleep disturbances especially difficulty falling asleep, sleep–wake transition problems, and excessive daytime sleepiness in children diagnosed with enuresis. Incorporating the assessment of sleep patterns and digital media habits into the routine clinical evaluation of enuretic children may be valuable, and family-based behavioral interventions supporting healthy media use and sleep hygiene should be considered as adjunctive strategies in enuresis management.

https://doi.org/10.1016/j.jpurol.2026.105954

Introduction

Enuresis is a common pediatric condition defined as intermittent urinary incontinence occurring during sleep in children aged five years or older, according to the terminology standardized by the International Children's Continence Society (ICCS) [1—4]. By definition, enuresis refers specifically to nocturnal urinary incontinence; the presence of concomitant daytime lower urinary tract symptoms is used to differentiate monosymptomatic from non-monosymptomatic enuresis rather than to establish the diagnosis itself. Beyond its physical manifestations, enuresis may adversely affect social functioning, emotional well-being, and family dynamics [5,6]. Achieving nocturnal continence requires adequate bladder capacity, appropriate regulation of nocturnal urine production, and the ability to awaken in response to bladder distension.

Disturbances in sleep regulation, including elevated arousal thresholds and disrupted sleep continuity, have been increasingly implicated in nocturnal enuresis. Polysomnographic and sleep monitoring studies suggest that children with enuresis may exhibit altered arousal responses and greater sleep instability compared with typically developing peers [7,8]. In particular, higher thresholds for awakening may reduce responsiveness to bladder distension during sleep, thereby increasing vulnerability to nocturnal enuretic episodes. Comparative studies have also reported greater sleepiness and compromised sleep patterns among children with enuresis [9]. Together, these findings support the view that alterations in sleep regulation and arousal mechanisms may contribute to difficulties in achieving nocturnal continence.

Over the past decade, children's exposure to digital media has expanded substantially, with screen-based activities becoming integrated into daily routines [10,11]. Evening engagement with social media platforms, online gaming, and other interactive digital content may delay bedtime, prolong sleep latency, and reduce total sleep duration. Comprehensive reviews of digital media use in childhood emphasize that dysregulated screen exposure can influence sleep timing and quality across developmental stages [11].

Empirical research across diverse populations consistently reports associations between problematic media use and sleep disturbances. Social media use has been linked to poorer objective and subjective sleep quality in young adults [12]. Longitudinal findings further indicate that impaired sleep quality may mediate associations between problematic social media engagement and broader health outcomes [13]. Cross-sectional studies further indicate that greater intensity of digital media engagement is associated with increased sleep-related complaints [14]. While these studies have primarily focused on adolescents and adults, they suggest a recurring pattern in which excessive or dysregulated digital engagement is associated with sleep instability.

Sleep problems are common during childhood and are influenced by both endogenous factors, such as circadian rhythm disturbances and mood-related difficulties, and exogenous factors, including academic pressure and screen exposure. Increased screen time and academic stress have been shown to shorten sleep duration and impair sleep quality [15]. Moreover, environmental conditions, the physical sleep environment, and family socioeconomic dynamics play a significant role in shaping sleep patterns in children [16]. Previous studies have demonstrated significant associations between internet addiction and sleep disorders; notably, stimulating activities such as digital gaming before bedtime have been shown to increase fatigue and impair the ability to awaken [17,18]. Disruptions affecting deep sleep stages may elevate the arousal threshold and thereby compromise nocturnal bladder control in children with enuresis [19].

Given the central role of sleep and arousal in nocturnal continence, alterations in sleep patterns related to problematic media use may be relevant for children with enuresis. Delayed sleep onset, fragmented sleep, and increased arousal thresholds may reduce the likelihood of awakening in response to bladder distension. Additionally, behavioral patterns accompanying prolonged screen engagement such as postponing toileting-may further influence nocturnal bladder dynamics. Despite growing awareness of both sleep disturbances in enuresis and the widespread use of digital media among children, studies specifically examining the relationship between problematic media use and sleep disorders in children with enuresis remain limited. A clearer understanding of this association may contribute to more comprehensive assessment strategies in children presenting with nocturnal urinary symptoms. Therefore, this study was designed to examine whether problematic media use is associated with sleep disorders in children diagnosed with enuresis and to assess how digital interaction-related behavioral patterns intersect with sleep regulation in this clinical population. Focusing specifically on children with enuresis, this study aims to clarify whether digital media habits are a contextual factor related to sleep vulnerability in this group.

Research questions

- Is there a significant relationship between problematic media use and sleep disorders in children with enuresis?
- Does problematic media use predict the level of sleep disorders?
- Do demographic characteristics influence the relationship between problematic media use and sleep disorders?

Materials and methods

Study type

This study was conducted as a descriptive and correlational study to examine digital media usage characteristics, problematic media addiction, and sleep disorders in children diagnosed with enuresis.

Population and sample

The study population consisted of children aged 6—12 years who presented to the pediatric urology outpatient clinic of

our hospital with a diagnosis of enuresis. This age range was selected because enuresis is most prevalent during school age, and problematic digital media use increases substantially in late childhood.

Participants were recruited consecutively during the study period. All eligible patients presenting within the defined timeframe were invited to participate in order to minimize selection bias. Enrollment occurred at the initial clinical evaluation, prior to detailed sleep-focused screening, thereby reducing the likelihood of preferential inclusion of children with prominent sleep complaints. Participants were included before the initiation of any enuresis-specific treatment and therefore represented a treatment-naïve clinical sample.

Between January and December 2024, a total of 360 admissions were recorded at the Pediatric Urology Outpatient Clinic, and these admissions constituted the study population. The sample size was calculated using the finite population sample size formula ($n = Nt^2pq/d^2(N-1) + t^2pq$). A margin of error of 5% and a 95% confidence level were assumed. Based on this calculation, the minimum required sample size was determined to be 186 participants. A total of 186 children diagnosed with enuresis and their parents agreed to participate and completed the study procedures. Questionnaires were completed by one parent for each participating child.

Data collection and data collection tools

Data were collected using the Parent and Child Demographic Information Form, the Problematic Media Use Scale Parent Form (PMUS-PF), and the Sleep Disorders Scale for Children (SDSC) through individual face-to-face interviews with the parents of pediatric patients. Parents of children were informed about the study, and upon providing consent, were asked to respond based on their child's sleep patterns over the previous six months and visual media use over the previous month.

Daytime lower urinary tract symptoms were evaluated using a parent-completed voiding diary documenting voiding frequency, postponement behaviors, and daytime urinary patterns. The diary also recorded nighttime voiding episodes (nocturia). In cases of nighttime urination, parents were instructed to measure and record urine volume using a calibrated container to estimate nocturnal urine output. Although nocturnal and daytime symptoms were assessed, formal classification into monosymptomatic and non-monosymptomatic enuresis according to ICCS criteria was not performed, as subgroup differentiation was not a primary objective of the present study.

The inclusion criteria were: being between 6 and 12 years of age, referral to the pediatric urology clinic with a diagnosis of enuresis, the accompanying parent being the mother or father, parental literacy, and voluntary informed consent. Exclusion criteria included being outside the specified age range, being accompanied by someone other than a parent, parental illiteracy, or the presence of a diagnosis of intellectual disability.

Parent and Child Demographic Information Form: Developed by researchers, this form consists of two main sections. The Parent Information Form contains a total of ten questions regarding the parents' age, marital status, educational level, employment status, income level, and time spent with their children. The Child Information Form consists of a total of fifteen questions about the children's age, gender, eating habits, internet and television usage times, sleep patterns, urination habits, and play habits.

Problematic Media Use Scale-Parent Form: The PMUS-PF was developed by Domoff et al. [20] and adapted into Turkish by Furuncu [21]. It consists of 27 items rated on a 5-point Likert scale and assesses problematic use of screen-based media, including television, computers, tablets, and smartphones. Higher mean scores indicate greater problematic media use. The scale demonstrated excellent internal consistency in this study (Cronbach's $\alpha = .94$).

Sleep Disorders Scale for Children: The SDSC was originally developed by Bruni et al. [22] and validated for the Turkish population by Ağca Bilmenoğlu [23]. It consists of 26 items across six subscales: sleep onset and maintenance disorders (SOMD), sleep-disordered breathing (SDB), sleep-awakening disorders (SAD), sleep—wake transition disorders (SWTD), excessive daytime sleepiness (EDS), and sleep hyperhidrosis (SH). Total scores range from 26 to 130, with higher scores indicating more severe sleep disturbances. In this study, the Cronbach's alpha coefficient was .83.

Ethics consideration

Permission was obtained from the copyright holders of the scales used. Institutional approval was granted, and ethical approval was obtained from the hospital's Scientific Research Ethics Committee (Date: 20.02.2025; Decision No: 118).

Statistical analysis

Statistical analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Normality was assessed prior to analysis. Depending on data distribution, comparisons between two groups were conducted using the independent samples t-test or Mann—Whitney U test, and comparisons among more than two groups using one-way analysis of variance (ANOVA) or the Kruskal—Wallis test. Post hoc analyses were performed using Bonferroni or Games—Howell tests as appropriate. Associations between variables were evaluated using Pearson or Spearman correlation coefficients. Multiple linear regression analyses were conducted to identify independent predictors of sleep disorder outcomes. Regression assumptions, including normality, linearity, multicollinearity, and influential observations, were assessed and met.

Results

A total of 186 children with enuresis were included in the analysis. The demographic characteristics of parents and children, along with scale scores, are summarized in Table 1.

Analysis of child-related characteristics revealed no significant differences in PMUS-PF or SDSC scores according to age or sex ($p > .05$). In contrast, PMUS-PF total scores were significantly higher among children with a negative perception of adequate and balanced nutrition

Table 1 Descriptive characteristics of parents and children.

	N (%)	Total PMUS-PF	SDSC						
			Total	SOMD	SDB	SAD	SWTD	EDS	SH
Mother's age (year)		**(X±SD)**	**(X±SD)**	**(X±SD)**	**(X±SD)**	**(X±SD)**	**(X±SD)**	**(X±SD)**	**(X±SD)**
25–30	42 (22.6)	1.9 ± .9	42.2 ± 12.3	12.0 ± 4.7	4.1 ± 1.4	4.1 ± 1.4	10.1 ± 4.0	8.4 ± 3.2	3.3 ± 1.8
31–36	61 (32.8)	2.1 ± .9	42.8 ± 9.3	12.2 ± 3.8	4.1 ± 1.5	4.0 ± 1.3	10.2 ± 3.4	8.4 ± 3.5	3.6 ± 1.9
37–42	64 (34.4)	1.9 ± .9	41.5 ± 10.5	12.3 ± 4.1	4.0 ± 1.5	3.8 ± 1.0	9.9 ± 3.2	8.1 ± 3.5	3.2 ± 1.7
≥43	19 (10.2)	2.0 ± .4	47.8 ± 16.0	14.1 ± 4.5	4.5 ± 2.2	4.8 ± 2.0	12.1 ± 4.9	8.4 ± 4.6	3.6 ± 2.10
		KW = 4.106; p = 0.250	KW = 2.855; p = 0.415	F = 1.251; p = 0.293	KW = 0.587; p = 0.899	KW = 4.670; p = 0.198	KW = 3.537; p = 0.316	KW = 1.026; p = 0.795	KW = 2.044; p = 0.563
Father's age (year)									
24–31[a]	12 (6.5)	2.1 ± 1.2	46.9 ± 11.2	14.0 ± 3.9	4.1 ± 1.6	4.6 ± 1.3	12.5 ± 4.3	8.0 ± 3.3	3.5 ± 1.6
32–39[b]	85 (45.7)	1.9 ± .8	41.4 ± 10.5	11.6 ± 4.1	4.2 ± 1.6	4.0 ± 1.2	9.7 ± 3.5	8.3 ± 3.3	3.2 ± 1.7
≥40[c]	89 (47.8)	2.0 ± .8	43.5 ± 11.9	12.9 ± 4.2	4.0 ± 1.5	4.0 ± 1.4	10.5 ± 3.6	8.3 ± 3.8	3.5 ± 2.0
		KW = 0.573; p = 0.751	KW = 3.782; p = 0.151	F = 2.965; p = 0.054	KW = 1.212; p = 0.545	KW = 3.505; p = 0.173	KW = 6.487; p = **0.039** **(a–b)**	KW = 0.562; p = 0.755	KW = 0.927; p = 0.629
Mother's educational status									
Literate/Elementary school	40 (21.5)	2.1 ± 1.0	44.87 ± 13.3	13.2 ± 4.7	4.4 ± 2.1	4.2 ± 1.3	10.60 ± 4.3	9.0 ± 4.1	3.3 ± 1.5
Middle school	61 (32.8)	2.0 ± .9	42.0 ± 8.4	11.9 ± 3.9	4.1 ± 1.3	4.0 ± 1.1	10.1 ± 2.8	8.3 ± 3.3	3.4 ± 2.0
High school	54 (29.0)	2.1 ± .7	42.7 ± 12.0	12.6 ± 4.2	4.0 ± 1.2	4.1 ± 1.5	10.5 ± 3.8	7.8 ± 3.2	3.5 ± 1.9
University	31 (16.7)	1.8 ± .6	41.5 ± 12.4	11.9 ± 3.9	4.1 ± 1.8	4.0 ± 1.6	9.8 ± 4.0	8.2 ± 3.8	3.3 ± 1.8
		KW = 3.015; p = 0.389	KW = 1.673; p = 0.643	F = 0.872; p = 0.457	KW = 0.844; p = 0.839	KW = 0.957; p = 0.812	KW = 1.507; p = 0.681	KW = 2.112; p = 0.550	KW = 0.717; p = 0.869
Father's educational status									
Literate/Elementary school	35 (18.8)	1.9 ± .9	42.4 ± 10.4	12.1 ± 4.2	3.9 ± 1.4	4.1 ± 1.3	10.5 ± 3.4	8.3 ± 3.8	3.2 ± 1.8
Middle school	50 (26.9)	2.2 ± 1.0	45.6 ± 12.7	13.3 ± 4.3	4.5 ± 1.9	4.3 ± 1.5	10.8 ± 3.9	8.9 ± 3.7	3.8 ± 1.9
High school	54 (29.0)	1.9 ± .7	41.6 ± 11.0	11.9 ± 4.5	4.2 ± 1.5	3.9 ± 1.2	9.7 ± 3.1	8.3 ± 3.8	3.3 ± 2.0
University	47 (25.3)	1.8 ± .7	41.2 ± 10.4	12.2 ± 3.6	3.8 ± 1.3	4.0 ± 1.3	10.1 ± 4.1	7.5 ± 2.8	3.3 ± 1.6
		KW = 4.096; p = 0.251	KW = 4.515; p = 0.211	KW = 4.194; p = 0.241	KW = 4.362; p = 0.225	KW = 1.746; p = 0.627	KW = 2.560; p = 0.465	KW = 3.554; p = 0.314	KW = 3.915; p = 0.271
Mother's occupation									
Housewife[a]	138 (74.2)	2.0 ± .8	43.4 ± 11.2	12.7 ± 4.3	4.2 ± 1.5	4.1 ± 1.3	10.4 ± 3.6	8.2 ± 3.5	3.4 ± 1.8
Government employee[b]	17 (9.1)	1.8 ± .6	37.9 ± 9.8	10.0 ± 2.4	4.1 ± 1.9	3.7 ± .9	8.7 ± 1.7	7.5 ± 2.9	3.5 ± 2.3
Other (worker, cleaning staff)[c]	31 (16.7)	2.0 ± 1.0	42.3 ± 12.0	12.4 ± 4.0	3.9 ± 1.6	3.9 ± 1.6	10.5 ± 4.3	8.2 ± 4.0	3.2 ± 1.5
		KW = 0.094; p = 0.954	KW = 4.837; p = 0.089	F = 7.309; p = **0.002** **(a–b) (b–c)**	KW = 2.717; p = 0.257	KW = 2.866; p = 0.239	KW = 2.637; p = 0.268	KW = 1.047; p = 0.593	KW = 0.160; p = 0.923
Father's occupation									
Freelance[a]	115 (61.8)	2.0 ± .8	42.6 ± 11.2	12.2 ± 4.0	4.1 ± 1.5	4.1 ± 1.4	10.3 ± 3.7	8.3 ± 3.7	3.4 ± 1.8
Government employee[b]	26 (14.0)	1.8 ± .8	39.3 ± 9.8	10.9 ± 2.5	4.1 ± 1.5	4.0 ± 1.3	9.3 ± 3.7	7.5 ± 2.4	3.4 ± 1.9
Other (worker, driver, farmer)[c]	45 (24.2)	2.1 ± 1.0	44.9 ± 12.0	13.6 ± 5.0	4.2 ± 1.78	4.0 ± 1.3	10.6 ± 3.5	8.8 ± 3.6	3.5 ± 2.0
		F = 1.402; p = 0.249	KW = 4.858; p = 0.088	F = 4.859; p = **0.011** **(b–c)**	KW = 0.072; p = 0.965	KW = 0.488; p = 0.783	KW = 3.505; p = 0.173	F = 1.115; p = 0.330	KW = 0.004; p = 0.998
Child's age (year)									
6–8	112 (60.2)	1.9 ± .8	41.8 ± 11.3	12.0 ± 4.0	4.1 ± 1.6	3.9 ± 1.2	10.1 ± 3.7	7.9 ± 3.3	3.5 ± 1.9
9–10	43 (23.1)	2.2 ± .8	44.6 ± 11.7	13.4 ± 4.2	4.0 ± 1.5	4.1 ± 1.5	10.4 ± 3.6	9.0 ± 4.1	3.4 ± 1.8
11–12	31 (16.7)	1.9 ± .7	43.6 ± 10.5	12.3 ± 4.5	4.3 ± 1.7	4.5 ± 1.5	10.6 ± 3.5	8.4 ± 3.5	3.2 ± 1.5
		KW = 5.497; p = 0.064	KW = 2.934; p = 0.231	F = 1.696; p = 0.186	KW = 0.193; p = 0.908	KW = 4.372; p = 0.112	KW = 0.865; p = 0.649	KW = 2.786; p = 0.628	KW = 0.211; p = 0.900
Child's gender									
Boy	117 (62.9)	2.0 ± .8	41.9 ± 11.2	12.1 ± 4.1	4.1 ± 1.6	4.0 ± 1.3	9.9 ± 3.5	8.0 ± 3.5	3.5 ± 2.0
Girl	69 (37.1)	1.9 ± .8	44.1 ± 11.3	12.8 ± 4.3	4.2 ± 1.6	4.2 ± 1.3	10.9 ± 3.8	8.6 ± 3.5	3.2 ± 1.4

		t = 1.046; p = 0.297	Z = −1.432; p = 0.152	t = −1.031; p = 0.304	Z = −0.852; p = 0.394	Z = −1.074; p = 0.283	Z = −1.953; p = 0.051	Z = −1.411; p = 0.158	t = 1.487; p = 0.139
Playing outside/around the house									
Yes	164 (88.2)	2.0 ± .9	42.8 ± 11.7	12.5 ± 4.3	4.1 ± 1.5	4.0 ± 1.3	10.3 ± 3.7	8.2 ± 3.6	3.4 ± 1.9
No	22 (11.8)	2.1 ± .7	42.0 ± 7.4	11.1 ± 2.4	4.4 ± 2.1	4.3 ± 1.4	10.3 ± 2.9	8.5 ± 3.5	3.1 ± 1.6
		t = −0.387; p = 0.699	Z = −0.165; p = 0.869	t = 2.249; p = **0.030**	Z = −0.104; p = 0.918	Z = −1.111; p = 0.267	t = −0.016; p = 0.987	Z = −0.178; p = 0.859	Z = −0.719; p = 0.472
Perception of adequate and balanced nutrition									
Evet	128 (68.8)	1.9 ± .8	40.9 ± 10.6	11.7 ± 4.0	4.1 ± 1.6	3.8 ± 1.3	9.8 ± 3.4	7.8 ± 3.4	3.3 ± 1.8
Hayır	58 (31.2)	2.2 ± .9	46.8 ± 11.8	13.9 ± 4.1	4.1 ± 1.5	4.5 ± 1.4	11.2 ± 3.9	9.2 ± 3.8	3.7 ± 1.9
		t = −2.160; p = **0.033**	Z = −3.676; p = **0.000**	t = −3.364; p = **0.001**	Z = −0.202; p = 0.840	Z = −3.752; p = **0.000**	Z = −2.341; p = **0.019**	Z = −2.778; p = **0.005**	Z = −1.752; p = 0.080
Learning disability situation									
Yes	28 (15.1)	2.1 ± 1.1	45.5 ± 11.9	12.5 ± 5.0	4.6 ± 2.0	4.3 ± 1.5	11.1 ± 3.9	9.1 ± 3.6	3.7 ± 1.9
No	158 (84.9)	2.0 ± .8	42.2 ± 11.1	12.4 ± 4.0	4.0 ± 1.5	4.0 ± 1.3	10.1 ± 3.6	8.1 ± 3.5	3.3 ± 1.8
		Z = −0.470; p = 0.638	Z = −1.601; p = 0.109	t = 0.102; p = 0.919	Z = −1.141; p = 0.254	Z = −1.021; p = 0.307	Z = −1.511; p = 0.131	Z = −1.521; p = 0.128	Z = −1.034; p = 0.301
Trying to hold your urine to watch a game/video									
Yes	121 (65.1)	2.2 ± .9	44.4 ± 11.5	13.1 ± 4.3	4.2 ± 1.6	4.1 ± 1.4	10.5 ± 3.6	8.7 ± 3.7	3.5 ± 1.9
No	65 (34.9)	1.7 ± .6	39.6 ± 10.3	11.0 ± 3.5	4.0 ± 1.5	4.0 ± 1.3	9.9 ± 3.8	7.4 ± 3.2	3.1 ± 1.5
		t = 4.178; p = **0.000**	Z = −2.967; p = **0.003**	t = 3.351; p = **0.001**	Z = −0.799; p = 0.424	Z = −1.106; p = 0.269	Z = −1.270; p = 0.204	Z = −2.682; p = **0.007**	Z = −0.989; p = 0.323
General sleep habits									
Sleeps very little[a]	6 (3.2)	2.3 ± 1.0	54.6 ± 20.8	17.0 ± 5.7	4.6 ± 2.2	5.0 ± 2.6	11.1 ± 5.8	12.1 ± 6.4	4.6 ± 3.0
Sleeps sufficiently/ wakes up naturally[b]	159 (85.5)	1.9 ± .8	41.2 ± 9.8	11.8 ± 3.8	4.0 ± 1.4	4.0 ± 1.3	10.1 ± 3.5	7.7 ± 3.0	3.3 ± 1.7
Wakes up feeling unwell[c]	21 (11.3)	2.4 ± 1.0	50.9 ± 13.6	15.0 ± 4.9	4.6 ± 2.1	4.2 ± 1.2	11.0 ± 4.3	11.8 ± 4.1	3.9 ± 2.0
		F = 2.915; p = 0.057	KW = 13.160; p = **0.001** **(b−c)**	F = 9.795; p = **0.000** **(a−b) (b−c)**	KW = 1.032; p = 0.597	KW = 1.560; p = 0.458	KW = 0.830; p = 0.660	KW = 21.092; p = **0.000**	KW = 2.656; p = 0.265
Appears fatigued									
Never[a]	75 (40.3)	1.8 ± .6	39.4 ± 9.9	10.9 ± 3.5	4.18 ± 1.7	4.0 ± 1.5	9.5 ± 3.3	7.3 ± 3.0	3.4 ± 1.8
Rarely[b]	43 (23.1)	2.0 ± .9	41.3 ± 9.1	12.7 ± 3.8	4.09 ± 1.1	3.8 ± .9	9.8 ± 3.1	7.6 ± 2.6	3.2 ± 1.5
Sometimes[c]	49 (26.3)	2.2 ± 1.0	44.6 ± 9.9	13.2 ± 4.0	3.97 ± 1.5	4.3 ± 1.3	10.8 ± 3.3	8.7 ± 3.1	3.5 ± 1.9
Usually/Always[d]	19 (10.2)	2.3 ± .9	54.3 ± 16.0	15.6 ± 5.5	4.73 ± 2.0	4.4 ± 1.7	13.0 ± 5.3	12.8 ± 4.8	3.6 ± 2.5
		F = 3.703; p = **0.016 (a−d)**	F = 10.986; p = **0.000** **(a−c) (a−d) (b−d) (c−d)**	F = 8.371; p = **0.000** **(a−c) (a−d) (c−a)**	KW = 3.181; p = 0.365	KW = 3.989; p = 0.263	F = 5.576; p = **0.001** **(a−d) (b−d)**	KW = 30.768; p = **0.000** **(a−d) (b−d) (c−d)**	KW = 0.280; p = 0.964
Sleep while participating in activities									
Never[a]	144 (77.4)	1.9 ± .7	41.9 ± 9.9	11.8 ± 3.9	4.1 ± 1.5	3.9 ± 1.2	10.2 ± 3.6	7.6 ± 3.0	3.2 ± 1.7
Rarely[b]	22 (11.8)	2.4 ± .9	48.5 ± 13.4	15.5 ± 3.9	4.5 ± 2.2	4.6 ± 1.6	10.1 ± 4.2	9.9 ± 3.7	3.8 ± 2.1
Sometimes[c]	13 (7.0)	2.2 ± 1.3	45.9 ± 10.4	12.3 ± 3.8	4.0 ± 1.2	4.3 ± 1.1	10.9 ± 2.9	10.1 ± 3.6	4.1 ± 2.2
Usually/Always[d]	7 (3.8)	2.7 ± 1.3	53.2 ± 19.7	13.8 ± 7.0	4.5 ± 1.3	5.2 ± 2.3	11.2 ± 5.3	13.8 ± 5.6	4.4 ± 2.7
		F = 2.532; p = 0.090	KW = 11.967; p = **0.007** **(a−b) (a−d)**	F = 5.249; p = **0.002** **(a−b)**	KW = 1.399; p = 0.706	KW = 8.864; p = **0.031**	KW13.394; p = 0.707	KW = 24.573; p = **0.000** **(a−b) (a−d) (b−d)**	KW = 4.676; p = 0.197
Dozing off during the day									
Never[a]	142 (76.3)	1.9 ± .8	40.4 ± 9.7	12.0 ± 4.1	4.0 ± 1.4	3.9 ± 1.3	9.8 ± 3.4	7.3 ± 2.8	3.1 ± 1.5
Rarely[b]	23 (12.4)	2.4 ± 1.2	49.7 ± 9.1	13.8 ± 4.1	4.7 ± 1.7	4.4 ± 1.2	11.6 ± 3.0	10.9 ± 3.9	4.0 ± 2.4
Sometimes[c]	21 (11.3)	2.1 ± .8	50.7 ± 16.4	13.3 ± 4.7	4.5 ± 2.4	4.5 ± 1.7	12.0 ± 5.1	11.8 ± 4.0	4.4 ± 2.5
		F = 3.473; p = **0.033 (a−b)**	KW = 24.794; p = **0.000** **(a−b) (a−c)**	F = 2.378; p = 0.096	KW = 4.514; p = 0.105	KW = 7.813; p = 0.080	F = 5.241; p = **0.006** **(a−c)**	KW = 40.242; p = **0.000** **(a−b) (a−c)**	KW = 6.095; p = **0.047** **(a−c)**
Stubborn									
Never[a]	41 (22.0)	1.9 ± .8	41.4 ± 10.9	11.3 ± 4.4	3.9 ± 1.7	4.1 ± 1.	10.0 ± 3.2	8.3 ± 4.0	3.5 ± 1.8
Rarely[b]	18 (9.7)	1.6 ± .3	37.3 ± 7.5	11.2 ± 2.9	3.6 ± .6	3.7 ± 1.1	9.0 ± 3.1	6.9 ± 2.2	2.8 ± 1.1
Sometimes[c]	41 (22.0)	1.7 ± .6	40.6 ± 7.1	12.5 ± 3.3	4.1 ± 1.4	3.9 ± .9	9.2 ± 2.6	7.3 ± 2.2	3.3 ± 1.6
Usually[d]	42 (22.6)	2.0 ± .7	41.6 ± 11.9	11.5 ± 3.8	4.2 ± 1.7	3.9 ± 1.2	10.4 ± 4.4	8.0 ± 3.3	3.3 ± 1.9

(*continued on next page*)

Table 1 (*continued*)

		N (%)	Total PMUS-PF	SDSC						
				Total	SOMD	SDB	SAD	SWTD	EDS	SH
Always[e]		44 (23.7)	2.6 ± 1.0 F = 7.943; p = **0.000** **(a–e) (b–e) (c–e) (d–e)**	49.3 ± 13.0 KW = 20.859; p = **0.000** **(a–e) (b–e) (c–e) (d–e)**	14.6 ± 4.7 F = 4.809; p = **0.001** **(a–e) (b–e) (d–e)**	4.4 ± 1.7 KW = 4.719; p = 0.317	4.4 ± 1.7 KW = 4.991; p = 0.288	11.9 ± 3.8 KW = 14.159; p = **0.007** **(b–e) (c–e)**	10.0 ± 4.2 KW = 13.488; p = **0.009** **(b–e) (c–e)**	3.7 ± 2.2 KW = 2.958; p = 0.565
Income perception status										
Revenue < expenses		19 (10.2)	2.0 ± 1.0	41.8 ± 5.8	12.8 ± 3.4	3.8 ± 1.5	3.7 ± 1.2	10.6 ± 3.7	7.8 ± 2.6	2.8 ± 1.3
Revenue = expenses		162 (87.1)	2.0 ± .8	42.8 ± 11.6	12.3 ± 4.2	4.1 ± 1.6	4.1 ± 1.4	10.2 ± 3.6	8.3 ± 3.6	3.5 ± 1.9
Revenue > expenses		5 (2.7)	1.6 ± .2	43.0 ± 17.5	12.4 ± 7.4	4.4 ± 1.6	4.6 ± 1.1	10.6 ± 5.9	8.6 ± 5.4	2.4 ± .5
			KW = 0.894; p = 0.640	KW = 0.226; p = 0.893	KW = 1.371; p = 0.504	KW = 2.062; p = 0.357	KW = 2.924; p = 0.232	KW = 0.443; p = 0.801	KW = 0.160; p = 0.923	KW = 4.313; p = 0.116
Parental union										
Yes		176 (94.6)	1.9 ± .8	42.5 ± 10.9	12.3 ± 4.2	4.1 ± 1.6	4.0 ± 1.2	10.1 ± 3.6	8.2 ± 3.5	3.4 ± 1.8
No		10 (5.4)	2.7 ± 1.2	46.8 ± 16.7	13.1 ± 4.4	3.9 ± 1.2	4.6 ± 2.6	12.3 ± 4.3	9.7 ± 4.7	3.2 ± 1.3
			t = −2.784; p = **0.006**	Z = −0.589; p = 0.556	t = −0.519; p = 0.605	Z = −0.551; p = 0.581	Z = −0.211; p = 0.833	Z = −1.616; p = 0.106	t = −1.251; p = 0.213	Z = −0.175; p = 0.861
Digital products in the house										
Smartphone	Yes	182 (97.8)	2.0 ± .8	42.8 ± 11.4	12.4 ± 4.2	4.1 ± 1.6	4.1 ± 1.4	10.3 ± 3.6	8.2 ± 3.6	3.4 ± 1.8
	No	4 (2.2)	2.0 ± .8	38.5 ± 3.6	10.7 ± 1.2	4.0 ± 1.1	4.0 ± .8	7.0 ± 1.4	9.7 ± 3.5	3.0 ± 1.1
			Z = −0.042; p = 0.966	Z = −0.695; p = 0.487	Z = −0.655; p = 0.512	Z = −0.050; p = 0.960	Z = −0.273; p = 0.785	t = 4.456; p = **0.011**	t = −0.804; p = 0.422	Z = −0.237; p = 0.812
Computer	Yes	69 (37.1)	2.1 ± .9	41.9 ± 12.0	12.0 ± 4.0	4.1 ± 1.5	4.0 ± 1.5	9.9 ± 3.6	8.1 ± 3.6	3.5 ± 1.9
	No	117 (62.9)	1.9 ± .8	43.2 ± 10.9	12.6 ± 4.3	4.1 ± 1.6	4.1 ± 1.3	10.5 ± 3.7	8.3 ± 3.5	3.3 ± 1.8
			Z = −0.485; p = 0.628	Z = −1.353; p = 0.176	t = −0.981; p = 0.328	Z = −0.211; p = 0.833	Z = −0.823; p = 0.410	Z = −1.275; p = 0.202	Z = −0.788; p = 0.431	Z = −0.396; p = 0.692
Tablet	Yes	88 (47.3)	2.1 ± .9	41.4 ± 10.9	12.3 ± 3.9	4.2 ± 1.7	3.9 ± 1.3	9.8 ± 3.6	7.6 ± 3.1	3.3 ± 1.8
	No	98 (52.7)	1.9 ± .8	43.9 ± 11.5	12.5 ± 4.4	4.0 ± 1.5	4.2 ± 1.4	10.7 ± 3.6	8.9 ± 3.8	3.5 ± 1.9
			t = 1.257; p = 0.210	Z = −1.687; p = 0.092	t = −0.256; p = 0.798	Z = −0.620; p = 0.535	Z = −1.347; p = 0.178	Z = −1.896; p = 0.058	t = −2.436; p = **0.016**	Z = −1.021; p = 0.307
Game console	Yes	26 (14.0)	2.2 ± .8	44.8 ± 12.5	13.0 ± 4.1	4.5 ± 1.9	4.1 ± 1.1	10.1 ± 3.8	9.3 ± 4.1	3.6 ± 2.1
	No	160 (86.0)	2.0 ± .8	42.4 ± 11.1	12.3 ± 4.2	4.1 ± 1.5	4.1 ± 1.4	10.3 ± 3.6	8.1 ± 3.4	3.4 ± 1.8
			t = 1.055; p = 0.293	Z = −0.794; p = 0.427	t = 0.848; p = 0.397	Z = −0.837; p = 0.403	Z = −0.569; p = 0.569	Z = −0.344; p = 0.731	t = 1.578; p = 0.116	Z = −0.366; p = 0.714
Time spent together during the day (hour)										
1–4		78 (41.9)	2.1 ± .9	42.5 ± 9.4	12.6 ± 3.7	4.0 ± 1.3	3.9 ± 1.0	10.2 ± 3.4	8.2 ± 3.5	3.4 ± 1.5
5–8		68 (36.6)	2.0 ± .8	44.8 ± 14.1	12.8 ± 4.5	4.3 ± 1.8	4.3 ± 1.7	10.8 ± 4.2	8.9 ± 4.1	3.5 ± 2.2
≥9		40 (21.5)	1.8 ± .7	39.6 ± 8.5	11.2 ± 4.4	4.2 ± 1.6	3.9 ± 1.3	9.3 ± 2.8	7.4 ± 2.3	3.3 ± 1.8
			F = 1.104; p = 0.334	KW = 3.277; p = 0.194	F = 1.981; p = 0.141	KW = 0.344; p = 0.842	KW = 1.380; p = 0.502	F = 2.173; p = 0.117	F = 3.035; p = 0.052	KW = 1.009; p = 0.604

($p = 0.033$), those who delayed urination while playing games or watching videos ($p < 0.001$), those appearing tired ($p = 0.016$), those who dozed during the day ($p = 0.033$), and those displaying stubborn behavior ($p < 0.001$). Similarly, SDSC total scores differed significantly according to perceived adequate and balanced nutrition ($p < 0.001$), delaying urination during digital activities ($p = 0.003$), general sleep habits ($p = 0.001$), appearing tired ($p < 0.001$), falling asleep during activities ($p = 0.007$), daytime dozing ($p < 0.001$), and stubborn behavior ($p < 0.001$) (Table 1).

With respect to digital media use characteristics, PMUS-PF scores did not differ according to the primary purpose of internet use (watching videos/series or listening to music; $p = 0.764$), internet use for homework ($p = 0.366$), daily television viewing time ($p = 0.556$), or eating and drinking during internet use ($p = 0.379$). However, SDSC total scores ($p = 0.008$) and SOMD subscale scores ($p = 0.011$) were significantly higher among children who used the internet for watching videos or listening to music. Playing digital games was associated with higher SDB subscale scores ($p = 0.008$). Social media use was associated with higher SDSC total scores ($p = 0.025$) as well as higher SDB ($p = 0.017$), SWTD ($p = 0.003$), and EDS ($p = 0.036$) subscale scores. Moreover, children who used the internet for more than 5 h per day exhibited significantly higher PMUS total scores ($p = 0.014$) and higher SDSC total ($p = 0.003$), SOMD ($p = 0.028$), and SWTD ($p = 0.022$) scores compared with those with shorter daily internet use durations (Table 2).

The mean PMUS-PF total score was $2.0 \pm .8$. The mean SDSC total score was 42.7 ± 11.3, with subscale means of 12.4 ± 4.2 for SOMD, 4.1 ± 1.6 for SDB, 4.1 ± 1.3 for sleep-awakening disorders, 10.3 ± 3.6 for SWTD, 8.3 ± 3.5 for EDS, and 3.4 ± 1.8 for sleep hyperhidrosis. PMUS-PF total scores were positively correlated with SDSC total and subscale scores, although the strength of these correlations was low to moderate ($p < .05$). The strongest correlations were observed for SOMD ($r = .401$) and SWTD ($r = .342$), whereas the association with SDB was weak (Table 3).

Regression analysis results show that the four models obtained have a significant effect in explaining the change in the dependent variables ($F_{2,183} = 21.701$ for the first model; $F_{3,183} = 18.328$ for the second model; third model $F_{3,182} = 10.896$; fourth model $F_{3,182} = 27.865$; $p < .001$ for each). The first model explains 18.3% of the overall sleep disorder level in children, the second model explains 21.9% of sleep initiation and maintenance disorders, the third model explains 13.8% of sleep–wake transition disorders, and the fourth model explains 30.3% of excessive sleepiness disorders. In children's overall sleep disorder level, each unit increase in problematic media use score causes a 4.7 unit increase, while a positive perception of adequate–balanced nutrition causes a 4.4 unit increase. At the level of sleep initiation and maintenance disorder, each unit increase in problematic media use score causes a 1.5 unit increase, an increase in appearing tired causes a 1.0 unit increase, and an increase in frequent urination at night causes a .4 unit increase. In sleep–wake transition disorder, each unit increase in problematic media use score leads to a 1.0 unit increase, an increase in daytime sleepiness leads to a .7 unit increase, and an increase in appearing tired leads to a .6 unit increase. In the excessive sleepiness disorder level, each unit increase in problematic media use score causes a .6 unit increase, an increase in daytime sleepiness causes a 1.9 unit increase, and an increase in appearing tired causes a .8 unit increase (Table 4).

Discussion

This study demonstrated a significant and clinically important relationship between problematic media use and sleep disorders in children diagnosed with enuresis.

Our findings suggest that digital media exposure may be linked to sleep based mechanisms involved in the pathophysiology of enuresis, particularly as difficulties in sleep initiation, sleep maintenance, and sleep–wake transitions were more strongly associated with problematic media use. These findings were derived from a widely used parent-reported screening instrument for assessing pediatric sleep disturbances, which, although not a substitute for objective sleep measurements such as polysomnography, is considered a valid and reliable tool in clinical and research settings. From a pediatric urology perspective, sleep fragmentation and elevated arousal threshold recognized as core mechanisms in enuresis may impair cortical perception of bladder fullness, predisposing children to involuntary urination. Supporting this perspective, Dhont et al. (2014) reported that children with enuresis frequently experience multiple transient arousals, resulting in reduced sleep quality [24]. Diminished sleep quality may interfere with the processing of bladder-related stimuli to the level necessary for awakening. Furthermore, Bliwise et al. (2015) demonstrated an association between sleep disturbances and increased nocturnal urine production, suggesting that altered sleep patterns may affect both arousal responses and urine regulation [25]. Taken together, these findings indicate that problematic media use, through its negative impact on sleep, may indirectly contribute to enuresis symptoms via combined effects on arousal mechanisms and nocturnal urine production.

When examining the subscales of sleep disorders, only a limited number of variables related to parents were found to have significant effects. The difference observed in the subscale of sleep initiation and maintenance disorders according to the parents' occupations suggests that parents' working conditions and daily life routines may have an indirect effect on children's sleep routines. The literature reports shorter sleep duration and increased daytime sleepiness in children of parents with irregular or unstable working hours [26]. The significant difference observed in the sleep–wake transition disorder subscale according to the variables of father's age and the presence of a smartphone at home suggests that parents' media usage habits may affect children's sleep patterns through behavioral modeling [27].

This study found that children's behavioral characteristics were decisive in both problematic media use and sleep disorders. Negative perceptions of adequate and balanced nutrition, holding urine during play or video viewing, appearing tired, dozing throughout the day, and stubborn behavior were significantly associated with higher problematic media use scores. In particular, the behavior of remaining in front of a screen at the expense of postponing

Table 2 Characteristics of children's digital media use.

		N (%)	Total PMUS-PF (X±SD)	SDSC						
				Total	SOMD	SDB	SAD	SWTD	EDS	SH
				(X±SD)	(X±SD)	(X±SD)	(X±SD)	(X±SD)	(X±SD)	(X±SD)
The most common purposes for using the internet										
Watching TV series, listening to music	Yes	157 (84.4)	2.0 ± .9	43.4 ± 10.8	12.7 ± 4.2	4.1 ± 1.5	4.1 ± 1.3	10.4 ± 3.6	8.4 ± 3.63	3.4 ± 1.8
	No	29 (15.6)	1.9 ± .6	39.3 ± 13.2	10.7 ± 3.7	4.3 ± 1.7	4.1 ± 1.5	9.3 ± 3.7	7.5 ± 3.33	3.2 ± 1.9
			t = 301; p = 0.764	Z = −2.637; p = **0.008**	Z = −2.539; p = **0.011**	Z = −0.479; p = 0.632	Z = −0.203; p = 0.840	Z = −1.845; p = 0.065	Z = −1.522; p = 0.128	Z = −1.020; p = 0.308
Playing video game	Yes	122 (65.6)	2.0 ± .8	42.6 ± 11.8	12.2 ± 4.0	3.9 ± 1.5	4.1 ± 1.4	10.3 ± 3.8	8.2 ± 3.5	3.5 ± 1.9
	No	64 (34.4)	1.9 ± .9	43.0 ± 10.3	12.7 ± 4.6	4.5 ± 1.6	4.0 ± 1.2	10.1 ± 3.4	8.3 ± 3.7	3.2 ± 1.7
			t = 1.112; p = 0.268	Z = −0.759; p = 0.448	t = −0.452; p = 0.651	Z = −2.653; p = **0.008**	Z = −0.147; p = 0.833	Z = −0.036; p = 0.971	t = −0.115; p = 0.908	Z = −1.242; p = 0.214
Social media	Yes	14 (7.5)	1.8 ± .4	53.0 ± 18.5	13.8 ± 5.8	5.3 ± 2.2	4.8 ± 2.1	13.1 ± 5.4	11.7 ± 5.9	4.0 ± 1.9
	No	172 (92.5)	2.0 ± .9	41.9 ± 10.1	12.3 ± 4.0	4.0 ± 1.5	4.0 ± 1.2	10.0 ± 3.4	8.0 ± 3.2	3.4 ± 1.8
			t = −1.728; p = 0.098	Z = −2.234; p = **0.025**	t = 0.979; p = 0.344	Z = −2.381; p = **0.017**	Z = −1.570; p = 0.116	t = 3.055; p = **0.003**	t = 2.331; p = **0.036**	Z = −1.383; p = 0.167
Homeworks	Yes	38 (20.4)	1.9 ± .7	43.5 ± 12.2	13.3 ± 4.6	4.1 ± 1.6	4.3 ± 1.5	10.2 ± 3.6	8.5 ± 3.7	3.0 ± 1.6
	No	148 (79.6)	2.0 ± .9	42.5 ± 11.1	12.1 ± 4.1	4.1 ± 1.6	4.0 ± 1.3	10.3 ± 3.7	8.2 ± 3.5	3.5 ± 1.9
			t = −0.906; p = 0.366.	Z = −0.252; p = 0.801	t = 1.462; p = 0.145	Z = −0.460; p = 0.646	Z = −1.436; p = 0.151	t = −0.179; p = 0.858	t = 0.401; p = 0.689	Z = −1.518; p = 0.129
Daily average internet usage time (hour per day)										
1–2[a]		108 (58.1)	1.9 ± .8	42.4 ± 11.3	12.3 ± 4.2	4.1 ± 1.5	4.0 ± 1.4	10.3 ± 3.7	8.1 ± 3.6	3.3 ± 1.8
3–4[b]		56 (30.1)	1.9 ± .7	40.5 ± 9.6	11.7 ± 4.0	4.0 ± 1.6	3.9 ± 1.2	9.5 ± 2.9	8.0 ± 3.0	3.2 ± 1.9
≥5[c]		22 (11.8)	2.7 ± 1.1	50.0 ± 12.8	14.5 ± 3.8	4.5 ± 1.9	4.7 ± 1.4	12.2 ± 4.5	9.8 ± 4.3	4.1 ± 1.8
			F = 4.658; p = **0.014** **(a–c) (b–c)**	KW = 11.318; p = **0.003** **(a–c) (b–c)**	F = 3.642; p = **0.028** **(b–c)**	KW = 2.652; p = 0.266	KW = 6.284; p = 0.079	KW = 7.618; p = **0.022** **(b–c)**	KW = 3.728; p = 0.155	KW = 6.246; p = 0.178
Average daily TV watching time (hour per day)										
1–2[a]		132 (71.0)	1.9 ± .8	43.0 ± 11.6	12.2 ± 4.1	4.2 ± 1.7	4.1 ± 1.4	10.6 ± 3.8	8.3 ± 3.6	3.4 ± 1.9
3–4[b]		47 (25.3)	2.1 ± 1.0	42.2 ± 10.7	13.0 ± 4.4	3.9 ± 1.2	3.8 ± 1.0	9.4 ± 3.2	8.4 ± 3.2	3.4 ± 1.6
≥5[c]		7 (3.8)	2.3 ± 1.1	41.0 ± 10.7	11.8 ± 4.8	4.2 ± 1.7	4.7 ± 1.7	9.1 ± 2.7	7.5 ± 4.3	3.4 ± 1.6
			KW = 1.173; p = 0.556	KW = 0.184; p = 0.912	KW = 1.53; p = 0.465	KW = 0.968; p = 0.616	KW = 2.265; p = 0.322	KW = 3.870; p = 0.144	KW = 1.677; p = 0.432	KW = 0.514; p = 0.774
Consuming food or drink while using the internet										
Yes		123 (66.1)	2.0 ± .8	43.3 ± 11.6	12.6 ± 4.2	4.1 ± 1.6	4.2 ± 1.4	10.2 ± 3.6	8.5 ± 3.7	3.4 ± 1.7
No		63 (33.9)	1.9 ± .8	41.7 ± 10.7	11.9 ± 4.1	4.1 ± 1.6	3.9 ± 1.2	10.3 ± 3.8	7.9 ± 3.2	3.4 ± 2.0
			t = 0.882; p = 0.379	Z = −0.982; p = 0.326	t = 1.166; p = 0.245	Z = −0.224; p = 0.823	Z = −1.201; p = 0.230	Z = −0.093; p = 0.926	t = 0.989; p = 0.324	Z = −0.433; p = 0.665

Table 3 Association between children's PMUS and SDS subscale and total scores.

	$\overline{X}$ ±SS	PMUS-PF Total	Total	SDSC					
				SOMD	SDB	SAD	SWTD	EDS	SH
PMUS total	2.0 ± .8	1							
SDS total	42.7 ± 11.3	445[b]	1						
SOMD	12.4 ± 4.2	401[b]	758[b]	1					
SDB	4.1 ± 1.6	101	382[b]	167[a]	1				
SAD	4.1 ± 1.3	138	519[b]	280[b]	230[b]	1			
SWTD	10.3 ± 3.6	342[b]	777[b]	425[b]	281[b]	373[b]	1		
EDS	8.3 ± 3.5	283[b]	655[b]	390[b]	120	409[b]	365[b]	1	
SH	3.4 ± 1.8	224[b]	503[b]	297[b]	264[b]	257[b]	309[b]	186[a]	1

r: Spearman Correlation.
[a] $p < .05$.
[b] $p < .001$

Table 4 Regression analysis results for variables predicting sleep disorders, sleep initiation and maintenance disorders, sleep–wake transition disorders, and excessive sleepiness disorders in children.

Variable	B	SE	Beta	t	*p*	Correlations		Tolerance	VIF
						Zero-order	Partial		
Model 1. Sleep disorders in children									
(Constant)	27.341	2.651		10.315	**0.000**				
Total PMUS-PF	4.723	0.864	0.369	5.465	**0.000**	0.399	0.375	0.971	1.030
Perception of adequate and balanced nutrition	4.442	1.645	0.182	2.700	**0.008**	0.245	0.196	0.971	1.030
$R = 0.438$; $R^2 = 0.183$; $F(2.183) = 21.701$; $p < 0.001$; Durbin Watson = 2.222									
Model 2. Sleep onset and maintenance disorders									
(Constant)	6.080	0.928		6.549	**0.000**				
Total PMUS-PF	1.585	0.319	0.332	4.969	**0.000**	0.383	0.346	0.947	1.056
Appearing tired	1.029	0.272	0.253	3.777	**0.000**	0.338	0.270	0.942	1.061
Frequent urination at night	0.440	0.211	0.136	2.086	**0.038**	0.144	0.153	0.991	1.009
$R = 0.482$; $R^2 = 0.219$; $F(3.183) = 18.328$; $p < 0.001$; Durbin Watson = 2.236									
Model 3. Sleep-wake transition disorders									
(Constant)	5.889	0.816		7.213	**0.000**				
Total PMUS-PF	1.007	0.293	0.241	3.432	**0.001**	0.299	0.247	0.945	1.058
Dozing off throughout the day	0.792	0.389	0.145	2.039	**0.043**	0.224	0.149	0.923	1.084
Looking tired	0.630	0.257	0.177	2.448	**0.015**	0.270	0.179	0.891	1.122
$R = 0.390$; $R^2 = 0.138$; $F(3.182) = 10.896$; $p < .001$; Durbin Watson = 2.111									
Model 4. Excessive sleepiness disorders									
(Constant)	2.454	0.715		3.431	**0.001**				
Total PMUS-PF	0.683	0.257	0.168	2.657	**0.009**	0.272	0.193	0.945	1.058
Dozing off throughout the day	1.986	0.341	0.372	5.831	**0.000**	0.461	0.397	0.923	1.084
Looking tired	0.869	0.225	0.251	3.856	**0.000**	0.388	0.275	0.891	1.122
$R = 0.561$; $R^2 = 0.303$; $F(3.182) = 27.865$; $p < .001$; Durbin Watson = 2.288									

physiological needs is considered one of the key indicators of problematic media use [28]. The fact that urine delay behavior becomes more pronounced during digital media use in children with enuresis suggests that daytime bladder habits may also be disrupted, and this situation may be related to nighttime symptoms. The association of similar behavioral patterns with sleep disorders is consistent with the literature reporting that behavioral irregularities, lack of physical activity, and poor sleep hygiene negatively affect sleep physiology in children [29]. The prominence of behavioral regulation difficulties, particularly in subscales such as sleep–wake transition disorders and excessive sleepiness, suggests that disruption in sleep architecture may further suppress nighttime arousal responses in children with enuresis.

The nature and duration of digital media use have shown different effects on specific subdimensions of sleep disorders. Although more passive content such as watching videos or series and listening to music did not significantly affect problematic media use scores, it was found to be associated with an increase in the total sleep disorder score and the subdimensions of sleep initiation and maintenance disorders, supporting the effect of screen exposure on sleep onset processes in particular. The fact that high-interaction digital content (such as gaming and social media use) creates more pronounced differences in some sleep

disorder subdimensions highlights the role of cognitive and emotional arousal in the depth and continuity of sleep [30].

This suggests that disruption in sleep architecture may impair the perception of nocturnal bladder signals in children with enuresis. Correlation analyses between problematic media use and sleep disorders have revealed that this relationship is particularly pronounced in sleep domains related to behavioral and circadian regulation. However, as there was no control group without enuresis, it is not possible to determine whether problematic media use directly contributes to sleep disorders or enuresis symptoms; nor can it be concluded that reducing media use will lead to clinical improvement. Therefore, the present findings should be interpreted as indicating an association rather than causality, and further longitudinal and controlled studies are required to clarify the direction and clinical significance of this relationship.

The weaker association found in the sleep-related breathing disorders sub-dimension suggests that such sleep problems may be more closely related to anatomical and physiological factors than to problematic media use [31].

Regression analyses showed that problematic media use independently predicted not only the overall level of sleep disorder but also specific subscales such as difficulty initiating and maintaining sleep, sleep—wake transition problems, and excessive sleepiness. These findings suggest that problematic media use in children is not limited to behavioral addiction tendencies but may also be an important environmental factor that can affect sleep physiology [32]. In light of these findings, evaluating sleep patterns and digital media habits may provide additional contextual information when assessing children with enuresis. However, the present data do not establish whether modifying media use or sleep behaviors would influence enuretic symptoms, and prospective interventional studies are required to clarify this relationship. While these findings highlight an association between problematic media use and sleep disturbance severity, they should not be interpreted as evidence for therapeutic modification. Further longitudinal and interventional research is necessary before clinical recommendations can be made.

This study has several limitations that should be considered. The absence of a control group of children without enuresis limits our ability to determine whether the observed associations between problematic media use and sleep disturbances are specific to enuretic children or reflect patterns seen in the general population. Accordingly, our findings should be interpreted as describing relationships within a clinically defined enuretic sample rather than as evidence of enuresis-specific effects. In addition, participants were recruited from a single tertiary pediatric urology outpatient clinic, which may limit the generalizability of the findings beyond this clinical setting. The cross-sectional design further precludes causal inferences, and therefore no causal relationship between problematic media use, sleep disturbances, and enuresis can be established. It remains unclear whether problematic media use contributes to sleep disturbances in children with enuresis, whether sleep disturbances influence digital media habits, or whether these relationships operate bidirectionally. Finally, the reliance on parent-reported measures may introduce reporting bias. Future studies incorporating matched control groups, longitudinal designs, and objective or multi-informant assessments would help clarify these relationships and strengthen the evidence base. In addition, although daytime urinary symptoms were documented through a voiding diary, formal classification into monosymptomatic and non-monosymptomatic enuresis was not performed, which may limit subgroup interpretation.

This study has some limitations. The single-center design, the data collection method based on parental self-reports, and the lack of objective measurement methods for sleep disorders may limit the generalizability of the results. Furthermore, the lack of analysis according to enuresis subtypes is another important limitation. In addition, the absence of a control group consisting of children without enuresis restricts the ability to determine whether the observed associations between problematic media use and sleep disorders are specific to children with enuresis or reflect patterns commonly seen in the general pediatric population. Future studies including a healthy control group and distinguishing between monosymptomatic and non-monosymptomatic enuresis subgroups may provide a clearer understanding of how problematic media use and sleep disturbances interact within different pediatric contexts.

Conclusion

In this sample of children with enuresis, higher levels of problematic media use were associated with greater sleep disturbance severity, particularly in domains related to sleep initiation and sleep—wake transitions. These findings reflect associations observed within an enuretic population. Given the cross-sectional design and absence of a control group, no causal inferences can be made regarding the relationship between media use, sleep disturbances, and enuresis. Further longitudinal and controlled studies are required to clarify the nature and direction of these associations.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The article has been read and approved by all authors.

Acknowledgments

The authors would like to thank all the participants.

References

[1] Schuster S, Reece J, Florentzou A, Apos E. Treating enuresis in children with neurodevelopmental disorders using bell and pad alarm. J Pediatr Urol 2021;17(5):645.e1—8. https://doi.org/10.1016/j.jpurol.2021.07.010.

[2] Gomez Rincon M, Leslie SW, Lotfollahzadeh S. Nocturnal enuresis. In: StatPearls. StatPearls Publishing; 2024. Retrieved from, https://www.ncbi.nlm.nih.gov/books/NBK545181/. [Accessed 2 March 2026].

[3] Nevéus T, von Gontard A, Hoebeke P, Hjälmås K, Bauer S, Bower W, et al. The standardization of terminology of lower urinary tract function in children and adolescents: report from the Standardisation Committee of the International Children's Continence Society. J Urol 2006;176(1):314—24. https://doi.org/10.1016/S0022-5347(06)00305-3.

[4] Austin PF, Bauer SB, Bower W, Chase J, Franco I, Hoebeke P, et al. The standardization of terminology of lower urinary tract function in children and adolescents: update report from the Standardization Committee of the International Children's Continence Society. J Urol 2014;191(6):1863—1865.e13. https://doi.org/10.1016/j.juro.2014.01.110.

[5] Kamperis K. Nocturnal enuresis in children: the role of arginine-vasopressin. Handb Clin Neurol 2021;181:289—97. https://doi.org/10.1016/B978-0-12-820683-6.00021-X.

[6] Jørgensen CS, Kamperis K, Walle JV, Rittig S, Raes A, Dossche L. The efficacy of standard urotherapy in the treatment of nocturnal enuresis in children: a systematic review. J Pediatr Urol 2023;19(2):163—72. https://doi.org/10.1016/j.jpurol.2022.12.011.

[7] Zhu B, Zou K, He J, Huang X, Zhu W, Ahmad Harb AK, et al. Sleep monitoring of children with nocturnal enuresis: a narrative review. Front Pediatr 2021;9:701251. https://doi.org/10.3389/fped.2021.701251. Published 2021 Sep. 30.

[8] Soster LA, Alves RC, Fagundes SN, Lebl A, Garzon E, Koch VH, et al. Non-REM sleep instability in children with primary monosymptomatic sleep enuresis. J Clin Sleep Med 2017;13(10):1163—70. https://doi.org/10.5664/jcsm.6762. Published 2017 Oct 15.

[9] Cohen-Zrubavel V, Kushnir B, Kushnir J, Sadeh A. Sleep and sleepiness in children with nocturnal enuresis. Sleep 2011;34(2):191—4. https://doi.org/10.1093/sleep/34.2.191. Published 2011 Feb 1.

[10] Ahorsu DK, Üztemur S, Huang PC, Fung XCC, Tu HF, Ruckwongpatr K, et al. Social media use and health. In: Sinharay S, editor. Reference module in social sciences. Elsevier; 2025.

[11] Griffiths MD, Stavropoulos V, Pontes HM, Carbonell X, King DL, Lin CY, et al. Gaming disorder among children and adolescents. In: Christakis DA, Hale L, editors. Handbook of children and screens. Springer; 2025. p. 187—94. https://doi.org/10.1007/978-3-031-69362-5_26.

[12] Langlais M, Bigalke J, Bigalke J. Relationship stress and sleep: examining the mediation of social media use for objective and subjective sleep quality. J Soc Media Res 2025;2(1):1—12.

[13] Saffari M, Chang KC, Chen JS, Potenza MN, Yen CF, Chang CW, et al. Sleep quality and self-stigma mediate the association between problematic use of social media and quality of life among people with schizophrenia in Taiwan: a longitudinal Study. Psychiatry Investig 2023;20(11):1034—44. https://doi.org/10.30773/pi.2023.0169.

[14] Zhang J, Zhang E, Cui S, Zhang L, Ren B, Jin Q, et al. Association of internet addiction severity with anxiety, depression, and suicidal ideation among civil aircrew members: a nationwide cross-sectional survey. Asian J Soc Health Behav 2025;8(3):116—24.

[15] Park MH, Park S, Jung KI, Kim JI, Cho SC, Kim BN. Moderating effects of depressive symptoms on the relationship between problematic use of the internet and sleep problems in Korean adolescents. BMC Psychiatry 2018;18(1):280. https://doi.org/10.1186/s12888-018-1865-x. Published 2018 Sep. 4.

[16] Öztürk A, Sezer TA, Tezel A. İlkokul öğrencilerinin uyku ve televizyon izleme alışkanlıklarının değerlendirilmesi. J Turk Sleep Med 2018;5(3):73—80. https://doi.org/10.4274/jtsm.99609.

[17] Duran Ş, Küçük Alemdar D. Investigation of the correlation between internet addiction, obesity risk and sleep disorder in children. J Pediatr Nurs 2023;73:e409—17. https://doi.org/10.1016/j.pedn.2023.10.009.

[18] Huang HM, Wei J, Sharma S, Bao Y, Li F, Song JW, et al. Prevalence and risk factors of nocturnal enuresis among children ages 5-12 years in Xi'an, China: a cross-sectional study. BMC Pediatr 2020;20(1):305. https://doi.org/10.1186/s12887-020-02202-w. Published 2020 Jun 22.

[19] Onguner S, Şahin Ş, Akçaboy M. Okul çağı çocuklarında internet bağımlılığı ve günlük alışkanlıkların etkileri. Kıbrıs Tıp Bilimleri Derg 2024;9(4):241—8. https://doi.org/10.4274/cjms.2024.2022-23.

[20] Domoff SE, Harrison K, Gearhardt AN, Gentile DA, Lumeng JC, Miller AL. Development and validation of the problematic media use measure: a parent report measure of screen media "addiction" in children. Psychol Pop Media Cult 2019;8(1):2—11. https://doi.org/10.1037/ppm0000163.

[21] Furuncu C. Problemli medya kullanım ölçeğinin Türkçe formunun geçerlilik güvenirlik çalışması: çocuklarda ekran bağımlılığı ölçeği ebeveyn formu [master's thesis]. İstanbul: İstanbul Üniversitesi-Cerrahpaşa Adli Tıp Enstitüsü; 2019.

[22] Bruni O, Ottaviano S, Guidetti V, Romoli M, Innocenzi M, Cortesi F, et al. The Sleep Disturbance Scale for Children (SDSC). Construction and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. J Sleep Res 1996;5(4):251—61. https://doi.org/10.1111/j.1365-2869.1996.00251.x.

[23] Ağca Bilmenoğlu S. Çocuklar için uyku bozuklukları ölçeği'nin Türkçe geçerlilik ve güvenilirliği. Edirne: Trakya Üniversitesi; 2019 [specialty thesis].

[24] Dhondt K, Baert E, Van Herzeele C, Raes A, Groen LA, Hoebeke P, et al. Sleep fragmentation and increased periodic limb movements are more common in children with nocturnal enuresis. Acta Paediatr 2014;103(6):e268—72. https://doi.org/10.1111/apa.12610.

[25] Bliwise DL, Holm-Larsen T, Goble S, Juul KV, van der Meulen E, Nørgaard JP. Delay of first voiding episode is associated with longer reported sleep duration. Sleep Health 2015;1(3):211—3. https://doi.org/10.1016/j.sleh.2015.05.001.

[26] Logan A, Schneider D. Parental exposure to work schedule instability and child sleep quality. Work Employ Soc 2024. https://doi.org/10.1177/09500170241235863. Published online April 28.

[27] Cook G, Carter B, Wiggs L, Southam S. Parental sleep-related practices and sleep in children aged 1—3 years: a systematic review. J Sleep Res 2023:e14120. https://doi.org/10.1111/jsr.14120. Published online December 22.

[28] Matias CN, Cardoso J, Cavaca ML, Cardoso S, Giro R, Vaz J, et al. Game on: a cross-sectional study on gamers' mental health,

game patterns, physical activity, eating, and sleeping habits. Comput Hum Behav 2023;148:107901. https://doi.org/10.1016/j.chb.2023.107901.

[29] Cakıl Z. Comprehensive mini review of pediatric sleep disorders: types, impact on health, and current management strategies. Contemporary Med 2024;14(6):355—9. https://doi.org/10.16899/jcm.1523344.

[30] Curvelo MV da S, Dias JA, Costa VAA, Rocha LF, Marques MS. Exposição às telas e impactos na qualidade do sono do público infantil: uma revisão sistemática. Res Soc Dev 2024. https://doi.org/10.33448/rsd-v13i2.45194. Published online March 3.

[31] Carter B, Rees P, Hale L, Bhattacharjee D, Paradkar M. Association between portable screen-based media device access or use and sleep outcomes: a systematic review and meta-analysis. JAMA Pediatr 2016;170(12):1202—8. https://doi.org/10.1001/JAMAPEDIATRICS.2016.2341.

[32] Khan A, Thomas G, Karatela S, Morawska A, Werner-Seidler A. Intense and problematic social media use and sleep difficulties of adolescents in 40 countries. J Adolesc 2024;96(5):1116—25. https://doi.org/10.1002/jad.12321.