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The Relationship between Sleep Quality, Cyberbullying, and Internet Addiction in Adolescents

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ABSTRACT

Background: Teenagers use the internet for their daily needs such as attending online classes, watching entertainment (such as YouTube or playing games) or even playing social media. The purpose of this study was to determine the relationship between cyberbullying incidents and sleep quality with internet addiction in adolescents.
Research Methods :This study used an observational analytical method using the PSQI, KDAI, and cyberbullying questionnaires. 276 adolescent respondents who were willing to fill out the questionnaire distributed via G-form were obtained. This study was analyzed with SPSS 26.0.
Results: The univariate results showed that 75 (27.2%) adolescents were addicted to the internet, 82 (29.7%) adolescents had been victims/perpetrators of cyberbullying, respondents experienced overall sleep quality, 90 students (32.6%) had good sleep quality and 186 students (67.4%) had poor sleep quality. The results of the bivariate analysis of this study found a significant relationship between internet-addicted teenagers and cyberbullying perpetrators (p = 0.000). A significant relationship was found between cyberbullying victims and internet addiction (p = 0.028). There was a significant relationship between subjective sleep quality (p = 0.000), sleep latency (p = 0.022), and sleep disturbance (p = 0.032) with internet addiction (p <0.05). The results of the Chi-Square statistical test obtained a value of 0.031, there was also a significant relationship between overall sleep quality and internet addiction. Using logistic regression, it can be seen that the independent variables that have a sig. <0.05 are the cyberbullying perpetrator variables and subjective sleep quality, so it can be said that both independent variables have a significant effect on internet addiction.
Conclusion: Significant relationship between subjective sleep quality and cyberbullying perpetrators on teenagers who tend to be addicted to the internet.

Keywords: Cyberbullying; Internet Addiction; Sleep Quality; Teenagers

INTRODUCTION

The development of digital technology and the internet has brought many conveniences to human life so the pattern of individual internet usage is different. This has caused various significant mental and social health problems. Three interrelated phenomena that have become major concerns in recent years are internet addiction, cyberbullying, and cognitive disorders[1]. High levels of excessive internet use can be considered an addictive disorder based on the diagnostic criteria for internet addiction in several countries such as Taiwan and Korea[2, 3]. The prevalence of internet addiction has

been studied, and it was found that it is around 7.02% and this size is greater than online game addiction[4].

Internet addiction is defined as the inability to control excessive internet use, which can interfere with daily activities and cause negative consequences[5]. Individuals with internet addiction tend to spend a lot of time in cyberspace, either playing online games, surfing social media, or other activities[6].

One of the negative impacts of internet addiction is the increased risk of being involved in cyberbullying. Cyberbullying refers to intimidation or harassment behavior that occurs through electronic devices[7]. Adolescents who spend more time online are more likely to engage in cyberbullying both as perpetrators and victims[8]. Recent studies have shown that excessive internet use not only has an impact on social and academic life but can also affect sleep quality and cause sleep disorders[9]. In addition to internet addiction being able to cause sleep disorders, there are indications of a relationship between brain glucose metabolism and internet addiction, at least in excessive internet game users[10].

Therefore, the aim of this study is to gain a comprehensive understanding of internet addiction in adolescents, especially in the context of its impact on sleep quality and cyberbullying. Comprehensive research on this phenomenon is needed to provide a better understanding and effective intervention strategies.

METHOD

This study used a cross-sectional descriptive study conducted on students of SMK Negeri 1 in the Banyumas area, SMA N 1 Purwokerto, and SMK Negri 1 Purwokerto in 2024. The inclusion criteria for this study were students aged 15-17 years who actively participated in learning at school, brought gadgets that could access Google Forms, and completed the questionnaire. The exclusion criteria were students who did not participate in the entire research series. The sample size was 276 respondents. This study has passed the research ethics committee of medical faculty University Muhammadiyah Purwokerto with the number KPEK/FK/015/III/2024. This research protocol begins with providing an explanation of the research to respondents and is continued with informed consent. Respondents completed the Internet Addiction Diagnosis Questionnaire (KDAI) taken from free download from kdai-online.id website, the translated Cyberbullying Questionnaire and the Pittsburgh Sleep Quality Index (PSQI) questionnaire[11, 12, 13, 14]. The statistical analysis used was SPSS 26.00 measuring univariate analysis, bivariate with Chi-square followed by multivariate logistic regression analysis.

RESULT

Univariate Analysis

In the results of the univariate analysis of 276 adolescent respondents, the following is obtained

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics		Frequency (F)	Percentage (%)
Gender	Male	37	27.2
	Female	99	72.8
Age	15 years	93	33.7
	16 years	136	49.3
	17 years	47	17.0
Active smoker	Yes	5	1.8
	No	271	98.2
Internet Addiction	Normal	201	72.8
	Internet Addiction	75	27.2

Based on the table 1, it can be seen that out of a total of 276 respondents, 211 (76.4%) were female and 65 (23.6%) were male. The majority of the study respondents were students aged 16 years, namely 136 (49.3%). From the frequency distribution results, it was found that most of the research respondents were not active smokers, namely 271 (98.2%). Based on the frequency distribution table above, it can be seen that most of the research respondents did not have an internet addiction or addiction, namely 201 (72.8%) respondents.

Table 2. Frequency Distribution of Cyberbullying

No.	Item	Never	%	Rarely	%	Sometimes	%	Often	%	Very Often	%	Always	%	N
	Cyberbullying Perpetration													
1	Sending threatening or insulting messages.	238	86	37	13	0	0	0	0	0	0	1	0.4	276
2	Posting or sending embarrassing pictures of classmates.	217	79	49	18	9	3.3	0	0	0	0	1	0.4	276
3	Posting links to embarrassing pictures for others to see.	251	91	21	7.6	4	1.4	0	0	0	0	0	0	276
4	Writing embarrassing jokes, rumors, gossip, or comments about classmates on the Internet	229	83	33	12	13	4.7	0	0	1	0.4	0	0	276
5	Posting or sending links to rumors, gossip, etc. about classmates to others so they can read it	229	83	33	12	13	4.7	0	0	1	0.4	0	0	276
6	Hacking to send messages via email or social media that can cause problems for others	263	95	10	3.6	3	1.1	0	0	0	0	0	0	276
7	Recording videos or taking pictures with a cell phone while a group of people laugh and force others to do something embarrassing or silly	237	86	30	11	6	2.2	0	0	0	0	3	1.1	276
8	Posting or sending these pictures for others to see	220	80	44	16	6	2.2	0	0	3	1.1	3	1.1	276
9	Recording videos or taking pictures with a cell phone while someone hits or hurts someone else.	257	93	15	5.4	3	1.1	0	0	1	0.4	0	0	276
10	Posting or sending these pictures for others to see	240	87	30	11	5	1.8	0	0	0	0	1	0.4	276
11	Broadcasting other people's secrets online, compromising information or images.	237	86	32	12	7	2.5	0	0	0	0	0	0	276
12	Intentionally excluding someone from an online group	217	79	50	18	6	2.2	0	0	2	0.7	1	0.4	276
13	Recording videos or taking pictures using a cell phone of a classmate engaging in sexual behavior.	264	96	11	4	1	0.4	0	0	0	0	0	0	276

No.	Item	Never	%	Rarely	%	Sometimes	%	Often	%	Very Often	%	Always	%	N
14	Hanging up or sending these pictures for others to see.	233	84	31	11	11	4	0	0	1	0.4	0	0	276
	Cyberbullying Victimization													
15	Receiving threatening or insulting messages.	207	75	56	20	9	3.3	0	0	2	0.7	2	0.7	276
16	Posting on the internet or sending embarrassing pictures about me.	194	70	52	19	18	6.5	0	0	10	3.6	2	0.7	276
17	Writing embarrassing jokes, rumors, gossip, or comments about me on the internet.	209	76	44	16	17	6.2	0	0	4	1.4	2	0.7	276
18	Hacking me to send messages via email or social media that can cause me trouble.	217	79	45	16	10	3.6	0	0	1	0.4	3	1.1	276
19	Recording videos or taking pictures through mobile phone while a group of people laugh and force me to do something embarrassing or silly	250	91	20	7.2	4	1.4	0	0	1	0.4	1	0.4	276
20	Recording a video or taking pictures with a mobile phone while someone hits or hurts me	257	93	17	6.2	2	0.7	0	0	0	0	0	0	276
21	Spreading secrets online, compromising information or images about me	259	94	16	5.8	0	0	0	0	1	0.4	0	0	276
22	Intentionally excluding me from online groups	200	72	60	22	12	4.3	0	0	3	1.1	1	0.4	276
23	Recording a video or taking pictures of myself with a mobile phone engaging in some type of sexual behavior	263	95	12	4.3	1	0.4	0	0	0	0	0	0	276

Based on the table 2, it shows that most respondents, namely 78.6% - 95.7%, answered never on the questionnaire item committing cyberbullying and most respondents, namely 70.3% - 95.3%, answered never on the questionnaire item cyberbullying as a victim.

Based on the table 3, it is illustrated that most respondents have subjectively quite good sleep quality, namely 188 (68.12%) and most respondents have a sleep duration of > 7 hours per day, namely 117 (42.39%). Most respondents have a sleep latency of <15 minutes, namely 110 (39.86%), and have sleep habits with sleep efficiency in the range of > 85%, namely 235 (85.14%). The frequency distribution table also shows that most, namely 172 (62.32%) respondents experience sleep disorders once a week, but even so, most respondents have never used sleeping pills, namely 240 (86.96%). In addition, most respondents experience > 3 times a week of daytime disorders or dysfunction, namely 95 (34.42%), and have experienced dysfunction at least once a week.

Based on the table 4, shows that most respondents have overall poor sleep quality (> 5), namely 186 (67.4%), this is based on the final score of the seven PSQI components.

We limited our analysis to data collected through the research questionnaire, without considering external factors such as mental health status, family dynamics, or other variables. This was done for consistency in measurement and in keeping with the scope of our research design, which

focused on respondents who completed the entire questionnaire process. We acknowledge that other factors may have played a role, but they were not captured in this research instrument.

This study has several limitations, especially in the use of PSQI, KDAI and cyberbullying questionnaires that rely on self-reports, making them susceptible to memory bias. Therefore, for further research, it is recommended to use qualitative and quantitative research methods to explore participants' experiences holistically.

Table 3. Frequency Distribution of Sleep Quality based on PSQI Components

No.	PSQI Components	Score	Assessment	Frequency (F)	Percentage (%)
1	Subjective Sleep Quality	0	Very Good	36	13.04
		1	Fairly good	188	68.12
		2	Fairly poor	45	16.30
		3	Very poor	7	2.54
2	Sleep duration	0	> 7 hour	117	42.39
		1	6 - 7 hour	85	30.80
		2	5 - 6 hour	65	23.55
		3	< 5 hour	9	3.26
3	Sleep Latency	0	Never	110	39.86
		1	1x a week	63	22.83
		2	2x a week	42	15.22
		3	> 3x a week	61	22.10
4	Sleep Efficiency	0	> 85%	235	85.14
		1	75 - 84%	27	9.78
		2	65 - 74%	9	3.26
		3	< 65%	5	1.81
5	Sleep Disorders	0	Never	24	8.70
		1	1x a week	172	62.32
		2	2x a week	56	20.29
		3	> 3x a week	24	8.70
6	Medication Use	0	Never	240	86.96
		1	1x a week	27	9.78
		2	2x a week	6	2.17
		3	> 3x a week	3	1.09
7	Daytime Dysfunction	0	Never	34	12.32
		1	1x a week	58	21.01
		2	2x a week	89	32.25
		3	> 3x a week	95	34.42

Table 4. Frequency Distribution of Overall Sleep Quality

		Frequency (F)	Percentage (%)
Valid	Good (< 5)	90	32.6
	Bad (>5)	186	67.4
	Total	276	100.0

Bivariate Analysis

The results of Table 5 above show that based on gender, most respondents do not experience internet addiction, namely from of the 211 female respondents, 157 (74.4%) were not addicted to the internet, while 54 (25.6%) were indicated as addicted to the internet. Of the 65 male respondents, 44 (67.7%) were not addicted to the Internet, while 21 (32.3%) were indicated as addicted to the Internet. The results of the Chi-Square statistical test obtained a value of 0.834, meaning that the p-value> 0.05, so it is said that there is no significant relationship between gender and internet addiction. Based on age, it is known that most respondents are not addicted to the Internet, namely out of 93 respondents aged 15 years, 73 (78.5%) are not addicted to the Internet, while 20 (21.5%) are indicated as addicted to the

Internet. Of the 136 respondents aged 16 years, 95 (69.9%) are not addicted to the internet, while 41 (30.1%) are indicated as addicted to the internet. Of the 47 respondents aged 17 years, there were 33 (70.2%) respondents who did not experience internet addiction while 14 (29.8%) indicated internet addiction. The results of the Chi-Square statistical test obtained a value of 0.059, meaning p-value> 0.05, so it is said that there is no significant relationship between age and internet addiction.

Table 5. Relationship between Respondent Characteristics and Internet Addiction

Characteristics of Internet Addiction		Internet Addiction				*P-value*
		Normal		Internet Addiction		
		F	%	F	%	
Gender	Male	44	67.7	21	32.3	0.287
	Female	157	74.4	54	25.6	
Age	15 years	73	78.5	20	21.5	
	16 year	95	69.9	41	30.1	0.059
	17 years	33	70.2	14	29.8	
Active smoker	Yes	3	60.0	2	40.0	0.515
	No	198	73.1	73	26.9	

Of the 5 active smoker respondents, there were 3 (60%) did not experience internet addiction while 2 (40%) experienced internet addiction. Of the 271 non-active smoker respondents, there were 198 (73.1%) who did not experience internet addiction while 73 (26.9%) indicated internet addiction. The results of the Chi-Square statistical test obtained a value of 0.515, meaning p-value> 0.05, so it is said that there is no significant relationship between active smoker status and internet addiction.

Table 6. Relationship between Cyberbullying and Internet Addiction

Cyberbullying		Internet Addiction				*P-value*
		Normal		Internet Addiction		
		F	%	F	%	
Perpetrator	Never	157	80.1	39	19.9	0.000
	Ever	44	55.0	36	45.0	
Victim	Never	148	76.7	45	23.3	0.028
	Ever	53	63.9	30	36.1	

Judging from the questionnaire of statements of cyberbullying perpetrators, it can be seen that of the 196 respondents who have never committed cyberbullying, there are 157 (80.1%) are not addicted to the internet while 39 (19.9%) are indicated to be addicted to the internet. Of the 80 respondents who have committed cyberbullying, there are 44 (55%) are not addicted to the internet while 36 (45%) are indicated to be addicted to the internet. The results of the Chi-Square statistical test obtained a value of 0.000, meaning p-value <0.05, so it is said that there is a significant relationship between cyberbullying perpetrators and internet addiction.

Judging from the questionnaire of cyberbullying victim statements, it can be seen that out of 193 respondents who had never experienced cyberbullying, 148 (76.7%) were not addicted to the internet while 45 (23.3%) indicated internet addiction. Of the 83 respondents who had experienced cyberbullying, 53 (63.9%) were not addicted to the internet while 30 (36.1%) indicated internet addiction. The results of the Chi-Square statistical test obtained a value of 0.028, meaning p-value <0.05, so it is said that there is a significant relationship between cyberbullying perpetrators and internet addiction.

The crosstab results above show that based on subjective sleep quality, most respondents are not addicted to the internet, namely from 188 respondents with fairly good sleep quality, 147 (78.2%) are not addicted to the internet while 41 (21.8%) are indicated to be addicted to the internet. The results

of the Chi-Square statistical test obtained a value of 0.006, meaning p-value <0.05, it is said that there is a significant relationship between subjective sleep quality and internet addiction.

Table 7. Relationship between Sleep Quality Based on PSQI Components and Internet Addiction

No.	Komponen PSQI	Score	Component	Internet Addiction				P-value
				Normal		Internet Addiction		
				F	%	F	%	
1	Subjective Sleep Quality	0	Very Good	29	80.6	7	19.4	0.000
		1	Fairly good	147	78.2	41	21.8	
		2	Fairly poor	23	51.1	22	48.9	
		3	Very poor	2	28.6	5	71.4	
2	Sleep duration	0	> 7 hour	86	73.5	31	26.5	0.700
		1	6 - 7 hour	60	70.6	25	29.4	
		2	5 - 6 hour	47	72.3	18	27.7	
		3	< 5 hour	8	88.9	1	11.1	
3	Sleep Latency	0	Never	91	82.7	19	17.3	0.022
		1	1x a week	43	68.3	20	31.7	
		2	2x a week	26	61.9	16	38.1	
		3	> 3x a week	41	67.2	20	32.8	
4	Sleep Efficiency	0	> 85%	169	71.9	66	28.1	0.553
		1	75 - 84%	20	74.1	7	25.9	
		2	65 - 74%	7	77.8	2	22.2	
		3	< 65%	5	100.0	0	0.0	
5	Sleep Disorders	0	Never	21	87.5	3	12.5	0.032
		1	1x a week	130	75.6	42	24.4	
		2	2x a week	33	58.9	23	41.1	
		3	> 3x a week	17	70.8	7	29.2	
6	Medication Use	0	Never	179	74.6	61	25.4	0.383
		1	1x a week	16	59.3	11	40.7	
		2	2x a week	4	66.7	2	33.3	
		3	> 3x a week	2	0.0	1	0.0	
7	Daytime Dysfunction	0	Never	29	85.3	5	14.7	0.124
		1	1x a week	46	79.3	12	20.7	
		2	2x a week	60	67.4	29	32.6	
		3	> 3x a week	66	69.5	29	30.5	

Based on sleep duration, it is known that from 117 respondents with sleep duration> 7 hours, 86 (73.5%) are not addicted to the internet while 31 (26.5%) are indicated to be addicted to the internet. Of the 85 respondents with a sleep duration of between 6-7 hours, 60 (70.6%) were not addicted to the Internet while 25 (29.4%) were indicated to be addicted to the Internet. Of the 65 respondents with a sleep duration of between 5-6 hours, 47 (72.3%) were not addicted to the internet while 18 (27.7%) were indicated to be addicted to the Internet. Of the 9 respondents with a sleep duration of <5 hours, 8 (88.9%) were not addicted to the internet. The results of the Chi-Square statistical test obtained a value of 0.700, meaning that the p-value> 0.05, it is said that there is no significant relationship between sleep duration and internet addiction. Based on sleep latency, it is known that of the 110 respondents with a sleep latency of <15 minutes, 91 (82.7%) were not addicted to the internet while 19 (17.3%) were indicated to be addicted to the internet. Of the 63 respondents with sleep latency between 16-30 minutes, 43 (68.3%) were not addicted to the Internet while 20 (31.7%) were indicated to be addicted to the Internet. Of the 42 respondents with sleep latency between 31-60 minutes, 26 (61.9%) were not addicted to the Internet while 16 (38.1%) were indicated to be addicted to the Internet. Of the 61 respondents with sleep latency > 60 minutes, 41 (67.2%) were not addicted to the internet while 20 (32.8%) were indicated to be addicted to the Internet. The results of the Chi-Square statistical test obtained a value of 0.022, meaning p-value <0.05, it is said that there is a significant relationship between sleep latency and

internet addiction. Based on sleep efficiency, it is known that out of 235 respondents with sleep efficiency > 85%, 169 (71.9%) were not addicted to the internet while 66 (28.1%) were indicated to be addicted to the internet. Out of 27 respondents with sleep efficiency between 75% - 84%, 20 (74.1%) were not addicted to the Internet while 7 (25.9%) were indicated to be addicted to the Internet. Out of 9 respondents with sleep efficiency between 65% - 74%, 7 (77.8%) were not addicted to the Internet while 2 (22.2%) were indicated to be addicted to the Internet. Out of 5 respondents with sleep efficiency <65%, all were not addicted to the Internet. The results of the Chi-Square statistical test obtained a value of 0.324, meaning p-value > 0.05, it is said that there is no significant relationship between sleep efficiency and internet addiction. Of the 24 respondents who never experienced sleep disorders, 21 (87.5%) did not experience internet addiction while 3 (12.5%) indicated internet addiction. Of the 172 respondents who experienced sleep disorders once a week, 130 (75.6%) did not experience internet addiction while 42 (24.4%) indicated internet addiction. Of the 56 respondents who experienced sleep disorders twice a week, 33 (58.9%) did not experience internet addiction while 23 (41.1%) indicated internet addiction. Of the 24 respondents who experienced sleep disorders > 3 times a week, 17 (70.8%) were not addicted to the internet and 7 (29.2%) indicated internet addiction. The results of the Chi-Square statistical test obtained a value of 0.005, meaning p-value <0.05, it is said that there is a significant relationship between sleep disorders and internet addiction.

Of the 240 respondents who had never used drugs, 179 (74.6%) were not addicted to the internet while 61 (25.4%) were indicated to be addicted to the internet. Of the 27 respondents who had used drugs once a week, 16 (59.3%) were not addicted to the internet while 11 (40.7%) were indicated to be addicted to the internet. Of the 6 respondents who had used them twice a week, 4 (66.7%) were not addicted to the internet while 2 (33.3%) were indicated to be addicted to the internet. The results of the Chi-Square statistical test obtained a value of 0.165, meaning that the p-value> 0.05, it is said that there is no significant relationship between the use of sleeping pills and internet addiction. Based on daytime dysfunction, it is known that of the 34 respondents who had never experienced daytime dysfunction, 29 (85.3%) did not experience internet addiction while 5 (14.7%) were indicated to be addicted to the internet. Of the 58 respondents who experienced 1 time a week of daytime dysfunction, 46 (79.3%) were not addicted to the internet while 12 (20.7%) indicated internet addiction. Of the 89 respondents who experienced 2 times a week of daytime dysfunction, 60 (67.4%) were not addicted to the internet while 29 (32.6%) indicated internet addiction. Of the 95 respondents who experienced more than 3 times a week of daytime dysfunction, 66 (69.5%) were not addicted to the internet while 29 (30.5%) indicated internet addiction. The results of the Chi-Square statistical test obtained a value of 0.124, meaning p-value> 0.05, it is said that there is no significant relationship between daytime dysfunction and internet addiction.

Thus, it can be concluded that the PQSI components of subjective sleep quality and sleep disorders have a significant relationship with internet addiction.

Table 8. Relationship between Overall Sleep Quality and Internet Addiction

Criteria		Internet Addiction				*P-value*
		Normal		Internet Addiction		
		F	%	F	%	
Overall Sleep Quality	Good (<5)	73	81.1	17	18.9	0.031
	Poor (>5)	128	68.8	58	31.2	

Based on overall sleep quality, it can be seen that out of 90 respondents with good sleep quality, 73 (81.1%) did not experience internet addiction while 17 (18.9%) experienced internet addiction. Out of 186 respondents with poor sleep quality, 128 (68.8%) did not experience internet addiction while 58 (31.2%) experienced internet addiction. The results of the Chi-Square statistical test obtained a value

of 0.031, meaning p-value <0.05, it is said that = there is a significant relationship between overall sleep quality and internet addiction.

Analysis Multivariate

Table 9. Multivariate Logistic Regression Analysis of Factors Associated with Internet Addiction among Adolescents

Variable	B	Sig.	Exp (B)	95% CI	
				Lower	Upper
Age	0.138	0.524	1.148	0.751	1756
Cyberbullying Perpetrators	1.27	0.000	3.56	1.837	6.897
Cyberbullying Victims	-0.086	0.807	0.918	0.461	1.829
Subjective Sleep Quality	0.764	0.003	2.148	1.299	3.551
Sleep Latency	0.234	0.064	1.263	0.987	1.618
Sleep Disturbances	0.247	0.273	1.28	0.824	1.988
Daytime Dysfunction	0.056	0.733	1.058	0.767	1.459
Constant	-2.758	0.000	0.063		

Based on the results of multivariate analysis using logistic regression, it can be seen that the independent variables that have a sig. <0.05 are the cyberbullying perpetrators and subjective sleep quality variables, so it can be said that both independent variables have a significant effect on internet addiction.

Thus, the results of the multivariate analysis of this study indicate that the variables that are most related and have a significant effect on internet addiction are cyberbullying perpetrators and subjective sleep quality.

DISCUSSION

In a meta-analysis study, internet addiction tends to be higher among adolescents[14]. This study found that most respondents were 16 years old, in line with longitudinal studies that observed an increase in internet addiction symptoms in adolescents with age, with a peak at age 16[15]. This is because there is still brain development, especially in the area responsible for self-control and decision-making, so it will influence adolescents to be more impulsive and less able to regulate internet use[16]. In this study, there was no relationship between gender and the tendency to internet addiction (p>0.05), but in this study, women (25%) were more likely to be addicted to the internet. The prevalence of internet addiction in a study conducted in a Brazilian city on public and private high school adolescents found that female adolescents tend to be addicted to the internet[17]. A possible reason is that female adolescents are more likely to use the internet to seek social and emotional support, so this can increase the risk of excessive internet use[18]. In this study, there was no relationship between smoking and internet addiction (p>0.05). This is because there are fewer adolescent smokers than non-smokers. This is possible because of the different mechanisms, in smokers it is more caused by substances, namely nicotine, while internet addiction is caused by repetitive behavior related to the internet[19,20].

This study found a relationship between cyberbullying perpetrators and internet addiction (p-value = 0.001). The Cyberbullying Questionnaire (CBQ) is a questionnaire developed to find out whether someone is a perpetrator or victim in Mexico the results found that adolescents tend to be able to carry out cyberbullying, especially individuals with internet addiction[12,21]. Research in Thailand states that male students are known to be more likely to be perpetrators of cyber or cyberbullies than female students, while female students are more likely to be victims and cyber bystanders or cyberbullies[22].

Internet addiction in adolescents is often associated with a lack of parental supervision, which can cause them to spend more time online. This increases the chances of engaging in negative behaviors such as cyberbullying. Research shows that effective parental supervision can serve as a protector against internet addiction and other risky behaviors[23].

This study found a relationship between sleep quality which subjectively tends to be a fairly good sleep pattern with internet addiction (p-value = 0.006). This is not in line with the research that excessive internet use can cause tolerance, where individuals need more and more online time to achieve the same satisfaction. Withdrawal symptoms can also occur when internet access is restricted[23]. Excessive internet use, especially at night, can disrupt circadian rhythms, affecting melatonin production and sleep quality[24]. The relationship between cyberbullying, sleep disturbances, and internet addiction can be explained through several interrelated mechanisms. Cyberbullying, which often occurs on social media platforms and online games, can cause significant psychological impacts on individuals, including anxiety and depression. Research shows that individuals who experience cyberbullying tend to experience higher sleep disturbances, which in turn can worsen internet addiction. One mechanism that can explain this relationship is through the psychological impact of cyberbullying. According to research by Firdaus (2023), addiction to social media use is closely related to poor sleep quality, because individuals who experience social media addiction tend to have disturbed sleep patterns[25]. When someone is a victim of cyberbullying, they may feel anxious and depressed, which can interfere with their ability to sleep well. This sleep disturbance can create a cycle where lack of sleep increases anxiety and depression, which in turn encourages individuals to use the internet more often as an escape[26]. Furthermore, research shows that internet addiction is associated with insomnia, where individuals who spend excessive time on the internet experience decreased sleep time and quality[26]. When individuals are trapped in internet addiction, they may neglect their sleep needs, which can lead to more serious sleep disorders. In this context, cyberbullying can worsen the situation, as individuals who experience online bullying may be more likely to seek escape in cyberspace, thereby increasing the time spent on the internet and reducing quality sleep time. Another relevant mechanism is the effect of the duration of electronic media exposure on sleep patterns. Research by Rahmawati and Wijayanti (2023) shows that excessive duration of playing online games can cause sleep disorders in students[27].

Cyberbullying, sleep disturbances, and internet addiction are interrelated through reinforcing psychological and behavioral mechanisms. Victims of cyberbullying often experience heightened anxiety and disrupted sleep, which may drive compensatory internet use, exacerbating addiction. To break this cycle, targeted interventions should address both cyberbullying coping strategies and sleep hygiene. However, given the cross-sectional nature of existing evidence, causal inferences remain limited. Future research should employ longitudinal or experimental designs such as sleep interventions combined with cyberbullying monitoring to clarify temporal relationships and establish effective prevention measures.

CONCLUSION

This study concludes that there is a significant relationship between poor sleep quality and cyberbullying perpetrators towards adolescents who tend to be addicted to the internet. Therefore, it is important to address this internet addiction problem together by providing appropriate education and support for individuals who experience poor sleep quality or who become perpetrators of cyberbullying.

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