

How to Cite

Kurniawan, I. G. Y., Mahardika, I. K. A., Aryani, L. N. A., & Santosa, I. K. A. (2024). Relationship of strength and difficulty factors and video game addiction in adolescents of Denpasar Junior High School. *International Journal of Health & Medical Sciences*, 7(4), 98-107. <https://doi.org/10.21744/ijhms.v7n4.2329>

Relationship of Strength and Difficulty Factors and Video Game Addiction an Adolescents of Denpasar Junior High School

I Gde Yudhi Kurniawan

Psychiatric Department of Bali Mental Hospital, Bangli, Indonesia
Corresponding author email: dryudhi.rsjbali@gmail.com

I Komang Ana Mahardika

Psychiatric Department of Medical Faculty, Udayana University, Denpasar, Indonesia

Luh Nyoman Alit Aryani

Psychiatric Department of Medical Faculty, Udayana University, Denpasar, Indonesia

I Ketut Arya Santosa

Psychiatric Department of Bali Mental Hospital, Bangli, Indonesia

Abstract---Introduction: Video game addiction in adolescents can result in negative impacts on daily functioning, including personal, social, and educational. Finding the strength and difficulty factors and the related factors is beneficial for better diagnosis and treatment. **Method:** This study was conducted using a cross-sectional study design to examine the relationship between strength and difficulty factors and video game addiction. The research was conducted at three chosen junior high schools in Denpasar City from March to April 2024. The inclusion criteria are junior high school students in Denpasar City. The exclusion criteria were students with severe comorbidities, a history of psychiatric disorders, and who refused research approval. Data analysis consists of descriptive statistical analysis, proportional comparison analysis, and logistic regression tests. **Result:** From the 209 samples, 56.9% were male, 36.4% played long games, 71.3% had WIFI at home, and 64.6% had low-income parents. The distribution of supporting and confounding factors in the sample based on the Strength and Difficulty Questionnaire (SDQ) found that the prevalence of abnormal emotions was 82 (39.2%), abnormal Conduct was 67 (32.1%), abnormal hyperactivity was 105 (50.2%), abnormal peer was 139 (66.5%), total difficulty (ECHP) was 131 (62.7%) and abnormal prosocial was 23 (11%). The prevalence of video game addiction was 29 (13.9%). In the chi-square bivariate test, it was found that the abnormal prosocial factor was associated with video game addiction in adolescents with an OR of 10.845, $p < 0.000$, (95%CI: 4.160 – 28.271). The long gaming duration variable was also found to be associated with video game addiction in adolescents with an OR of 4.100, $p < 0.001$ (95%CI: 1.792 – 9.380). After conducting logistic regression tests on the two significantly related variables, it was found that the two factors were related after controlling other confounding variables through statistical analysis, with the Prosocial Factor AOR of 13.984 (95% CI: 4.780-40.910) and the long Game Playing Duration AOR of 5.280 (95% CI: 2.041-13.654). **Conclusion:** Abnormal condition of prosocial factors from SDQ and the long game duration played were found to be related to video game addictions in adolescents of Denpasar Junior High School.

Keywords---adolescent, difficulty factor, strength factor, video game addiction.

Introduction

Video game addiction has become a significant concern among adolescents, particularly in the digital age, where access to gaming platforms is widespread (Surya et al., 2024). This addiction can negatively impact daily functioning, including personal, social, and educational aspects (Király et al., 2023). Many studies have shown that

video game addiction leads to changes in the brain that are similar to those that occur in substance addiction and gambling (Shabina et al., 2023).

The World Health Organization's inclusion of gaming disorder in the ICD-11 in 2018 has provided a standardized definition for research and clinical practice. Gaming disorder is defined in the 11th Revision of the International Classification of Diseases (ICD-11) as a pattern of gaming behavior (Darvesh et al., 2020; Siste et al., 2022). The diagnostic criteria include preoccupation with gaming activities, withdrawal symptoms, failed attempts to control or reduce gaming time, loss of interest in other activities or hobbies due to excessive gaming, and continued use despite negative consequences (Jin et al., 2021; Siste et al., 2022).

The prevalence of video game addiction varies across studies and populations. The worldwide prevalence of gaming disorder was 3.05% (confidence interval: [2.38, 3.91]); this figure was adjusted to 1.96% [0.19, 17.12] when considering only studies that met more stringent sampling criteria (Stevens et al., 2021). The overall pooled prevalence of GD in East Asia was 12%, 95% CI (10%–15%); this figure was adjusted to 6%, 95% CI (3%–9%) for a representative sample. Higher prevalence was observed in males than in females (16% vs. 8%, respectively, $P < 0.05$) (Liao et al., 2022).

Recent studies have highlighted several factors that may contribute to video game addiction in adolescents. For instance, a study by Przybylski et al. (2019), identified that emotional regulation and social skills are significant predictors of gaming addiction (Przybylski & Weinstein, 2019). Other studies also found that self-reported well-being at school and social integration in class are protective factors (Rehbein & Baier, 2013). Poor social skills and problematic gaming were also found to be related. In detail, it described that avoidant attachment was positively associated with excessive gaming in adolescents without problematic gaming (Carvalho et al., 2023).

The Strength and Difficulties Questionnaire (SDQ), a widely used behavioral screening tool, has been employed in various studies to assess the psychological attributes associated with gaming addiction (Goodman et al., 2000). Studies have consistently demonstrated that adolescents with higher levels of emotional and behavioral difficulties, as measured by the SDQ, are more likely to exhibit problematic gaming behaviors. For instance, emotional problems and peer relationship difficulties were significantly associated with gaming addiction (Wartberg et al., 2020). Similarly, another study reported that adolescents with higher scores on the SDQ's total difficulties scale were at greater risk for developing gaming disorder (Stevens et al., 2021). These findings suggest that the SDQ is an effective tool for identifying adolescents who may be at risk for gaming addiction due to underlying psychological issues.

Furthermore, the SDQ's ability to capture prosocial behavior provides additional insights into the social dimensions of gaming addiction. A deficit in prosocial behavior is common among adolescents with gaming disorders, suggesting that difficulties in social interactions and empathy may contribute to the risk of addiction (Tomei et al., 2021). Good prosocial behavior, which negatively correlates with problematic video game use and can be a protective factor (Coyné et al., 2018; García-Gil et al., 2022).

Understanding the factors that contribute to video game addiction is crucial for better diagnosis and treatment. The present study aims to investigate the relationship between strength and difficulty factors and video game addiction among adolescents in Denpasar junior high schools.

Methods

This study used a cross-sectional design to examine the relationship between strength and difficulty factors and video game addiction. It was conducted at three chosen junior high schools in Denpasar City from March to April 2024.

Subjects

The inclusion criteria for this study were junior high school students in Denpasar City. The exclusion criteria were students with severe comorbidities, a history of psychiatric disorders, and who refused research approval. Multistage random sampling was applied to choose the subjects. A total of 209 subjects from three chosen junior high schools approved the informed consent to join the study and completed all measurements. Subject characteristics data (controlled variable), such as gender, parents' income, Wi-Fi availability, and duration of games played, were included and would be controlled in the analytical test.

Strength and Difficulties Questionnaire (SDQ)

SDQ has been tested on various versions of research instruments. Goodman started the study in 1997 and showed that the results of SDQ-teacher reports (TR) and parent reports (PR) were as useful as the Rutter scale (Goodman,

2001; Goodman & Scott, 1999). In 2003, Goodman, Ford, Simmons, Gatward, and Meltzer showed that SDQ had a sensitivity of 63.3%, a specificity of 94.6%, a positive prediction value of 52.7%, and a negative prediction value of 96.4%. SDQ sensitivity will be significantly higher when using multiple informants of all three SDQ forms than single informants (Goodman, 2000).

The SDQ measures emotional symptoms, conduct problems, hyperactivity/ inattention, peer relationship problems, and prosocial behavior offering a comprehensive understanding of the psychological landscape of adolescents (Goodman et al., 2000).. It exists in several versions to meet the needs of researchers, clinicians, and educationalists. All versions of the SDQ ask about 25 positive and negative attributes. These 25 items are divided between 5 scales: 1) emotional symptoms (5 items), 2) conduct problems (5 items), 3) hyperactivity/ inattention (5 items), 4) peer relationship problems (5 items), 5) prosocial behavior (5 items). 1) to 4) added together to generate a total difficulties score (based on 20 items) (Goodman et al., 1997).

Self-completed SDQ cut-off for each part or domain: Total difficulties score 0-15 (normal), 16-19 (borderline), 20-40 (abnormal), Emotional problems score 0-5 (normal) 6 (borderline) 7-10 (abnormal), Conduct problems score 0-3 (normal) 4 (borderline) 5-10 (abnormal), Hyperactivity score 0-5 (normal) 6 (borderline) 7-10 (abnormal), Peer problems score 0-3 (normal) 4-5 (borderline) 6-10 (abnormal), Prosocial score 6-10 (normal) 5 (borderline) 0-4 (abnormal) (Goodman, 2016). The Indonesian version of SDQ has been translated by Tjhin Wiguna and Yohana Hestyanti and has a brief behavioral screening questionnaire for 2-17-year-olds (Wiguna et al., 2016; Wiguna & Hestyanti, 2012). This version of the SDQ has good internal validity of Cronbach's $\alpha = 0.773$ (Oktaviana & Wimbarti, 2014). Another study in Indonesia also divided the three categories of SDQ into two categories normal and abnormal (borderline and abnormal included) (Pandia et al., 2021).

Video Game Addiction Test (VAT)

The 14-item VAT self-report scale incorporates various aspects of problematic (addictive) behavior including: loss of control, conflict, preoccupation/salience, coping/mood modification, and withdrawal symptoms. Example VAT items include: 'How often do you find it difficult to stop gaming?' and 'How often do you think about gaming, even when you're not online?' and answer options range from 'never' (score 0), seldom (1), sometimes (2), to 'often' (3) and 'very often' (4). The average score on the 14 VAT items indicates the average severity of the problematic gaming across all the items (van Rooij et al., 2012). The average of 2.5 on the self-reported problematic (addictive) gaming measure (VAT) is considered high on this scale, as the VAT is largely distributed towards 0 and 1 in healthy samples (Van Rooij & Prause, 2014; van Rooij et al., 2017). The Indonesian VAT version has been proven valid and reliable ($\alpha = 0.846$) (Permatasari et al., 2021).

Statistical Analysis

The initial stage of data analysis is the presentation of descriptive statistics to determine the demographic data of the subject obtained from the data according to the demographic data form of the study and from the results of research measurements. Demographic data is made using a frequency distribution table and percentage.

This research data is categorical data with a nominal dichotomous scale. The dependent and independent variables were analyzed using crosstabulations 2x2 with the Chi-Square test to find prevalence ratio and statistical significance. After bivariate tests for several variables, significant related variables will be continued in the multivariate analysis. Multivariate analysis in this research uses logistic regression tests. The level of significance used in this study is $\alpha = 5\%$. Data analysis was performed using SPSS software version 25.0 for Windows.

Results

Subject characteristic

The study sample consisted of 209 adolescents with an average age of 14.54 years. As seen in Table 1, there was a slight male predominance (56.9% vs 43.1% female). Most participants came from low-income backgrounds (64.6%) and had access to Wi-Fi (71.3%). Interestingly, most participants (63.6%) reported playing games for short rather than long durations.

Table 1
Demographic characteristics of subjects

Variable	Result (n=209)
Age (M+SD)	14.54 (1.563)
Sex, n (%)	
Male	119 (56.9%)
Female	90 (43.1%)
Parents Income, n (%)	
Low Income	135 (64.6%)
Middle-High Income	74 (35.4%)
WIFI Availability, n (%)	
Available	149 (71.3%)
Not Available	60 (28.7%)
Duration Game Played, n (%)	
Long Duration	76 (36.4%)
Short Duration	133 (63.6%)

Prevalence of mental health issues and video game addiction

The Strengths and Difficulties Questionnaire (SDQ) revealed a considerable prevalence of mental health challenges shown in Table 2. Peer problems were the most common, with 66.5% showing abnormal scores. Total difficulty scores were abnormal in 62.7% of participants. Hyperactivity was an issue for about half the sample (50.2%). Emotional and conduct problems were less prevalent but still significant (39.2% and 32.1% respectively). Only 11% showed abnormal prosocial behavior, indicating that most participants maintained positive social interactions despite other difficulties. The prevalence of video game addiction in this sample was 13.9%, which is a significant proportion and warrants attention.

Table 2
Strength and difficulty factors and video game addiction test

Variable	Result (n=209)
SDQ, Emotional, n (%)	
Abnormal	82 (39.2%)
Normal	127 (60.8%)
SDQ, Conduct, n (%)	
Abnormal	67 (32.1%)
Normal	142 (67.9%)
SDQ, Hyperactivity, n (%)	
Abnormal	105 (50.2%)
Normal	104 (49.8%)
SDQ, Peer, n (%)	
Abnormal	139 (66.5%)
Normal	70 (33.5%)
SDQ, Total Difficulty, n (%)	
Abnormal	131 (62.7%)
Normal	78 (37.3%)
SDQ, Prosocial Behavior, n (%)	
Abnormal	23 (11.0%)
Normal	186 (89.0%)
Video Game Addiction Test, n (%)	
Addiction	29 (13.9%)
Normal	180 (86.1%)

Factors associated with video game addiction

Table 3 shows data that while males showed a higher prevalence of addiction (17.6% vs 8.9% in females), this difference wasn't statistically significant. This suggests that gender may not strongly predict video game addiction in this population. From socioeconomic factors neither parental income nor Wi-Fi availability significantly correlated with addiction rates. This implies that video game addiction crosses socioeconomic boundaries in this sample (Stockdale & Coyne, 2018; Hyun et al., 2015).

Data in this study shows that the duration of the game played was significantly associated with addiction ($p=0.01$). Those who played for longer durations had over three times the addiction rate at 25.0% compared to those who played for shorter durations at 7.5% (OR 4.100; 95% CI: 1.792 – 9.380). This highlights the importance of monitoring and potentially limiting gaming time.

Table 3
Relationship Subject Characteristic and VAT

		Video Game Addiction		P value	Prevalence Ratio (Confidence Interval 95%)
		Addiction n, (%)	Normal n, (%)		
Sex	Male	21 (17.6%)	98 (82.4%)	0.105	2.196 (0.924 – 5.219)
	Female	8 (8.9%)	82 (91.1%)		
Parents Income	Low Income	19 (14.1%)	116 (85.9%)	1.000	1.048 (0.460 – 2.390)
	High Income	10 (13.5%)	64 (86.5%)		
Wi-Fi Availability	Available	21 (14.1%)	128 (85.9%)	1.000	1.066 (0.444 – 2.560)
	Not Available	8 (13.3%)	52 (86.7%)		
Duration Game Played	Long Duration	19 (25.0%)	57 (75.0%)	0.001*	4.100 (1.792 – 9.380)
	Short Duration	10 (7.5%)	123 (92.5%)		

Note: *: p value significant at $p < 0.05$

SDQ factors with video game addiction

Most SDQ subscales in Table 4 (emotional, conduct, hyperactivity, peer problems, and total difficulties) didn't show significant associations with video game addiction. This is an interesting finding, suggesting that these broader mental health issues may not directly predict gaming addiction. However, in contrast, prosocial abnormality was the standout factor in the SDQ. Those with abnormal prosocial behavior had a dramatically higher rate of video game addiction (52.2%) compared to those with normal prosocial behavior (9.1%). This was highly significant ($p < 0.001$) and suggests a strong link between social interaction difficulties and gaming addiction (OR 10.845; 95% CI: 4.160 – 28.271).

Table 4
Relationship SDQ Factors and VAT

		Video Game Addiction		P value	Prevalence Ratio (Confidence Interval 95%)
		Addiction n, (%)	Normal n, (%)		
SDQ, Emotional	Abnormal	9 (11.0%)	73 (89.0%)	0.330	0.660 (0.284 – 1.530)
	Normal	20	107		

		Video Game Addiction		P value	Prevalence Ratio (Confidence Interval 95%)
		Addiction n, (%)	Normal n, (%)		
		(15.7%)	(84.3%)		
SDQ, Conduct	Abnormal	9 (13.4%)	58 (86.6%)	0.899	0.947 (0.406 – 2.207)
	Normal	20 (14.1%)	122 (85.9%)		
SDQ, Hyperactivity	Abnormal	10 (9.5%)	95 (90.5%)	0.067	0.471 (0.207 – 1.069)
	Normal	19 (18.3%)	85 (81.7%)		
SDQ, Peer	Abnormal	19 (13.7%)	120 (86.3%)	0.903	0.950 (0.416 – 2.170)
	Normal	10 (14.3%)	60 (85.7%)		
SDQ, Total Difficulty	Abnormal	14 (10.7%)	117 (89.3%)	0.099	0.503 (0.228 – 1.107)
	Normal	15 (19.2%)	63 (80.8%)		
SDQ, Prosocial Behavior	Abnormal	12 (52.2%)	11 (47.8%)	0.000*	10.845 (4.160 – 28.271)*
	Normal	17 (9.1%)	169 (90.9%)		

*: Significance result at $p < 0.005$

Multivariate Logistic Regression Analysis

The logistic regression confirmed two key predictors of video game addiction. The first variable, the game's duration, was found to have an adjusted odds ratio (AOR) of 5.280; longer gaming duration increased the odds of video game addiction by over 5 times (95% CI: 2.041 - 13.654, $p=0.001$). The second variable found significant in bivariate analysis, prosocial behavior, had an even stronger effect, with an AOR of 13.984. This means that abnormal prosocial behavior increased the odds of video game addiction by nearly 14 times after controlling for other factors (95% CI: 4.780 - 40.910, $p<0.001$).

Table 5
Multivariate Logistic Regression Analysis

Variable	AOR	95% CI	P value
Duration Game Played	5.280	2.041 – 13.654	0.001
SDQ, Prosocial Behavior	13.984	4.780 – 40.910	0.000

The study found that longer gameplay duration and abnormal prosocial behavior were the strongest predictors of video game addiction in this sample of adolescents. In the final model, other demographic factors and most SDQ subscales did not show significant associations with addiction. These results highlight the complex interplay between gaming habits, social behavior, and addiction risk. They suggest that interventions targeting both gaming duration and social skills development could be effective in preventing or addressing video game addiction in adolescents (Kulbok & Cox, 2002; Olsson et al., 2003).

The findings also emphasize the need for a nuanced understanding of video game addiction, as it doesn't seem to be strongly linked to other mental health issues measured by the SDQ, apart from prosocial behavior. This could inform more targeted screening and intervention strategies.

Discussion

This study investigates the demographic characteristics, Strengths and Difficulties Questionnaire (SDQ) factors, and Video Game Addiction Test (VAT) results among a sample of 209 adolescents. The findings provide valuable insights into the prevalence and associations of various factors with video game addiction.

The demographic data reveal a balanced gender distribution among the subjects, with a slightly higher percentage of males (56.9%) than females (43.1%). Most subjects came from low-income families (64.6%), and a significant proportion had WIFI access (71.3%). Notably, a higher percentage of subjects played games for a short duration (63.6%) than for a long duration (36.4%). These findings align with existing literature suggesting that socioeconomic factors and access to technology can influence gaming behavior. For instance, [Mihara & Higuchi \(2017\)](#), found that adolescents from lower socioeconomic backgrounds are more likely to engage in excessive gaming due to limited access to other recreational activities ([Mihara & Higuchi, 2017](#)). Similarly, other studies show that access to internet facilities, such as WIFI, significantly predicts adolescent gaming behaviors ([Stevens et al., 2021](#)). Furthermore, a study by [Wartberg et al. \(2020\)](#), indicated that socioeconomic status is a critical factor influencing the prevalence of gaming disorders among adolescents ([Wartberg et al., 2020](#)).

The SDQ results indicate substantial emotional and behavioral challenges among the subjects. The prevalence of abnormal peer problems (66.5%) and total difficulties (62.7%) highlights significant social and behavioral issues. However, prosocial behavior was predominantly normal (89.0%). The VAT results show that 13.9% of the subjects were classified as having an addiction to video games, which is consistent with other studies reporting video game addiction rates ranging from 8% to 15%. [Wartberg et al.](#) also found a similar result, reporting that adolescents with higher scores on emotional and behavioral difficulties scales are more likely to exhibit problematic gaming behaviors, further supporting the current study's findings ([Wartberg et al., 2020](#)). The other study also supports the notion that emotional and behavioral difficulties are common among adolescents with gaming addiction ([Anderson et al., 2017](#)).

The relationship between demographic characteristics and video game addiction revealed that males had a higher prevalence of addiction (17.6%) compared to females (8.9%), though this difference was not statistically significant ($p = 0.105$). This finding is in line with previous research indicating that males are more likely to develop video game addiction than females. For example, an Indonesian study reported that males have a higher influence on online gaming addiction compared to females (Odds Ratio 14.556[95% CI: 2,490-85,079]) ([Samsidar et al., 2023](#)).

Parental income and WIFI availability did not show significant associations with video game addiction. However, the duration of games played was significantly associated with addiction. Subjects who played games for a long duration had a significantly higher prevalence of addiction (25.0%) compared to those who played for a short duration (7.5%), with a prevalence ratio of 4.100 ($p = 0.01$). This supports the hypothesis that longer gaming duration is a risk factor for developing addiction. Research by [King et al. \(2020\)](#), emphasizes that prolonged gaming sessions significantly increase the risk of developing addictive behaviors. These studies suggest that limiting gaming time is crucial for preventing video game addiction. Moreover, excessive gaming time is a strong predictor of gaming disorder, further supporting the importance of monitoring gaming duration ([Przybylski & Weinstein, 2019](#)).

The relationship between SDQ factors and video game addiction showed mixed results. Emotional problems, conduct problems, hyperactivity, and peer problems did not show significant associations with video game addiction. However, prosocial behavior was significantly associated with video game addiction. Subjects with abnormal prosocial behavior had a markedly higher prevalence of addiction (52.2%) compared to those with normal prosocial behavior (9.1%), with a prevalence ratio of 10.845 ($p < 0.005$). This finding suggests that difficulties in social interactions and empathy may contribute to the risk of developing video game addiction. Two studies have also noted that deficits in prosocial behavior and social skills can lead to increased reliance on video games as a means of social interaction, thus heightening the risk of addiction ([Anderson et al., 2017](#); [Roza et al., 2023](#)).

The multivariate logistic regression analysis identified two significant predictors of video game addiction: the duration of games played and prosocial behavior. Subjects who played games for a long duration were significantly more likely to develop an addiction (AOR = 5.280, $p = 0.001$). Additionally, abnormal prosocial behavior was a strong predictor of video game addiction (AOR = 13.984, $p < 0.000$). These findings underscore the importance of monitoring gaming duration and promoting healthy social behaviors to prevent video game addiction among adolescents. Studies by [King et al. \(2020\)](#), and [Stevens et al. \(2021\)](#), highlight the effectiveness of interventions focused on reducing gaming time and enhancing social skills in mitigating the risk of video game addiction ([King et al., 2020](#); [Stevens et al., 2021](#)). Furthermore, interventions aimed at improving prosocial behavior are effective in reducing the prevalence of gaming disorders and hurtful behavior among adolescents ([Saleem et al., 2012](#)).

The current study's findings contribute to the growing body of evidence on the multifaceted nature of video game addiction. The significant association between prolonged gaming duration and video game addiction is consistent with recent studies highlighting the critical role of time spent on gaming as a determinant of problematic gaming behavior. [Stevens et al. \(2021\)](#), conducted a meta-analysis showing that excessive gaming time is a robust predictor of gaming disorder, suggesting that interventions targeting gaming duration are essential ([Stevens et al., 2021](#)). Similarly, [Przybylski et al. \(2019\)](#), found that time spent gaming is a key factor in developing gaming addiction, emphasizing the need for parental and self-regulation strategies to control gaming time ([Przybylski & Weinstein, 2019](#)).

Moreover, the strong association between abnormal prosocial behavior and video game addiction highlights the potential impact of social skills and behaviors on gaming addiction. Adolescents with difficulties in social interactions may turn to video games as a coping mechanism, potentially leading to addictive behaviors ([Lemmens et al., 2011](#)). These findings suggest that interventions to improve social skills and promote positive social interactions could effectively mitigate the risk of video game addiction.

While the study provides valuable insights, it has several limitations. The cross-sectional design limits the ability to establish causal relationships between strength and difficulty factors and video game addiction. Longitudinal studies are needed to understand better the directionality of these associations and the long-term impact of gaming addiction on adolescents' development ([Ananda et al., 2022](#)).

Furthermore, the study relies on self-reported data, which may be subject to social desirability bias and inaccuracies in reporting gaming behaviors and emotional states. Future research should consider incorporating objective measures of gaming time and multi-informant reports to enhance the reliability of the findings.

Conclusion

This study found abnormal conditions of prosocial factors from SDQ and the long game duration played were found to be related to video game addictions in adolescents of Denpasar junior high school. By understanding the strengths and difficulties factors associated with addiction, stakeholders can develop targeted interventions that promote healthy gaming habits and support adolescents' mental health and well-being.

Declaration

Conflict Of Interest

None of the authors has any commercial or other conflicts of interest with this work.

Ethical Statement

The study protocol was approved by the Institutional Ethical Committee of Medical Faculty, Udayana University, with registration number 2024.03.1.0588 and ethical clearance registration number 1488/UN14.2.2.VII.14/LT/2024.

Author's Contribution

Conceived and designed the analysis and collected the data: I Komang Ana Mahardika, Luh Nyoman Alit Aryani, I Gde Yudhi Kurniawan, I Ketut Arya Santosa.

Contributed data or analysis tools and performed the analysis: I Komang Ana Mahardika, I Gde Yudhi Kurniawan, I Ketut Arya Santosa.

Wrote the paper: I Komang Ana Mahardika, Luh Nyoman Alit Aryani.

Supervised the paper and approved the final manuscript: Luh Nyoman Alit Aryani.

All authors contributed significantly to this work, and all agree with the contents of this article.

Funding

This research received no specific grant from any funding agency.

Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Acknowledgments

We want to thank all the subjects who participated in the current study, the students, the teacher, and the parents from three chosen junior high schools in Denpasar.

Consent for publication

A written informed consent was given by each participant regarding the publication of their information.

References

- Ananda, A., Baso, Y. S., Hidayanty, H., Syarif, S., Aminuddin, A., & Bahar, B. (2022). Providing education chronic energy deficiency (CED) uses web-based she smart to improve knowledge, attitudes, and practice in adolescent girls. *International Journal of Health & Medical Sciences*, 5(1), 56-62. <https://doi.org/10.21744/ijhms.v5n1.1833>
- Anderson, E. L., Steen, E., & Stavropoulos, V. (2017). Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. *International Journal of Adolescence and Youth*, 22(4), 430-454.
- Carvalho, C. B., Cabral, J. M., Teixeira, M., Cordeiro, F., Costa, R., & Arroz, A. M. (2023). "Belonging without being": Relationships between problematic gaming, internet use, and social group attachment in adolescence. *Computers in Human Behavior*, 149, 107932. <https://doi.org/10.1016/j.chb.2023.107932>
- Coyne, S. M., Warburton, W. A., Essig, L. W., & Stockdale, L. A. (2018). Violent video games, externalizing behavior, and prosocial behavior: A five-year longitudinal study during adolescence. *Developmental Psychology*, 54(10), 1868.
- Darvesh, N., Radhakrishnan, A., Lachance, C. C., Nincic, V., Sharpe, J. P., Ghassemi, M., ... & Tricco, A. C. (2020). Exploring the prevalence of gaming disorder and Internet gaming disorder: a rapid scoping review. *Systematic reviews*, 9, 1-10.
- García-Gil, M. Á., Fajardo-Bullón, F., Rasskin-Gutman, I., & Sánchez-Casado, I. (2022). Problematic video game use and mental health among Spanish adolescents. *International Journal of Environmental Research and Public Health*, 20(1), 349.
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of child psychology and psychiatry*, 38(5), 581-586.
- Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(11), 1337-1345. <https://doi.org/10.1097/00004583-200111000-00015>
- Goodman, R. (2016). *Scoring the strengths & difficulties questionnaire for age 4-17 or 18+*.
- Goodman, R., & Scott, S. (1999). Comparing the Strengths and Difficulties Questionnaire and the Child Behavior Checklist: is small beautiful?. *Journal of abnormal child psychology*, 27, 17-24.
- Goodman, R., Ford, T., Simmons, H., Gatward, R., & Meltzer, H. (2000). Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *The British journal of psychiatry*, 177(6), 534-539.
- Hyun, G. J., Han, D. H., Lee, Y. S., Kang, K. D., Yoo, S. K., Chung, U. S., & Renshaw, P. F. (2015). Risk factors associated with online game addiction: A hierarchical model. *Computers in human behavior*, 48, 706-713. <https://doi.org/10.1016/j.chb.2015.02.008>
- Jin, Y., Qin, L., Zhang, H., & Zhang, R. (2021). Social factors associated with video game addiction among teenagers: School, family and peers. In *2021 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021)* (pp. 763-768). Atlantis Press.
- King, D. L., Delfabbro, P. H., Billieux, J., & Potenza, M. N. (2020). Problematic online gaming and the COVID-19 pandemic. *Journal of behavioral addictions*, 9(2), 184-186.
- Király, O., Koncz, P., Griffiths, M. D., & Demetrovics, Z. (2023). Gaming disorder: A summary of its characteristics and aetiology. *Comprehensive Psychiatry*, 122, 152376. <https://doi.org/10.1016/j.comppsy.2023.152376>
- Kulbok, P. A., & Cox, C. L. (2002). Dimensions of adolescent health behavior. *Journal of adolescent health*, 31(5), 394-400. [https://doi.org/10.1016/S1054-139X\(02\)00422-6](https://doi.org/10.1016/S1054-139X(02)00422-6)
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2011). Psychosocial causes and consequences of pathological gaming. *Computers in human behavior*, 27(1), 144-152. <https://doi.org/10.1016/j.chb.2010.07.015>
- Liao, Z., Chen, X., Huang, Q., & Shen, H. (2022). Prevalence of gaming disorder in East Asia: A comprehensive meta-analysis. *Journal of Behavioral Addictions*, 11(3), 727-738.
- Mihara, S., & Higuchi, S. (2017). Cross-sectional and longitudinal epidemiological studies of Internet gaming disorder: A systematic review of the literature. *Psychiatry and clinical neurosciences*, 71(7), 425-444.
- Oktaviana, M., & Wimbari, S. (2014). Validasi klinik strenghts and difficulties questionnaire (SDQ) sebagai instrumen skrining gangguan tingkah laku. *Jurnal Psikologi*, 41(1), 101-114.

- Olsson, C. A., Bond, L., Burns, J. M., Vella-Brodrick, D. A., & Sawyer, S. M. (2003). Adolescent resilience: A concept analysis. *Journal of adolescence*, 26(1), 1-11. [https://doi.org/10.1016/S0140-1971\(02\)00118-5](https://doi.org/10.1016/S0140-1971(02)00118-5)
- Pandia, V., Novianhari, A., Amelia, I., Hidayat, G. H., Fadlyana, E., & Dhamayanti, M. (2021). Association of mental health problems and socio-demographic factors among adolescents in Indonesia. *Global pediatric health*, 8, 2333794X211042223.
- Permatasari, D. L. B., Natalya, L., & Siaputra, I. B. (2021). Validasi Video Game Addiction Test pada Player Esports di Indonesia: Sumber Bukti Berdasarkan Struktur Internal (Validation of Video Game Addiction Test on Esports Players in Indonesia: Evidence based on internal structure). *PSIKODIMENSIA Kajian Ilmiah Psikologi*, 20(2), 243-250.
- Przybylski, A. K., & Weinstein, N. (2019). Investigating the motivational and psychosocial dynamics of dysregulated gaming: Evidence from a preregistered cohort study. *Clinical Psychological Science*, 7(6), 1257-1265.
- Rehbein, F., & Baier, D. (2013). Family-, media-, and school-related risk factors of video game addiction. *Journal of Media Psychology*.
- Roza, T. H., Noronha, L. T., Makrakis, M. A., Spritzer, D. T., Gadelha, A., Kessler, F. H. P., & Passos, I. C. (2023). Gaming disorder and problematic use of social media. In *Digital Mental Health: A Practitioner's Guide* (pp. 237-253). Cham: Springer International Publishing.
- Saleem, M., Anderson, C. A., & Gentile, D. A. (2012). Effects of prosocial, neutral, and violent video games on children's helpful and hurtful behaviors. *Aggressive behavior*, 38(4), 281-287.
- Samsidar, Marthoenis, & Tahlil, T., (2023). Determinants of Online Game Addiction Among Indonesian Adolescents. *Open Access Journal of Nursing* 6, 32–41. <https://doi.org/10.22259/2639-1783.0601005>
- Shabina, M., Jan, R. A., & Alsaedi, S. L. (2023). Symptoms, mechanisms, and treatments of video game addiction. *Cureus*, 15(3).
- Siste, K., Pandelaki, J., Miyata, J., Oishi, N., Tsurumi, K., Fujiwara, H., ... & Firdaus, K. K. (2022). Altered Resting-State Network in Adolescents with Problematic Internet Use. *Journal of Clinical Medicine*, 11(19), 5838.
- Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry*, 55(6), 553-568.
- Stockdale, L., & Coyne, S. M. (2018). Video game addiction in emerging adulthood: Cross-sectional evidence of pathology in video game addicts as compared to matched healthy controls. *Journal of affective disorders*, 225, 265-272. <https://doi.org/10.1016/j.jad.2017.08.045>
- Surya, B. N., Eashwar, V. A., Palaniappan, P., Kumar, S., Narayanan, A., Venkatesh, B., ... & Kumar, U. S. (2024). Exploring the Risk Factors Associated with Video Game Addiction among Adolescent School Children in Chennai District, Tamil Nadu, India: A Cross-sectional Study. *Journal of Clinical & Diagnostic Research*, 18(4).
- Tomei, A., Studer, J., & Gmel, G. (2021). Prosocialness in young males with substance and behavioral addictions. *Journal of behavioral addictions*, 10(2), 327-337.
- Van Rooij, A. J., Schoenmakers, T. M., & Van de Mheen, D. (2017). Clinical validation of the C-VAT 2.0 assessment tool for gaming disorder: A sensitivity analysis of the proposed DSM-5 criteria and the clinical characteristics of young patients with 'video game addiction'. *Addictive behaviors*, 64, 269-274. <https://doi.org/10.1016/j.addbeh.2015.10.018>
- van Rooij, A. J., Schoenmakers, T. M., Van den Eijnden, R. J., Vermulst, A. A., & van de Mheen, D. (2012). Video game addiction test: validity and psychometric characteristics. *Cyberpsychology, Behavior, and Social Networking*, 15(9), 507-511.
- Van Rooij, A., & Prause, N. (2014). A critical review of "Internet addiction" criteria with suggestions for the future. *Journal of behavioral addictions*, 3(4), 203-213.
- Wartberg, L., Kriston, L., & Thomasius, R. (2020). Internet gaming disorder and problematic social media use in a representative sample of German adolescents: Prevalence estimates, comorbid depressive symptoms and related psychosocial aspects. *Computers in Human Behavior*, 103, 31-36. <https://doi.org/10.1016/j.chb.2019.09.014>
- Wiguna, T., & Hestyanti, Y. (2012). What is the SDQ? [WWW Document]. URL <https://www.sdqinfo.com/a0.html> (accessed 6.9.24).
- Wiguna, T., Manengkei, P. S. K., Pamela, C., Rheza, A. M., & Hapsari, W. A. (2016). Masalah emosi dan perilaku pada anak dan remaja di poliklinik jiwa anak dan remaja RSUPN dr. Ciptomangunkusumo (RSCM), Jakarta. *Sari Pediatri*, 12(4), 270-7.