



Systematic Review

The correlation between depression with online game addiction among adolescents: Systematic review

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Abstract

Objectives: Depression is a mental health problem that many adolescents experience related to their immaturity of ability to manage emotions. This condition often makes adolescents seek escape through online games, thereby increasing the intensity of the game which can lead to addiction. This study aims to assess and describe the relationship between depression and online game addiction in adolescents based on the results of previous studies that have been summarized and examined.

Methods: Searching for articles in this review using the Scopus, Proquest, and ClinicalKey databases were reviewed between January 2 and February 27, 2023. The inclusion criteria are (a) publication in 2019–2023; (b) publications in English; (c) available in full text; and (d) original research articles. The exclusion criteria in this study were (a) other documents in the form of book chapters, reviews, and conference proceedings and (b) qualitative research. The keywords in this literature identification were “depression” AND “online games” AND “addiction” AND “adolescent” OR “teenager” OR “youth.” The writing of this systematic review uses the PRISMA guidelines.

Results: The findings of 11 studies reviewed show that depression can cause online game addiction in adolescents and conversely, depression experienced by adolescents can lead to online game addiction.

Conclusion: Depression has a reciprocal relationship with the incidence of online game addiction in adolescents. An effort is needed to improve effective coping skills for adolescents to prevent depression and online game addiction. Further research is regarding effective coping mechanisms to prevent depression and online game addiction in adolescents.

Keywords: Addiction; adolescent; depression; online games; teenager; youth.

Depression is a negative mood disorder that affects feelings, cognition, behavior, and social relationships.^[1] Depression can be experienced by every individual, especially adolescents. Adolescence is an age of transition from childhood to adulthood, at this age adolescents experience a lot of adaptation processes to the changes experienced, especially in physiological, psychological aspects, and roles and responsibilities. The roles and responsibilities of adolescents have increased compared to school age, such as in the aspects of education, self and career development, so-

cial contribution, the creation of physical and mental health, self-awareness, and technology. The increased roles and responsibilities faced by adolescents can cause stress and depression.^[2] This condition can be exacerbated by the immature emotional development of adolescents. Immature emotional conditions in adolescents can cause them to experience depression problems in carrying out their roles and responsibilities, so the impact can be in the form of dropping out of school, having difficulty finding work, and withdrawing from social interactions.^[3]

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The prevalence rate of depression among adolescents globally is 1.1% (aged 10–14 years) and 2.8% (aged 15–19 years),^[4] whereas the national rate of adolescent depression stands at 1%.^[5] Depression, which is a psychological issue, is one of the leading causes of illness and disability in adolescents.^[6] This problem is influenced by sociodemographic conditions, lifestyle, anthropometry, and biological conditions of adolescents.^[7] Other studies also state that the problem of depression in adolescents is influenced by loneliness and lack of social support.^[8,9] Negative interpersonal relationships and sociocultural changes increase the risk of depression.^[10] Depression also causes individuals to experience a decreased mood, feelings of guilt, and low self-esteem, an inability to feel happy, a loss of energy, sleep disturbances, and feelings of helplessness and hopelessness. These symptoms can impact an individual's withdrawal behavior from the social environment. If this condition lasts for a prolonged period, it can have an impact on social isolation and loneliness.^[11]

Depression can be one of the factors that trigger an increase in online gaming.^[12] Loneliness, withdrawal from the social environment, and a lack of mood and enthusiasm for activities due to depression can make online games an escape to overcome these problems. Studies show that adolescents often use online games to compensate for a sense of belonging to their social environment.^[13] Excessive use of online games can lead to psychological health problems, namely addiction. The American Psychiatric Association defines online gaming addiction as the consistent and prolonged use of the internet to play video games that can cause interference with several aspects of one's life (personal relationships, work, and/or education).

Online gaming addiction is also defined as the behavior of playing online games obsessively to neglecting other things in life that leads to social and/or psychological impairment of the individual.^[14] Studies show the prevalence of online gaming addiction has reached 3.1% worldwide,^[15] with prevalence in adolescent males (6.8%) and adolescent females (1.3%).^[16] Meanwhile, in Indonesia, 1 in 10 adolescents is indicated to have an online game addiction.^[17] Depression and online game addiction can have a negative impact on adolescents' interpersonal relationships with families including lack of communication, the emergence of adolescent conflicts with family members due to uncontrolled emotions, and neglecting roles and responsibilities as children in the family.

An understanding of depression and online game addiction is required to aid adolescents in developing according to their current stage of development without interfering with the next stage. Consequently, a systematic review of existing research is necessary so that the connection between depression and online game addiction in adolescents can be better explained.

Study Questions

What is the relationship between depression and online game addiction in adolescents?

What is presently known on this subject?

- Immature emotional development makes adolescents vulnerable to psychological problems, such as depression. Depression is one of the triggering factors for the rise of online game addiction.

What does this article add to the existing knowledge?

- There is a correlation between depression and online game addiction. Online game addiction can lead to depression in adolescents and conversely, depression experienced by adolescents can trigger online game addiction.

What are the implications for practice?

- Depression and online game addiction are variables that must be considered in managing adolescents. The development of effective coping skills is necessary to prevent online game addiction and depression. Hence, further research is needed regarding effective coping mechanisms to prevent online game addiction and depression in adolescents.

Materials and Method

Studies Identification

This study was registered with PROSPERO (ID: 410317) and was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.^[18] The process of searching and selecting literature is in three stages. The first stage is to identify relevant articles in the 2019–2023 publication year range. Several different data sources are used to provide a comprehensive picture of the relationship between depression and online game addiction in adolescents. The electronic data sources used in this study are Scopus, PubMed, and ClinicalKey. The literature search process was carried out on January 2 and February 27, 2023 (by BN and DS) with the keywords and Medical Subject Headings (MeSH) “depression” AND “online games” AND “addiction” AND “adolescent” OR “teenager” OR “youth.” The second stage is to screen the articles that have been identified. At this stage, the researcher issued articles that were not available in full text, not in English, other documents (not journal articles), and duplicated articles. The third stage is assessing the feasibility of the article based on the title, abstract, and research criteria.

Inclusion and Exclusion Criteria

The inclusion criteria in this study are: (a) publication in 2019–2023; (b) publications in English; (c) available in full text; and (d) original research articles whereas the exclusion criteria in this study were: (a) other documents in the form of book chapters, reviews, and conference proceedings and (b) qualitative research.

Quality Assessment

Quantitative study quality assessment (n=11) was carried out using the Joanna Briggs Institute critical appraisal instrument. Quality ratings were carried out by both researchers and discrepancies in ratings were discussed among the authors and agreement was made for each item. All assessed studies met the quality criteria for inclusion and exclusion.

Data Extraction and Synthesis

During coding, the researcher used Google Sheets to record the following details of the article including methodological design (quantitative, qualitative, and mixed method), data type (cross-sectional, longitudinal, etc.), data source (survey, national, etc.), number sample, online game addiction variable, and depression variable. Two research members were involved in reviewing this article. When there is disagreement, the researcher reviews the article and extracts related information to determine the best suitable category. Twenty-seven PRISMA Checklist items were used to evaluate research characteristics.^[19]

Results

Figure 1 shows the literature search flow in this study. In the first stage, based on the identification results of article publications for 2019–2023 in three databases, 31,839 articles were obtained. Furthermore, in the second stage the screening process was continued with the criteria of full text, English, in-human, and being research articles, the results obtained were 10,375 articles. Then, the researcher carried out the process of exclusion of duplicated articles with the results of 10,341 articles. In the third stage, the researcher assessed the feasibility of the article based on the title, abstract, and research criteria. It obtained 11 research articles that were involved in this systematic review.

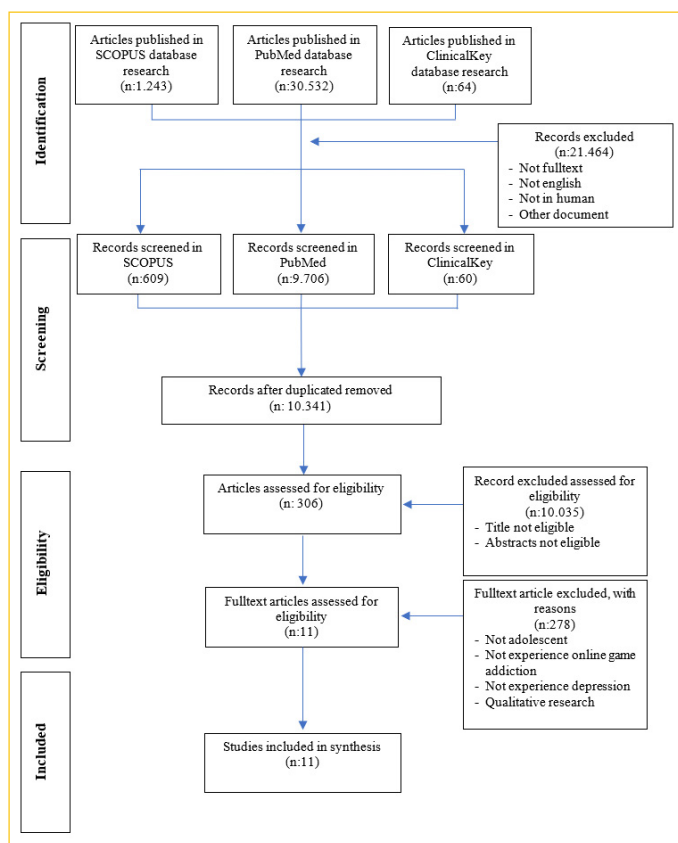


Figure 1. PRISMA flow diagram.

The 11 articles in this systematic review have a total sample of 12,969. The characteristics of the sample in this study in 11 reference articles are adolescent age (10–24 years), playing online games for the past 1 year, owning or using a smartphone, having internet access, being willing to become a respondent, and getting parental consent to become a respondent. The research period in 11 articles was 2017–2022, but there was one study conducted in 2013–2014.^[20] In addition, the countries where research was conducted in these 11 articles were India, Thailand, China, Norway, Saudi Arabia, Iran, the Republic of Korea, and Taiwan.

In general, the results of the study show that there is a relationship between online game addiction and depression in adolescents. This relationship is two-way, both directly and indirectly. Several researched articles state that online gaming addiction in adolescents leads to decreased psychological health and poor interpersonal relationships with family and social environments. Adolescent gamers show isolating behavior and low psychological health.^[21] Other studies note that depression and anxiety are contributing factors to adolescent online gaming addiction.^[22,23] Furthermore, depression caused by childhood trauma has a relationship with addiction issues experienced by adolescents.^[24] Increased gaming time correlates with increased psychological depression.^[25] Kim et al.^[26] show that higher social capital is associated with increased time spent playing games, higher levels of self-esteem, and increased degrees of life satisfaction. Meanwhile, groups with low social capital show an increase in time spent playing games, higher levels of depression, and lowered self-esteem, which in turn leads to increased depression, decreased self-esteem, and increased time spent playing online games.^[27] There was a reciprocal relationship between sleep quality disturbances and a significant increase in online gaming behavior disorder.^[26,28] On the other hand, Olsen et al.^[20] note that there was a significant decrease in the average depression score along with an increase in online game addiction. The details of the research results can be seen in Table 1.

Discussion

The results explain that depression has a relationship with online game addiction in adolescents and vice versa, which depression can be caused by adolescents experiencing online game addiction or online game addiction can cause depression in adolescents.^[20,25] Depression experienced by adolescents can be caused by their inability to manage their emotions regarding every problem they face. Depression can also result from childhood trauma in adolescents.^[24] Adolescents who are depressed because of a problem will run away or divert themselves from the problem and choose online games as their goal. This condition is believed to make adolescents calm because the euphoria they get when playing games reduces their sadness feeling.^[30]

The interaction of the Person-Affect-Cognition-Execution (I-PACE) model states that mood disorders such as anxiety,

Table 1. Characteristics and research methods of the articles (n:11)

Author, year of publication, country	Objective	Design and sample	Method	Measurement tools	Conclusion
Chang et al. ^[15] (2022), China	Explored and identified subtypes of Internet Gaming Disorder severity and estimated the association between these subtypes and other disorder	- Cross-sectional - Age:13-21 - Mean age:15.2 n: 1.785	- Data were collected by filling out three questionnaires using Qualtrics. - The statistical analyses used Pearson's correlations, latent class analysis, and multinomial logistic regression	- Internet Gaming Disorder Scale - Short Version of the Smartphone Addiction Scale Depression, Anxiety, Stress Scale-21	Based on the results of the analysis, there are four classifications of gamers, namely normative (30.9%), occasional (42.4%), problematic (22.7%), and addictive (4.1%). Normative gamers supported all symptom items (close to 0%), except for those with a greater propensity to support negative emotional discharge (18.1%). Addictive gamers (4.1%) gave the highest support of all symptom items. Occasional gamers (42.4%) are relatively the same as normative gamers. Problematic gamers (22.7%) had a lower probability of behavioral symptom items playing games (54.3%) and lost interest in other activities (29.2%). Regression analysis showed that compared with normative gamers, gender, PSU, and depression were statistically significant and positively related to addictive gamers, occasional gamers, and problematic gamers
Olsen et al. ^[20] (2021), Norway	To assess the prevalence rates and associated risk factors of problem gaming in a sample of Norwegian conscripts across two-time points: at the beginning and end of duty	- Longitudinal - Age:18-24 - Mean age: 19.5 n: 1.017	• Data were collected through filling out questionnaires which were carried out in several waves, namely before and 1 month after starting military service. • The statistical analysis used was descriptive statistics, paired sample t-test, and linear regression.	• Gaming Addiction Scale • Robert's UCLA Loneliness Scale • Boredom Proneness Scale-Short Form • Hopkins Symptom Checklist-5	In the first T1 survey (before going through military training) 78.8% were classified as normal gamers, 4.8% as problematic gamers, 0.5% as addicted gamers, and 15.9% were not gamers. After attending the training (T2) 65.6% were classified as normal gamers, 8.1% were problem gamers, 4.6% were addicted gamers, and 21.7% were not gamers. The test results showed that there was a significant increase in the respondent's anxiety level along with an increase in addiction, but there was a significant decrease in the average depression score from M:3.99 (T1) to M:3.01 (T2). Studies also show that there is no relationship between increased online gameplay and psychological variables (loneliness, boredom). The experience of playing games that are addictive results in poor psychological health and interpersonal relationships between adolescents and their parents/peers. Gamers show isolating behavior and have psychological health conditions that are more detrimental than those who do not have a gaming addiction, especially men. Male gamers are at high risk for developing psychological health and poor interpersonal relationships due to problematic gaming experiences and game addiction.
Mukherjee et al. ^[21] (2021), India	To explore the effect of MMORPG and addiction among male adolescents and young adults on their psychological health and interpersonal relationships in West Bengal	- Cross-sectional - Age:15-24 - Mean age:19.94 n: 300	- Data collection is done by filling out a questionnaire. - MANOVA analysis and linear regression were performed to understand the results of this study	• Bi-Lingual Gaming Experience Questionnaire • Bi-Lingual Gaming Addiction Questionnaire • Depression Anxiety Stress Scales (DASS-21) • Inventory of Parent & Peer Attachment Questionnaire	

Table 1. Cont.

Author, year of publication, country	Objective	Design and sample	Method	Measurement tools	Conclusion
Taechoyotin et al. ^[23] (2020), Thailand	To estimate the prevalence and associated factors of internet gaming disorder among secondary school students in an area with comparatively lower technological access in a large community sample	- Cross-sectional - Age: 12-18 n: 5.497	<ul style="list-style-type: none"> Data were collected by self-administered questionnaires. The statistical analysis was using descriptive statistics, univariate regression, and multivariate logistic regression analysis. 	<ul style="list-style-type: none"> Internet Gaming Disorder Test Depression Anxiety Stress Scales (DASS-21). 	There were 5.4% of the 5497 teenagers who took part in the study experienced addiction to playing games, which 49.2% of them experienced symptoms of psychological problems in the form of anxiety (55.4%) and depression (49.2%). Adolescents with psychological problems consist of 44.9% males and 55.1% females. On the other hand, the results of univariate and multivariate logistic regression analysis showed that the occurrence of internet gaming disorder was influenced by gender (OR: 1.4), not living with parents (OR: 1.7), bullying behavior at school (OR: 1.5), depression (OR: 1.9), anxiety (OR: 1.6), and stress (OR: 3.5).
Tsui & Cheng. ^[23] (2021), China	To examine the prevalence of IGD and risky online behavior, their hypothesized associations with depressive symptoms, and the beneficial role of psychological resilience as an underlying psychological mechanism	- Cross-sectional - Age: 10-17 - Mean age: 13.5 n: 1.099	<ul style="list-style-type: none"> Data were completed from a battery of validated self-report questionnaires at their schools - MANOVA, Pearson's correlation to indicate the magnitude of the association among the study variables, and the Bonferroni correction method 	<ul style="list-style-type: none"> Child and Youth Resilience Measure-28 Korean Internet Addiction Proneness Scale Risky Online Behaviour Inventory (62) and the survey protocol constructed by Livingstone Epidemiologic Studies Depression for Children Scale 	There are 4% of teenagers with online game addiction in the high, 6% in the medium, and 90% in the average category. Depressive symptoms were higher in adolescents who had the high online game-playing disorder ($p < 0.0001$) category. Boys have higher rates of addiction, length of time, and exposure to violence in playing games than girls, but female teenagers experience more depressive symptoms. Depression in addition to playing games is indirectly influenced by the psychological resilience of adolescents. Adolescents who show depressive symptoms tend to have lower psychological resilience. Low levels of psychological resilience and high depressive symptoms increase addictive online games.
Shi et al. ^[24] (2020), China	To investigate the mechanisms of Internet gaming disorder (IGD) and the associated interaction effects of childhood trauma, depression, and anxiety in college students	- Cross-sectional - Age: 16-20 n: 922	<ul style="list-style-type: none"> Data were collected by questionnaires. Participants reported their sociodemographic characteristics and undertook a standardized assessment of childhood trauma, anxiety, depression, and IGD. The statistical analysis used was descriptive statistics, correlation tests, and structural equation analysis model 	<ul style="list-style-type: none"> The Childhood Trauma Questionnaire Short Form The Generalized Anxiety Disorder-7 The Quick Inventory of Depressive Symptomatology-Self Report The Internet Gaming Disorder Scale 	The analysis showed that there was a relationship between childhood trauma and anxiety ($r: 0.24$), depression ($r: 0.33$), and disruption in online gameplay ($r: 0.19$). Online game disorder is also significantly correlated with anxiety ($r: 0.20$), and depression ($r: 0.25$). The results of the independent t-test revealed the same level of online game addiction between men and women. Furthermore, the results of the mediation analysis of anxiety and depression mediate between childhood trauma and online game addiction. Online game addiction is directly correlated with childhood trauma and indirectly related to depression and anxiety.

Table 1. Cont.

Author, year of publication, country	Objective	Design and sample	Method	Measurement tools	Conclusion
Alhamoud et al. ^[25] (2022), Saudi Arabia	To assess the prevalence of internet gaming disorder (IGD), and its association with gaming behavior, depression, and anxiety in male high school students.	- Cross-sectional - Mean age: 16.9 n: 726	- Data were collected using a self-administered questionnaire - The statistical analysis used descriptive statistics, t-test or Mann-Whitney U test, ANOVA or Kruskal-Wallis test, Chi-square test, and Spearman correlation coefficient	<ul style="list-style-type: none"> • Compromised Game-Related Behavior • Internet Game Disorder Scale-Short Form • Arabic Version of the Patient Health Questionnaire • Generalized Anxiety Disorder-7 Arabic Version 	Playing violent games had higher distraction ($p=0.008$) with more playing time each day. The classification of disorder in playing games is divided into escapism (57.0%), preoccupation (39.7%), tolerance (37.5%), and addiction (35.5%). Depression and anxiety scores increased based on gaming disorder status; namely, 38.8% had minimal depression, 50% had mild/moderate depression, and 10.5% had moderate/severe depression. Approximately 54% of students have no anxiety, 28.0% have mild anxiety, 12.7% have moderate anxiety, and 5.0% have severe anxiety. A moderate correlation was found between addiction, depression, and anxiety. Playing games for >4 h on weekdays and >6 h on holidays is closely related to the risk of interruption in playing games. Playing RPGs (OR=0.568) and sports video games was associated with a lower risk of the disorder.
Kim et al. ^[26] (2022), Korea	See the long-term effect of social capital among adolescent gamers.	- Longitudinal - Age: 14-16 n: 403	- Data were collected used a 2-years of panel survey with whom the survey was conducted 3 times over the course of 3 years. - The statistical analysis is used are General Linear Model	<ul style="list-style-type: none"> • Internet Social Capital Scales • UCLA loneliness scale • Center for Epidemiological Studies-Depression Scale • Satisfaction with Life Scale • Rosenberg Self-Esteem Scale • Average daily online gaming time 	There is a relationship between time and social capital. There are significant differences in adolescent online game use with changes in psychosocial conditions based on time and social capital. Social capital has a reciprocal relationship with the use of online games and psychosocial well-being, namely adolescent life satisfaction ($F=9.621$, $p=0.000$), depression ($F=7.142$, $p=0.001$), loneliness ($F=23.1261$, $p=0.000$) and self-esteem ($F=3.565$, $p=0.029$) which is significantly regulated by social capital. Groups with higher social capital experienced increased time playing games (T1 and T2), levels of self-esteem, and increased degrees of life satisfaction (T2 and T3), while groups with low social capital increased time playing games (T1) increased depression (T2) and lowered self-esteem (T2), which then increased depression, decreased self-esteem also increased time playing online games.

Table 1. Cont.

Author, year of publication, country	Objective	Design and sample	Method	Measurement tools	Conclusion
Wang et al. ^[27] (2019), China	Examined the relationship between mobile game addiction and social anxiety, depression, and loneliness among adolescents	<ul style="list-style-type: none"> • Cross-sectional • Mean: 15 • n: 600 	<ul style="list-style-type: none"> • Data were collected by completing the questionnaire in a classroom setting • The statistical analyses are descriptive statistics and zero-order correlations 	<ul style="list-style-type: none"> • Mobile Game Addiction Scale • Depression Scale • Child Loneliness Scale • Child Social Anxiety Scale 	<p>There is a positive relationship between online game addiction and depression, loneliness, and social anxiety with a correlation level between 0.18 and 0.46 (p<0.01). Online game addiction is associated with 10% depression, 6% social anxiety, and 4% loneliness. The correlation between online game addiction and mental health is influenced by gender. Adolescent boys who used and reported being addicted to playing online games had higher anxiety ($\beta=0.118$, $p<0.001$), depression ($\beta=0.280$, $p<0.001$), and loneliness ($\beta=0.311$, $p<0.001$) when compared to female adolescents ($\beta=0.077$, $p<0.001$; $\beta=0.17$, $p<0.01$; and $\beta=0.16$, $p<0.05$).</p> <p>There was a significant impact between online gaming disorder scores on depression, anxiety, stress, and insomnia severity in adolescents. The IGDS-SF9 score indicated a significant actor effect on depression in students of 0.17 (SE:0.04; $p<0.004$) and their siblings 0.29 (SE:0.04; $p<0.001$). In addition, gaming disorder scores also have a significant impact on high levels of anxiety, stress, and insomnia in adolescents.</p> <p>The results of multiple linear regression showed that there was a relationship between online game-playing behavior disorder and psychological problems, namely depression ($\beta:0.295$), anxiety ($\beta:0.325$), and stress ($\beta:0.339$) with $p<0.0001$. The results of the analysis also showed that there was a reciprocal relationship between sleep quality disturbances and a significant increase in online gaming behavior disorder.</p>
Lin et al. ^[28] (2021), Iran	To examine whether siblings' IGD symptoms may relate to depressive, anxiety symptoms or sleep quality among each other.	<ul style="list-style-type: none"> • Cross-sectional • Age: 13–18 • Mean age: 16.9 • n: 320 	<ul style="list-style-type: none"> • Data were collected by completing the questionnaire • Data collected by the statistical analysis were descriptive statistics, Pearson's correlation test, and Actor-Partner Interdependence Model 	<ul style="list-style-type: none"> • Internet Gaming Disorder Scale-Short Form • Depression Anxiety Stress Scale-21 • Insomnia Severity Index 	
Wong et al. ^[29] (2020), Hong Kong	Investigate relationships between severities of internet gaming disorder and problematic social media use with sleep quality and psychological distress among young adults.	<ul style="list-style-type: none"> • Cross-sectional • Mean age: 20.9 • n: 300 	<ul style="list-style-type: none"> • Data were collected by an online survey (Google form) using a questionnaire. • The statistical analysis used are Pearson's correlations, Fisher's on dependent samples, regression models, and t-test statistic 	<ul style="list-style-type: none"> • Chinese versions of the Internet Gaming Disorder Scale-Short Form • Bergen Social Media Addiction Scale • Pittsburgh Sleep Quality Index • Depression Anxiety Stress Scales 	

euphoria, and depression due to the stressors experienced can influence an individual's cognitive function to decide, focus, or pay attention to something pleasant.^[31] This means that adolescents choose online games as a diversion of focus from stressors that cause depression. Apart from that, in the I-PACE model regarding motives and expectations, playing online games is aimed at getting pleasure and escaping from stressors so that it will produce positive associations (implicit). Positive associations (implicit) are cognitive biases that have a positive correlation with substance addiction, online games, pornography, and addiction.^[31] This is in line with the results of previous research which stated that the reason adolescents play online games is because of escape.^[25] This condition can increase the intensity of online game use among adolescents which will have an impact on online game addiction.

Online game addiction occurs because adolescents enjoy playing online games. They get satisfaction when they are able to overcome challenges or win games. The next pleasure is that adolescents are able to interact well with other game players. This often happens to adolescents who are unable to interact socially well in real life.^[32] Apart from that, the ability to play online games can also form a positive self-concept through the player's game character which is not present in real life.^[33] this can be a symptom of withdrawal from the environment and conflict with oneself. This condition is in line with the theory of the 6 core processes of online game addiction, namely salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse.^[34]

Online game addiction is related to depression problems.^[28] This condition is caused by online games require adolescents' ability to play to achieve victory, sometimes making adolescents have difficulty expressing emotions if they are unable to achieve or win challenges in the game. Failure or inability to complete challenges repeatedly in playing online games can increase psychological pressure that develops into depression.^[29] In addition, gaming addiction can make individuals withdraw from social environments, thereby further worsening their emotional well-being because they do not have positive emotional coping.^[35] Many factors influence adolescents' ability to control emotions, one of which is the biological aspect, namely lack of rest time. This is relevant to adolescents who experience online game addiction who experience a decrease in sleep quality due to playing excessive online games.^[36]

Based on the description above, adolescents are an age group that is vulnerable to experiencing stress which can develop into psychological problems.^[37] It is necessary to achieve optimal psychosocial development in adolescents, because, in this way, adolescents have the emotional ability to deal with the psychological problems they experience,^[38] so they do not use online games as an escape when experiencing psychosocial problems such as depression. Optimal psychological and physical development makes adolescents focus on activities that build both themselves and their social environment.^[39] Having physical activity, extracurricular activities from school,

and the habit of reading books and playing music can be protective factors against the risk of online game addiction.^[40] Research results reveal that adolescents who have positive activities outside the home such as sports and recreation can reduce their activity of playing online games.^[41] Adolescents with high levels of physical activity tend to have good academic scores.^[42]

Apart from that, family support is also important to control adolescents' excessive online gaming behavior so that it does not cause online game addiction problems. Family support makes adolescents feel they are treated equally and increases adolescents' trust in their families so that adolescents can use their families as a source of support if they have problems.^[43] Forms of family support that can be done are increasing open communication between families and teenagers, limiting time playing online games, families getting involved in playing online games with adolescents, and providing emotional support when adolescents experience defeat when playing online games.

Conclusion

Depression and online game addiction in adolescents have a reciprocal relationship. Depression related to online game addiction and online game addiction. Conversely, online game addiction is also related to depression. Early intervention is very important to prevent the onset of online game addiction and depression in adolescents. In addition, effective coping skills must be developed to prevent depression or online gaming addiction in adolescents. In addition to greater attention focused on improving treatment/recovery, prevention/health promotion efforts regarding depression and online gaming addiction in adolescents can also be undertaken by clinical, field, and mental health professionals. Apart from that, family support and a supportive social environment are also needed. Further research is needed to explore effective coping mechanisms that adolescents can use to prevent online game addiction.

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