Predicting the mental health quality of adolescents with intensive exposure to metaverse and its counseling recommendations in a multicultural context

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ABSTRACT

Metaverse—an incredible medium that combines features of virtual reality platforms such as online games, social media, and the Internet—is predicted to bring significant changes to human behavior. It is believed that social interaction and the quality of mental health can be at risk once Metaverse becomes more prevalent with adolescents predicted to be the most vulnerable group. This study intends to prove this prediction by examining the effect of online game addiction and social media addiction on the mental health quality of adolescents as the majority group with Metaverse access. This correlational study involved 700 students from 14 schools in the greater Malang area. Data were collected through the Metaverse Impact Instrument (MII) and analyzed partially using the T-test and simultaneously using the F-test to know the contribution of gender using an independent sample T-test. Previously, the assumptions of multicollinearity and heteroscedasticity assumption were also tested. The results indicate that online games and social media negatively affect mental health at a rate of 31.5%. These results provide empirical evidence for theoretical predictions regarding the impact of Metaverse on mental health quality in adolescents. As a follow-up, research is needed to develop educational intervention strategies, appropriate guidance, and counseling services to: 1) integrate cultural and religious values into character education; 2) anticipate the potential risks of metaverse among adolescents.

Keywords: metaverse, mental health quality, social media addiction, media social, game online addition, adolescent

INTRODUCTION

Metaverse has become a subject of discussion in mainstream media and academic studies since Mark Zuckerberg announced the major rebrand of Facebook to Meta (Bale et al., 2022; Kraus et al., 2022). Metaverse is not a new term somehow; Neal Stephenson first introduced it in 1992 in his fictional novel entitled "Snow Crash" (Dwivedi et al., 2022; Tan, 2022). After three decades, Metaverse has turned from a mere fantasy to a manifestation of technological advancement. Metaverse seamlessly integrates games and 3D media in the form of virtual reality (VR), augmented reality (AR), mixed reality (MR), and mirror worlds (Anderson & Rainie, 2022). This combination makes Metaverse capable of duplicating real-world interactions into

virtual-world interactions that are not limited to the time (Dionisio et al., 2013; Dwivedi et al., 2022; Kye et al., 2021).

As a collective 3D virtual reality environment accessible using technical equipment, Metaverse provides a new sensory experience that involves five human senses to experience a simulated environment with different perceptions in the virtual space (Novak, 2022; Shen et al., 2021). When presented in a game, the Metaverse feels more accurate to the players, providing a different experience (Alvarez-Risco et al., 2022). In other words, Metaverse is the evolution or continued development of games, social media, virtual technology, and the internet (Lee et al., 2021). The presence of the Metaverse is predicted to have a tremendous impact on human life, even being considered the world's future. Some studies even mention that Metaverse is highly likely to change the world through its negative and positive impacts (Tan, 2022). Tech, gaming, and social media activists believe that the presence of Metaverse will benefit human life in various aspects (Wang et al., 2022). They argue that having Metaverse as a future tech will reduce constraints in communication, promote social interaction, and even bring back a deceased person in a virtual reality space (Kye et al., 2021). Despite these advantages, there is a growing concern about the metaverse's impact on mental health quality.

These assumptions and predictions are based on the adverse effects of social media and gaming on their users' mental health (Usmani et al., 2022). Social media such as Facebook, Instagram, and Twitter are one of the milestones for Metaverse development to create components of online social ecosystems such as human-avatar interaction, user perception, multi-user collaboration, virtual economy, security, and privacy (Lee et al., 2021; Shi et al., 2022). Among game players and social media account owners, engagement nowadays is reinforced by using an avatar as a visual representation of a person's identity that they can carry through to digital contexts (Grabowicz et al., 2012). These virtual identities transform the way people connect more interactively in virtual settings and allow a more accurate imitation of in-person interaction digitally. The merging of cyber-social space and the constant advancement of technology are becoming the key drivers in powering the development of the Metaverse (Cui et al., 2022). Based on this reasoning, this research would like to examine the impact of the addictive use of Metaverse elements, namely online games, and social media, on the quality of adolescent mental health.

A person's mental health quality can be influenced by their daily activities (Muhorakeye & Biracyaza, 2021). As a result, it is frequently assumed that teenagers who use social media and online games excessively are affected to some extent by game and social media content. Although the development of advanced technology, such as Metaverse, is inevitable (Yang et al., 2022), its impact on human life, especially mental health, still needs to be anticipated. It is suspected that excessive social media and gaming use can trigger depression, cyberbullying, acts of violence, and even self-injury (Marzaleh et al., 2022). Another study states that using social media and playing high-intensity games will adversely affect users' cognitive, affective, emotional, and behavioral aspects (Mystakidis, 2022), especially in the long term (Bawa, 2022).

The results of these recent studies raise alarm about the preventive measures that need to take place because the majority of social media and gaming users are teenagers who are still studying at the high school level (Putri et al., 2022). In Indonesia, the impact of Metaverse may threaten efforts to prepare Indonesia's golden generation in 2045 due to the demographic bonus. Therefore, efforts to prevent Metaverse's negative impact have become urgent (Muhorakeye & Biracyaza, 2021). The development of preventive efforts against the impact of Metaverse needs to be based on valid and in-depth empirical studies. Although many predictions of the impact of Metaverse have been published, most of these studies are still in the form of literature reviews, so solid empirical evidence is needed regarding the impact of Metaverse on adolescent mental health. Further, it can be followed up with the development of intervention strategies to improve the mental health quality of adolescents with strong immersion in Metaverse (Usmani et al., 2022). The lack of empirical studies on predicting the impact of Metaverse on adolescent mental health has directed this research to focus on predicting the mental health quality of adolescents who spend much time in Metaverse and its intervention recommendations. The metaverse referred to in this study is online gaming and social media, which are frequently viewed in the same light as metaverse elements.

The aims of this study were formulated as follows: (1) to determine the effect of game addiction (X1) on the mental health of (Y) high-school-aged adolescents in the Greater Malang area; (2) to determine the effect of social media addiction (X2) on the mental health of high-school-aged adolescents in the Greater Malang area; (3) to determine the effect of game addiction (X1) and social media addiction (X2) on the mental health of (Y) high-school-aged adolescents in the Greater Malang area; (4) determine the contribution of game addiction and social media addiction based on the gender on the mental health of high-school-aged adolescents in the Greater Malang area; and (5) provide relevant multicultural-based intervention recommendations to improve the mental health of high-school-aged adolescents in the Greater Malang area.

As a starting point for the testing process, this research hypothesized that (1) there is an effect of game addiction on adolescent mental health; (2) there is an influence of social media addiction on adolescent mental health; (3) there is an influence of game addiction and social addiction on adolescent mental health; and (4) there are differences in the level of adolescent mental health between male and female students.

METHOD

A quantitative approach with a correlational design was chosen as the research design of this study. Multiple regression analysis was performed in the data analysis to answer and predict the relationship between the level of mental health quality with online game addiction and social media addiction in high-school-aged (SMA) adolescents. Participants were selected from a variety of locations in the Greater Malang area which consists of Malang City, Malang Regency, and Batu City. A total of 700 students from 14 schools representing the three areas above were involved in this research. Using the cluster random sampling technique (Creswell & Creswell, 2018), 50 respondents were selected from each cluster and equally distributed by half based on gender. Data on the distribution of respondents is presented in Table 1.

Table 1. Research respondents

No	School	Region	Number of Students	Gender	
				Male	Female
1	SMA Negeri 2 Malang	Malang city	50	25	25
2	SMA Negeri 4 Malang		50	25	25
3	SMA Negeri 8 Malang		50	25	25
4	SMA Negeri 10 Malang		50	25	25
5	SMA Negeri 9 Malang		50	25	25
6	SMA Katolik St. Albertus		50	25	25
7	SMA Islam Malang		50	25	25
8	SMA Laboratorium UM		50	25	25
9	MAN 1 Kota Malang		50	25	25
10	SMA Negeri 1 Turen	Malang District	50	25	25
11	MAN 2 Kabupaten Malang		50	25	25
12	SMA Negeri 1 Kepanjen		50	25	25
13	SMA Islam Al-Ma'arif		50	25	25
14	SMA Negeri 3 Batu	Batu City	50	25	25
	Total	3 Regions	700	350	350

The procedures for collecting the data followed the Metaverse Impact Instrument (MII), which incorporates several scales, namely: (1) the Gaming Addiction Scale for Adolescents (Lemmens et al., 2009); (2) the Social Media Addiction scale (Şahin, 2018); and (3) the Mental Health Screening Questionnaire (Sharma & Devkota, 2019). The development of the data collection instrument was carried out in several stages according to the guide for the translation and adaptation of the test kit released by the Standards for Educational and Psychological Testing (American Psychiatric Association, 2013). It includes (1) pre-condition; (2) test development; (3)

forward translation synthesis; (4) backward translation; (5) backward translation synthesis; (6) expert review; (7) final scale; (8) scale trial; and (9) review of trial results.

After going through seven initial stages, the MII limited group trial was tested on 92 students in SMA 1 Lawang, Malang Regency. The limited group test found that the MII's reliability and validity showed a Cronbach's Alpha value of > 0.7 and a Corrected Item-Total Correlation value of > 0.3. The result of Cronbach's Alpha on the developed instrument was 0.941, with all items having a Corrected Item-Total Correlation value at above 0.3.

From the trial process, 41 fixed MII statements were obtained and used to predict the impact of online games and social media addiction on the mental health of high school teenagers in Malang Raya at the onset of this Metaverse era. MII instruments were distributed via Google form to ensure an efficient data collection process. The research team went in person to guide and monitor the data collection process in each cluster or school in Malang City, Malang Regency, and Batu City. This was done to ensure accuracy and prevent research participants from misinterpreting the instruction or statement in the instrument.

Data collected through the Metaverse Impact Instrument (MII) was analyzed by means of parametric statistics using (1) the T-test to test the first and second hypotheses; (2) the F-test to test the third hypothesis; and (3) the Independent Samples T-test to test the fourth hypothesis. Sequentially, there are four hypotheses in this study, as follows: (1) the effect of game addiction on adolescent mental health; (2) the effect of social media addiction on adolescent mental health; (3) the effect of game addiction and social addiction on adolescent mental health; and (4) differences in adolescent mental health between male and female students. Before testing the hypotheses, an assumption test was first carried out. For the normality test, the researchers used the SPSS-performed one-sample Kolmogorov-Smirnov. Next, multicollinearity assessment was done using tolerance values and the variance inflation factor (VIF). Lastly, to detect the heteroscedasticity problem, the researchers used the Glejser test. After going through the classic assumption test as a prerequisite for doing the T-test, F-test, and Independent Samples T-test, The entire data analysis process was carried out using IBM SPSS Version 26.

FINDING AND DISCUSSION

Finding

Upon a series of multiple regression tests, both partially (T-test) and simultaneously (F-test), the classical assumptions, which include normality, multicollinearity, and heteroscedasticity, were generated.

Table 2. Normality test results residual values

Variable	Significance	Description	Conclusion
Game Addiction			
Social Media Addiction	0.144	$p > 0.05$	Normal Distribution
Mental health			

The normality test on the residual value of the data using the Kolmogorov-Smirnov One Sample showed a significance value of 0.144 > 0.05, which indicated that the residual value of the research data was normally distributed.

Table 3. Multicollinearity test results

Variabel	Tolerance	Description	*VIF*	Description	Conclusion
Game Addiction	0.948	$p > 0.10$	1.055	$p < 10.00$	There are no symptoms of multicollinearity
Social Media Addiction					

Based on the results of the multicollinearity test using the tolerance value and VIF, the tolerance value for the game addiction variable (X1) and social media addiction (X2) was 0.948 > 0.10, while the VIF value for the game addiction variable (X1) and social media addiction (X2)

was 1.055 < 10.00. These results illustrated that there were no symptoms of multicollinearity in the variables of game addiction (X1) and social media addiction (X2) and their effects on adolescent mental health (Y).

Table 4. Heteroscedasticity test results

Variable	Significance	Description	Conclusion
Game Addiction	0.677	$p > 0.05$	There are no symptoms of Heteroskedastisitas
Social Media Addiction	0.116		

The Glejser test was used to check heteroscedasticity which results showed that the significance of the game addiction variable (X1) was 0.677 > 0.05. Social media addiction (X2) was 0.116 > 0.05, so there was no symptom of heteroscedasticity in the game addiction variable (X1) and social media addiction (X2) and its effect on adolescent mental health (Y).

The results of the classical assumption test as presented above become the requirement to perform a partial T-test and simultaneously F-test, which is then further scrutinized to determine the contribution of gender in forming gadget addiction, social media addiction, and mental health through an independent sample T-test.

The effect of game addiction and social media addiction on adolescent mental health

Table 5 informs us that the partial regression results obtained on the game addiction variable significantly affect mental health based on $p = 0.000$ ($p <0.05$). The value of $\beta = -0.379$ suggested a significant adverse effect between game addiction and adolescent mental health. This means that the higher the level of game addiction, the lower the quality of adolescent mental health. Conversely, the lower the game addiction, the better the adolescents' mental health. The value of $R^2 = 0.029$ implied that game addiction's effective contribution to mental health variables was 2.9%.

Table 5. T-test results

Variable	Constant	β	R^2	t	Sig
Game Addiction	31.977	-0.379	0.029	4.528	0.000
Social Media Addiction	14.731	-0.440	0.315	17.909	0.000

a. Dependent Variable: Mental health

Furthermore, the results of the partial regression test for the effect of social media addiction on mental health obtained $p = 0.000$ ($p <0.05$), meaning there was a significant effect indicated. The β value = -0.440 indicated a negative influence between social media addiction and adolescent mental health. This means that the higher the level of social media addiction in adolescents, the lower the quality of their mental health. Adolescent mental health improves as their level of social media addiction decreases. The value of $R^2 = 0.315$ suggested that the effective contribution of social media addiction was 31.5%.

Table 6. F-test results

	Model	Sum of Squares	df	Mean Square	F	Sig.	Beta	R Square
1	Regression	13.688.416	2	6.844.208	161.454	.000^b	0,563	0,317
	Residual	29.546.493	697	42.391				
	Total	43.234.909	699					

a. Dependent Variable: MentalHealth
b. Predictors: (Constant), SocialMediaAddiction, GameAddiction

The results of the F-test showed a value of Sig 0.00 <0.05, which means that game addiction (X1) and social media addiction (X2) simultaneously affected the mental health of high school adolescents (Y) in the Greater Malang area. The result was $R^2 = 0.317$, which means that the contribution of game addiction and social media addiction to adolescent mental health was 31.7%.

On this basis, 68% of other variables affected adolescent mental health outside this model. This shows that game addiction and social media affect adolescent mental health.

Contribution of game addiction, social media addiction, and adolescent mental health in terms of gender

Table 7 shows that the equal variance assumed value was obtained at 0.000 < 0.05 using the independent sample t-test on the game addiction variable in terms of gender, indicating differences in the level of game addiction of male and female students. If it is associated with the average score, the game addiction of female students was 11.09 less than that of male students at 12.75. This indicates that male students have a higher average score for online game addiction than females.

Table 7. Independent samples T-test results

No	Variable	Gender	*N*	*Average*	*Std. Dev*	*Sig. (2-tailed)*
1	Game Addiction	Male	350	12,75	3,495	0.000
		Female	350	11,09	3,328	
2	Social Media Addiction	Male	350	46,46	10,435	0.000
		Female	350	52,47	8,638	
3	Mental health	Male	350	33,48	7,512	0.000
		Female	350	39,5	7,021	

Through the Independent Sample T-test on the social media addiction variable in terms of gender, the Equal variances assumed value was obtained at 0.000 < 0.05, which means that there were differences in the social media level of male and female students. The average score for female students' social media addiction was 52.47, while the average for male students was 46.46. This shows that female students had a higher average score for social media addiction than males.

The equal variances assumed value for the independent sample t-test on the mental health variable was 0.000 < 0.05, indicating differences in the mental health levels of male and female students. The average result of the mental health scores of female students was 39.50, and the average score of the mental health of male students was 33.48. This shows that female students are more prone to mental health disorders than male students.

Discussion

The results of the data analysis show that there is a negative influence between online game addiction and adolescent mental health. The higher the level of online game addiction in adolescents, the lower their mental health level. These findings suggest that adolescents are likelier to develop a negative addiction to online games. This is in line with the research of Kamal & Wok (2020), Lestari & Wimbarti (2021), and Singh (2019), which state that game addiction affects the quality of teenagers' mental health. The negative impact arises because individuals who are addicted to online games lose track of time. They spend eight to ten hours daily and at least 30 hours a week playing online games (American Psychiatric Association, 2013). An addict can even fall asleep playing online games without eating or sleeping, to the extent that they neglect daily activities such as school or interacting with family and friends. Teenagers addicted to games cannot be prevented from playing because they will feel restless and angry without binge gaming. Gradually, online game addicts will develop aggressive behavior, symptoms of depression, mood swings, negative self-esteem, feelings of loneliness, and symptoms of social anxiety. It may further lead them to experience problems with their family members (Choi et al., 2018; Dwivedi et al., 2022; Hou et al., 2019; Kiatsakared & Chen, 2022; Labana et al., 2020; Mun, 2022).

Similar to online game addiction, social media addiction also dramatically influences the quality of adolescent mental health. From this research, it is known that there is a negative relationship between social media addiction and adolescent mental health. These results are in line with the opinions of Bekalu et al. (2019); O'reilly et al., (2018); and Septiana (2021), who

stated that the higher the dependence of adolescents on social media, the lower the quality of their mental health. Teenagers who experience social media addiction tend to show signs of depression and fear of missing out (FOMO) when they do not stay on top of social media trends. When they do not announce their existence, they feel excessively anxious and insecure. Furthermore, social media addiction can lead to poor sleep quality and family or social conflict (Fabris et al., 2020; Malak et al., 2022; Robinson et al., 2019).

With better control and responsibility, games and social media can positively impact users. Arini (2020); Barr & Copeland-Stewart (2022); Ismi & Akmal (2020); and Prastius (2020) explained that online games and social media (1) could improve foreign language skills; (2) can improve public speaking skills; (3) can train teamwork; (4) can expand social circles; (5) can increase concentration; and (6) can give pleasure. Teenagers will have a positive impact if they can manage themselves while playing online games and using social media. To obtain these benefits, adolescents must have good self-regulation so that they can control themselves and be aware of the negative impacts when they indulge themselves in the fun of online games and social media (Fatima et al., 2021; He et al., 2020; Jo et al., 2022; Safarina & Halimah, 2019). Developing adolescents' self-control skills in online games and social media is challenging for teachers and parents.

Furthermore, this study found that the influence of game addiction and social media addiction on adolescent health was 31.7%. This indicates that online games and social media are not a single variable, considering that there are other variables at 68% that can affect the mental health of adolescents in Malang Raya. If we scrutinize this further, the problem of addiction to games and social media is increasing along with the COVID-19 pandemic. The social distancing policy and the online learning process cause more screen time, thereby increasing the opportunity to access online games and social media. Based on this, it can be assumed that adolescent addiction to online games and social media may be influenced by online learning variables (Copeland et al., 2021) and the duration of time spent accessing gadgets (screen time) (Rosen et al., 2021). Other factors that may contribute to the addiction are interest in accessing news in various online media (Septiana, 2021), poor education and communication with parents and family members (Guessoum et al., 2020), and little awareness of the negative impact of gadgets due to a lack of knowledge (Liang et al., 2020). This challenging situation needs to be addressed by developing an intervention strategy to improve the mental health of adolescents.

Another significant result of this research is that male adolescents have a higher prevalence of online game addiction than female students. In contrast, female students tend to be more addicted than male students to social media. This finding corroborates the research results of Lemmens et al. (2009), which stated that male students tend to be more addicted to online games than female students (32%). Not only that, Akaroğlu (2022) stated that gender is one of the factors that influence online game addiction, where men tend to be more addicted to online games than women. Boys are more interested in playing games due to their innate nature that prefers to play logic and challenges, while girls are more interested in safe and peaceful situations (Anggraini & Ratnawati, 2022). This can be seen from the types of games that are frequently played, such as First-person Shooter Games (FPS), Real-time Strategy Games, Massively Multiplayer Online Role-playing Games (MMORPG), and Simulation Games which require logic and strategy to win (Mertens, 2022).

The opposite fact was discovered in social media addiction dominated by female students. This is linear with the research of Mulyani et al. (2018) which stated that adolescent girls are used to spending more time on social media than boys. One underlying reason is that adolescent girls like to get attention from others (Ismail et al., 2022). Hartinah et al. (2019) argued that a high level of narcissism causes the higher intensity of women in social media than men. Research by Field Boursier et al. (2020) and Field Kusuma et al. (2019) has empirically proven narcissistic tendencies in women. They prove that there is a significant negative contribution between self-control and narcissistic tendencies in adolescent girls who engage with Instagram more intensely. The higher the self-control of female adolescents, the lower the narcissistic tendency to use social media.

Meanwhile, in terms of potential mental health problems, female students are more prone to mental health problems than male students. These findings align with the research by Kamila et al., (2021), which states that in dealing with various problems, adolescent girls tend to have a higher sense of anxiety than adolescent boys. In general, men benefit from having better resilience in responding to stressful situation as they lean toward logical thinking and facts. This greatly supports the quality of their mental health. Meanwhile, the characteristics of women who tend to be more easily carried away make them more prone to anxiety (Rice et al., 2021; Sun et al., 2020). The results of Aziz et al. (2021) strengthen Rice and Sun's opinion that during the Covid-19 pandemic, the tendency for mental health disorders in adolescent girls was proven to be very high, at 30%.

The negative influence of online games and social media addiction on the mental health quality of adolescents must be followed up with the development of appropriate intervention strategies. Intervention strategies that need to be developed include efforts to prevent and deal with the psychological impact of Metaverse, especially the impact of online game addiction and social media addiction on adolescents (Bawa, 2022). In doing so, schools can try out integrative counseling where counselors are in charge of giving psychoeducation and counseling in person (Kuss & Griffiths, 2017; Nwoburuoke & Eremie, 2021; Silomba et al., 2021).

Efforts to prevent the impact of Metaverse due to the game and social media addiction through guidance and counseling services can be scheduled regularly by opening slots for group guidance services (Primayuni & Neviyarni, 2020; Utomo, 2021). For this effort to be successful, the community and other helpers such as psychologists, psychiatrists, and exceptional case therapists need to play a role. Considering that social media is very often used by teenagers in Indonesia, including Instagram, Facebook, Tik-Tok, WhatsApp, and Twitter, intervention efforts can make use of social media to educate students about the harms of using online games and social media excessively and irresponsibly.

The guidance and counseling services can focus on introducing self-control and doing exercises to improve it in the context of online games and social media use. Education and the teaching of noble cultural values and habituation of responsible behavior are one of the preventive efforts that need to be done. This strategy can be carried out by the school through school guidance and counseling service (Kadafi et al., 2021). Guidance and counseling are worth considering providing interventions based on cultural values so that adolescents and young adults are not easily influenced by technological developments that Might change their realities and expectations contrary to the set of values they believe in (Habsy et al., 2020).

One of the recommended intervention models to anticipate the impact of Metaverse is a guidance model incorporating cultural values, religious values , and guidance strategies oriented towards improving critical thinking skills. The model is considered appropriate to strengthen self-control, responsible behavior, morality filters, and the ability to select harmful content and other negative impacts of online games and social media (Habsy et al., 2020; Hidayah et al., 2018). In more detail, there are several strategies that counselors can use in group guidance, for instance, sociodrama techniques (Nugraha & Ajie, 2019), traditional games (Putri et al., 2022), and educational cinema techniques (Iryani & Suriatie, 2021). These three techniques can develop self-control, exercise responsibility, and increase youth's multicultural awareness.

As for students who experience mental health problems due to online games and social media addiction, counseling services can play a more effective role in it. Considering that manifestation of addiction can be observed in students' undisciplined and irresponsible behavior, problems of thought distortion, and irrational beliefs about self-appearance, school counselors can choose one of the appropriate interventions depending on the client's main problem, either through cognitive behavioral counseling approaches, behavioral counseling, or rational emotive behavior counseling, and reality counseling (Djunaidia et al., 2019; Haagsma et al., 2013; Han et al., 2018; Hou et al., 2019; Sağar, 2021; Zhou et al., 2021). Implementation of the counseling approach must be accompanied by special techniques according to the problems to be handled by the counselor. According to Agbaria (2022), cognitive restructuring techniques in cognitive behavioral counseling can overcome adolescent problems related to internet addiction (online games and social media). Behavioral counseling with self-management techniques is also

effective in helping counselors deal with teenage online game addiction (Wölfling & Dominick, 2022). According to Park et al., (2016), reality counseling with the W-D-E-P strategy can reduce online game addiction in adolescents. Thus, mental health problems due to excessive Metaverse access, especially addiction to online games and social media, can be anticipated and appropriately resolved.

CONCLUSION

The following research conclusions can be formulated as follows: (1) Game addiction (X1) has a negative effect on the mental health (Y) of senior high school teenagers in Malang Raya; (2) social media addiction (X2) has a negative effect on the mental health of high school youth equivalents in Malang Raya; (3) both game addiction (X1) and social media addiction (X2) have a negative effect on the mental health (Y) of junior high school students in Malang; and (4) both game addiction and social media addiction significantly contributed to the mental health of adolescents in Malang at 31.5%. Based on gender, teenage boys are more prone to online game addiction than teenage girls. Meanwhile, adolescent girls are more dominant in their use of social media than adolescent boys. However, female students in the Greater Malang area are more prone to mental health problems than male students. Based on these results, all working hypotheses are accepted. Besides, recommendations for multicultural-based interventions relevant to improving the mental health of senior high school adolescents in Malang Raya are considered in need based on the findings.

As a contribution to the world of education, recommendations were made for schools to make prevention and alleviation efforts through educational programs and comprehensive, integrative, and collaborative guidance and counseling services to anticipate the negative impacts of Metaverse. Education and guidance focus on forming and strengthening students' self-control, responsible behavior, and critical thinking skills. These efforts can be carried out through group guidance using sociodrama, cinema, and educational biblio techniques. Meanwhile, curative intervention for students addicted to online games and social media can be done through counseling services applying a cognitive behavioral counseling approach, behavioral counseling, and rational emotive counseling. Implementing preventive and curative intervention strategies needs to integrate cultural and religious values in the service content.

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