Does Violent Video Games Exposure Reduce Aggression? The Moderating Roles of Self-Esteem

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Abstract
Media video games have become an integral part of people's daily life. While previous studies have reported the detrimental outcomes of negative game factors, the impact of exposure to violent video games remains unclear. This study examined the effects of self-esteem in moderating the relationship between violent video games exposure and aggressive behavior. Data from 384 local online gamers in Klang Valley, Malaysia, were sampled using purposive and snowball sampling techniques and were analysed using SEM-PLS. The results demonstrate that self-esteem significantly moderates the relationship between violent video game exposure and aggressive behavior. This finding suggests that individuals with higher self-esteem may exhibit a weaker association between exposure to violent video games and subsequent aggressive behavior. These results shed light on the complex dynamics between game exposure, individual traits, and aggressive tendencies. Considering the questions raised by moderating analysis, future studies could investigate the impact of game factors in violent video games on aggressive behavior with a larger sample size.
Keywords: Online Gaming, Aggressive Behavior, Gaming Addiction, MMORPG, Self-Esteem

Introduction
Aggression, a pressing issue within the framework of the Fourth Industrial Revolution (IR4.0), holds significant implications for social psychology and the vision set forth by the 2030 Agenda for Sustainable Development, specifically encapsulated in Goal 3. This goal aims to ensure healthy lives and promote overall well-being for people of all ages while establishing a world

free from violence and exploitation for adults and nurturing the rights and capabilities of future generations.

However, the advent of advanced technologies and transformative societal changes has introduced a new scenario in social psychology concerning exposure to digital violent video gaming (Lacko et al., 2022). The prominence of aggression within the IR4.0 landscape requires proactive measures to safeguard the mental and emotional well-being of individuals, foster positive and healthful behaviors, and cultivate an environment that upholds the rights and holistic development of both present and forthcoming generations. Research suggests that prolonged exposure to violent video games can lead to desensitization toward aggression, reduced empathy, and an increase in aggressive thoughts, emotions, and behaviors (Anderson et al., 2010).

To address these challenges effectively, it is essential to raise public awareness and educate individuals, parents, and educators about the potential risks of excessive exposure to digital violent video games. Promoting responsible gaming practices, emphasizing the importance of balance, and encouraging critical thinking and media literacy skills can help individuals navigate the digital landscape responsibly. Additionally, collaborations between researchers, game developers, and policymakers can lead to the implementation of guidelines and regulations that prioritize the well-being of players and minimize the potential negative impacts of digital violent video gaming.

By confronting the issue of aggression, particularly in the context of digital violent video gaming, we can work towards creating a society that fosters positive social psychology, nurtures the well-being of individuals, and ensures the rights and holistic development of present and future generations within the transformative IR4.0 landscape.

According to the Department of Statistics Malaysia (2020), Malaysia witnessed a concerning increase in violent rates, with figures rising from 5.6% in 2019 to 8.4% in 2020. Simultaneously, research conducted by the Malaysian Communications and Multimedia Commission (MCMC, 2020) indicates that a substantial 57.1% of Malaysian youth are exposed to aggressive scenarios in online gaming. As noted by Götz (2020) emphasizes the influence of various factors on psychological phenomena that predict aggressive behavior, with certain variables intensifying or diminishing the relationship between independent and dependent variables. Factors identified by Götz (2020) contribute to the relationship between aggression and its predictors, including family environment, peer influence, media exposure, socioeconomic factors, and individual psychological characteristics.

The prevalence of aggressive behavior and moral concerns among youth has been linked to significant psychosocial outcomes, as highlighted by recent statistics revealing that 52% of young individuals aged 18 to 21 have engaged in criminal activities due to adverse circumstances (Tharshini et al, 2020). These findings underscore the pressing need to address both the escalating rates of violence and the exposure of Malaysian youth to aggression.

There has been an increasing demand for violent-themed media in the previous studies which linked violent video games (VVG) with aggressive behavior. Massive Multiplayer Online Role-Playing Games (MMORPG) are particularly appealing to a large portion of youth. MMORPG involves players simultaneously playing games on the Internet with different backgrounds, making it a unique online gaming segment (Zhong, 2011) that offers many types of games featured in a single game with thousands of players (Merrick et al., 2013).

Meanwhile, Alrobai et al (2016) have noted that gaming can have a significant negative impact on personal development. Similar to Coyne et al (2023) found that individuals with multiple risk factors or higher levels of violent gameplay were most aggressive over time and that

playing violent video games will likely increase aggression more in individuals with other gaming problems and males with low self-regulation.

To address this gap, this research study aims to examine the relationship between violent video game exposure and aggressive behavior and how self-esteem moderates the effect. Specifically, the study will explore the moderating effect of self-esteem on this relationship refer to Figure 1.0. By investigating this relationship, the study aims to contribute to a deeper understanding of the impact of violent media on youth and highlight the importance of considering the role of self-esteem in shaping aggressive behavior.

H^1: Self-esteem have a significant relationship between violent video games and aggressive behavior.

H^2: Self-esteem moderates the relationship between violent video games and aggressive behavior.

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                        │     Self-esteem      │
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│ Violent video game exposure│────┼──────▶│ Aggressive behavior  │
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                                  │ H²
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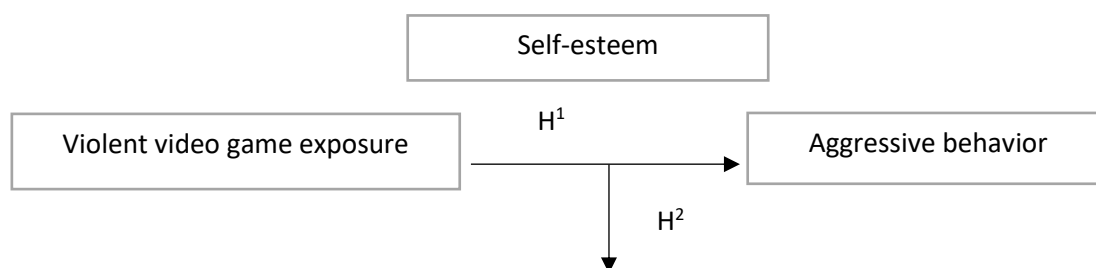
Figure 1.0 Study Framework

In light of the problem, objectives, and research questions, our research used the General Aggression Model (GAM) by Anderson and Bushman (2002) which reflects the expected relationships between the independent, moderator, and dependent variables in this study.

Violent Video Game Exposure (VVGE) and Aggression

Gaming exposure involving violent content is a growing concern among teenagers and young adults, prompting several studies in Malaysia to investigate the relationship between gaming, addiction, and behavior. Marzo et al (2019) explored the correlation between violent video games and aggressive behavior among Malaysian teenagers, finding that exposure to violent video games was associated with increased aggression and a decrease in prosocial behavior. Similarly, Aziz (2021) conducted a systematic review of the impact of computer game addiction on adolescents' physical health, identifying obesity, musculoskeletal disorders, and sleep disturbances as potential health consequences.

In the context of online gaming, According to Hainuddin et al (2023), Malaysian undergraduate students who engage in video gaming may experience negative emotional effects. Many of them struggle to control their emotions when facing difficulties in the game, and they may also experience a sense of emptiness when not playing. These emotional effects are generally linked to factors such as poor time management for studies, social avoidance, and emotional instability. Similarly, T'ng (2021) found that need frustration and gaming motives were predictors of internet gaming disorder in mobile multiplayer online battle arena (MOBA) games. Meanwhile, Abdul Nasser et al (2021) used task-based functional magnetic resonance imaging (fMRI) to study neural activity associated with internet gaming addiction in Malaysian

adolescents, finding that addiction caused alterations in cognitive control and reward processing neural activity.

Furthermore, Ismail et al (2021) examined the relationship between internet addiction, internet gaming, and anxiety among Malaysian medical students during the COVID-19 pandemic, revealing a positive correlation between internet gaming and anxiety. Lastly, Mohd Yunus et al (2019) investigated factors influencing Malaysian youths' involvement in MMORPGs and identified social influence, entertainment, and game design as key contributors.

As the demand for violent media grows, evidence suggests a link between exposure to violent media and increased aggressive behavior. Extensive research has been conducted on the effects of exposure. Effects of violent and nonviolent sexualized media on aggression-related thoughts, feelings, attitudes, and behaviors demonstrated in the General Aggression Model (GAM) and the General Learning Model (GLM) (Burnay et al., 2022). Both models explain how exposure to violent media content can shape an individual's characteristics and personality. For instance, research shows a correlation between exposure to physical and relational aggression in media and increased aggressive behavior.

Our research was guided by GAM (Anderson and Bushman, 2002) was proposes that situational (violent video games) and personal factors (self-esteem) can trigger aggression, and these factors can interact to influence an individual's interpretation of events and their emotional and physiological responses. The model suggests that exposure to violent media content can increase the likelihood of aggressive behavior by priming aggressive thoughts, increasing physiological arousal, and reducing inhibitions toward aggression. The GAM emphasizes that aggressive behavior is a complex phenomenon influenced by various factors, including individual differences, situational factors, and media exposure.

In summary, these studies provide valuable insights into the complex relationship between gaming and aggressiveness in the Malaysian context, highlighting the need for further research to address potential negative consequences and inform interventions.

Self-esteem and Aggression

The literature review provides valuable insights into the complex interplay between self-esteem, aggression, cyberbullying, and the influence of video games on these variables. Lokithasan et al (2020) conducted a survey among vocational high school students and found a negative correlation between empathy and cyberbullying, suggesting that individuals with higher levels of empathy were less likely to engage in online aggressive behavior. Conversely, a positive correlation was found between self-esteem and cyberbullying, indicating that individuals with higher self-esteem may be more prone to perpetrating harmful acts online. Meanwhile, self-esteem and empathy are psychological factors that contribute to a person's psychological makeup and influence their thoughts, feelings, and behaviors.

Self-esteem also has the potential to shape online behavior toward aggressiveness across different age groups (Chua et al., 2019). This finding highlights the potential influence of self-perceptions and power dynamics on online behavior, supported by Cabras et al (2019) noted that exposure to violent video games was associated with higher levels of aggression and anxiety while playing non-violent video games was linked to increased self-esteem. On top of that, self-esteem plays a crucial role in moderating the effect of shaping behavior.

Furthermore, Lee et al (2021) posit that individuals with high levels of competitive motivation and low self-esteem were more likely to engage in cheating behavior. These findings shed light on the psychological factors especially low self-esteem that moderate to negative behaviors

within online gaming communities. In addition, Skobkareva (2020) noted that high self-esteem, in conjunction with dark personality traits, increased the likelihood of engaging in aggressive behavior. This underscores the complex nature of individual factor and personality traits when considering self-esteem have a tendency to moderate the impact on behavior.

Overall, the reviewed literature supports the hypothesis that self-esteem plays a crucial role as a moderator in the relationships between aggression and video game use exposure. To further advance this field, future research should investigate the underlying mechanisms driving these relationships and explore the effectiveness of interventions that promote positive behavior and reduce the negative impact of high self-esteem on online behavior.

Methodology

For initial analysis, inferential statistics were used to scrutinize the attributes of the 384 participants within the sample group. Next, structural equation modeling (SEM) was implemented to perform a comprehensive path analysis, thereby examining the interrelationships between variables.

Sample and Procedure

A quantitative approach, featuring a cross-sectional and correlational design, was employed to investigate the relationship between VVGE and aggressive behavior, considering self-esteem as a potential moderating factor. The study was conducted in Klang Valley, Malaysia, an area representing the majority of the Malaysian population, with 81% of the nation's internet users residing there as reported by the Malaysian Communications and Multimedia Commission (MCMC) in 2020. Furthermore, Klang Valley hosted a prominent e-sports competition in Asia at Melawati Stadium in Shah Alam, Selangor, in 2020 (Mohd Yunus et al., 2021).

Utilizing the Krejcie and Morgan (1970) formula, the researchers determined a sample size of 384 respondents. The inclusion criteria for the sample encompassed Malaysian citizens aged 18-40 who expose to violent media (playing games and watching a movie). Conversely, the exclusion criteria comprised individuals who were unable to read English and Malay Language. The purposive and snowball technique had been used to gather the data from the population. Therefore, the data were analysed using Structural Equation Model (SEM-PLS)

Measure

In this empirical study, a variety of psychometric instruments were utilized to evaluate key constructs. The Content-based Media Exposure Scale (C-ME), which consists of 17 items and is adapted from Den Hamer et al (2017), was employed to measure violent video game exposure (VVGE). This instrument yielded an alpha (α) of .796.

Subsequently, the Reactive and Proactive Aggression Questionnaires (RPQ), comprising 23 items and derived from Raine et al (2006), served as the primary tool for assessing aggressive behavior exhibited by participants. This measure demonstrated an alpha (α) of 0.929. Finally, the Rosenberg Self-Esteem Scale (RSES) was utilized to evaluate self-esteem levels. The scale exhibited a satisfactory Cronbach's alpha that is 0.898.

Data Collection Process

To enhance our reach, we collaborated with the Malaysia E-Sport Federation and the Malaysia Ministry of Youth and Sports, who participated as enumerators during the National E-Sport Day event. Subsequently, we encouraged participants to share the online survey with their

contacts, leveraging a "snowball" sampling method to increase the questionnaire's online dissemination. Additionally, we recruited local online gamers through various gaming platforms (refer to Table 1). Each participant was allocated a 20-minute time frame to complete the questionnaire, which covered a range of variables, including demographic characteristics, VVGE, self-esteem, and aggressive behavior.

Table 1
Gaming Platform

Type	Name
Social Media Forum	MMORPG Forum
Gamer Influencer	MMORPG Forum
YouTube Influencer	MMORPG Forum
Gaming Event	National Sports Day
Gaming Event	College Orientation Program

Results and Discussion
The study involved 384 participants, with a gender distribution indicating a significant disparity between male (67.2%) and female (32.8%) respondents. The majority of participants were young adults between the ages of 18 and 24, more than 70% of the sample. On the other hand, there were only a few older adults (6.8%) aged 32 to 40 years old who participated in the study. Additionally, the results revealed that all respondents are exposed to violent video games.

In terms of VVGE, most participants (62.2%) fell within the moderate exposure level (37-56), while a smaller proportion (14.8%) reported low exposure levels (17-36). A minority of participants (22.9%) indicated high levels of VVGE (>57). Regarding self-esteem, a significant proportion of participants (82.8%) exhibited low levels within the range of 13-24, indicating lower self-esteem. A smaller percentage (9.4%) demonstrated moderate levels (25-36) of self-esteem. A minority of participants (7.8%) reported low self-esteem within the range of 20-45. Concerning aggressive behavior, most participants (68.8%) displayed low levels of aggression within the range of 23-35. A smaller portion (10.9%) exhibited moderate levels (36-49) of aggressive behavior, while a minority (20.3%) reported high levels (>50) of aggression. Therefore, with moderate (62%) exposure to violent video games, this will likely affect the aggressive level soon for local online gamers in Malaysia.

Table 2
Level of VVGE, self-esteem and aggressive behavior

Variables	Level	Frequency	Percent
VVGE	Low (17-36)	57	14.8
	Moderate (37-56)	239	62.2
	High (>57)	88	22.9
SE	Low (13-24)	30	7.8
	Moderate (25-36)	318	82.8
	High (>37)	36	9.4
AB	Low (23-35)	264	68.8
	Moderate (36-49)	42	10.9
	High (>50)	78	20.3

Note: VVGE (Violence Video Game Exposure), SE (Self-Esteem), AB (Aggressive Behavior)

Direct Effect Analysis

The data presented in Table 3 corresponds to the results of a hypothesis test conducted to examine the direct effect between Violent Video Game Exposure (VVGE) and Aggressive Behavior (AB).

The analysis reveals a positive relationship between VVGE and AB, as indicated by the beta coefficient (β) of 0.219. This suggests that higher levels of exposure to violent video games are associated with an increase in aggressive behavior. Consequently, hypothesis 1, was accepted based on the findings from the analysis.

Table 3
Relationship between VVGE and aggressive behavior

Variable	Original sample (O)/β	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
VVGE -> AB	0.219	0.220	0.033	6.626	0.000

Note: VVGE (Violence Video Game Exposure), AB (Aggressive Behavior), β (standardized coefficient symbol)
Significance level 0.05>

Moderating Analysis

The regression coefficient (β) for self-esteem in moderate the effect between VVGE and aggressive behavior is -0.110, indicating the negative direction, which means high self-esteem will reduce the relationship between VVGE and aggressive behavior. Meanwhile, low self-esteem will increase the relationship with those variables.

Table 4
Result for moderation analysis.

Variable	Original sample(O)/β	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
SE x VVGE -> AB	-0.110	-0.112	0.034	3.217	0.001

Note: VVGE (Violence Video Game Exposure), SE (Self-esteem), AB (Aggressive Behavior), β (standardized coefficient symbol)

significant level (0.05)

This suggests that the hypothesis proposing self-esteem moderates the relationship between VVGE and aggressive behavior was supported by the data. Therefore, our hypothesis 2 is accepted.

Conclusion

A significant role of SE moderates the relationship between violent video game exposure (VVGE) and aggressive behavior (AB) when a negative β coefficient of -0.110 indicates that the association between VVGE and AB varies depending on the level of self-esteem.

Specifically, higher levels of SE are found to weaken the link between VVGE and aggressive behavior. This implies that individuals with high VVGE and low self-esteem are more likely to display a heightened inclination towards aggressive behavior compared to individuals with high VVGE and high self-esteem.

Self-esteem has the potential to moderate the relationship between violent video game exposure (VVGE) and aggressive behavior due to several mechanisms. First, individuals with different levels of self-esteem may interpret and perceive the same violent video game content differently, with higher self-esteem individuals perceiving it as less threatening.

Second, self-esteem influences coping mechanisms and resilience, with higher self-esteem individuals have better skills for emotional regulation and coping, which may mitigate the negative effects of VVGE on aggression. Third, self-esteem is closely tied to self-worth and social comparison, with higher self-esteem individuals being less influenced by negative comparisons and aggressive behaviors portrayed in video games. Finally, self-esteem affects self-efficacy beliefs, with higher self-esteem individuals having stronger beliefs in their ability to resist negative effects and choose non-aggressive behaviors.

The interpretation aligns with the theoretical concept of social cognitive theory (Bandura, 1986), which proposes that individuals' thoughts, beliefs, and self-perceptions influence their behavior. According to this theory, individuals with low self-esteem may be more susceptible to the negative effects of violent video game exposure on aggression because their self-perceptions and beliefs about themselves can influence how they interpret and respond to media content.

These findings underscore the importance of considering both self-esteem and video game exposure when predicting aggressive behavior. The study has potential implications for developing interventions and policies aimed at reducing aggressive behavior among individuals who play violent video games. For example, interventions that aim to increase self-esteem or reduce exposure to violent video games may help prevent or reduce aggressive behavior among such individuals.

Implication and Recommendation

The practical implication for interventions and policies aimed at reducing the negative effects of violent media exposure should consider individual differences such as self-esteem. Specifically, the findings have significant implications for various stakeholders, including parents, educators, mental health professionals, and policymakers. In terms of parents and educators, the results suggest that monitoring and regulating children's exposure to violent media, particularly those with lower levels of self-esteem, is crucial. Limiting access to violent video games and promoting alternative forms of entertainment that encourage prosocial behavior can be effective.

Additionally, providing support and guidance to children with lower levels of self-esteem may help mitigate the negative effects of violent media exposure. Therefore, prioritizing the promotion of alternative forms of entertainment that encourage prosocial behavior is crucial for parents and educators. For mental health professionals, the findings indicate the importance of considering self-esteem as a potential factor in the treatment of individuals with aggression issues. By taking into account individual differences such as self-esteem, mental health professionals may provide more tailored and effective treatment interventions. For example, digital detox intervention program Liao (2019) conducted a study on attention control after a two-week digital detox intervention. The findings revealed that individuals with low levels of depression and anxiety symptoms experienced a significant improvement in their self-regulation skills. Haris et al (2017) define digital detox as a conscious and intentional period during which individuals abstain from using electronic connected devices like smartphones and computers in order to minimize the influence of these devices on their everyday lives.

On the other hand, Perrin and Dunggan (2015) reported that Japan has established a Digital Detox centre in Yokohama, this initiative reflects the recognition of the need to promote healthy online behaviors and safeguard the well-being of individuals, particularly young people, in the digital age. Overall, these findings suggest that digital detox interventions can have positive effects on self-control, self-regulation, and reducing procrastination, particularly for individuals with low levels of depression and anxiety symptoms.

Thus, prioritizing the consideration of individual differences such as self-esteem in the treatment of individuals with aggression issues is important. In terms of policymakers, the results suggest the need for regulations and policies that restrict children's access to violent media and promote alternative forms of entertainment that encourage prosocial behavior.

Policymakers may also consider funding research that investigates the impact of violent media exposure on individuals with different levels of self-esteem. Indeed, online games developer continuously focused on preference and graphic development to make digital life an attention-grabbing and gain more players. Hence, policymakers should consider implementing regulations and policies that restrict children's exposure to violent media and encourage them to explore alternative forms of entertainment. This approach is crucial to prevent severe incidents like the unfortunate case in South Korea where a man passed away after playing a video game continuously for 50 hours without taking breaks for sleep or proper nutrition (Aziz et al., 2018).

From a theoretical perspective, the study suggests that future research should investigate the role of individual differences in the relationship between violent media and aggression and explore other potential moderators that may influence this relationship. The theoretical implication of the findings is that individual differences, such as self-esteem, may play an important role in determining the impact of violent media on aggression. This is consistent with previous research that has highlighted the importance of individual differences in this relationship.

In addition, the findings of this study also contribute to the General Aggression Model (GAM) by Bushman and Anderson (2002), which explains the influence of violent media content on an individual's characteristics and personality toward aggressiveness. When self-esteem is considered as a moderator within the GAM, it implies that the level of self-esteem can influence how individuals respond to and are affected by violent media content. For example, high self-esteem individuals are more resilient and less likely to be influenced by aggressive media content, while low self-esteem individuals may be more susceptible to internalizing

aggressive messages. By recognizing the influence of self-esteem, the GAM can be refined to incorporate the interaction between personal attributes and situational factors, such as violent media exposure, in shaping aggression.

This perspective allows for a more nuanced understanding of the processes underlying media violence effects. In conclusion, self-esteem acts as a personal characteristic that can moderate the relationship between violent media exposure and aggression within the GAM frameworks. The findings suggest that future research should continue to investigate the role of individual differences in the relationship between violent media and aggression, and consider other potential moderators that may influence this relationship.

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References

Abdull Nasser, N. M., Mohamad, M., Chan, L. F., Suppiah, S., Yusoff, A. N., Abd Hamid, A. I., Wan Ismail, W. S., & Sim, S. T. (2021). The Task-Based fMRI Study on Neural Activity of Internet Gaming Addiction Among Malaysian Adolescents: A Stroop Color Task. *Neurology Asia*, *26*(3).

Alrobai, A., McAlaney, J., Dogan, H., Phalp, K., & Ali, R. (2016). Exploring the requirements and design of persuasive intervention technology to combat digital addiction. In *Human-Centered and Error-Resilient Systems Development* (pp. 130-150). Springer, Cham.

A. Perrin and M. Duggan, "Americans' Internet access: 2000- 2015," Pew Res. Cent., no. June, pp. 1–13, 2015.

Aziz, N., Iida, H., Ariffin, M., Akhir, E. A. P., & Sugathan, S. K. (2018). Massively Multiplayer Online Game (MMOG) impact towards Malaysian youth's time management, social life and psychology. *Advanced Science Letters*, *24*(3), 1754-1757.

Aziz, N., Nordin, M. J., Abdulkadir, S. J., & Salih, M. M. M. (2021). Digital Addiction: Systematic Review of Computer Game Addiction Impact on Adolescent Physical Health. *Electronics*, *10*(996), 1-18.

Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ*, *1986*(23-28).\

Burnay, J., Kepes, S., & Bushman, B. J. (2022). Effects of violent and nonviolent sexualized media on aggression-related thoughts, feelings, attitudes, and behaviors: A meta-analytic review. *Aggressive behavior*, *48*(1), 111-136.

Cabras, C., Cubadda, M. L., & Sechi, C. (2019). Relationships among violent and non-violent video games, anxiety, self-esteem, and aggression in female and male gamers. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, *11*(3), 15-37.

Chua, A. F., Kwan, J. H. T., & Raksshana, S. (2019). *Aggression and self-esteem on cyberbullying among undergraduates in Malaysia* (Doctoral dissertation, UTAR).

Coyne, S. M., Warburton, W., Swit, C., Stockdale, L., & Dyer, W. J. (2023). Who is most at risk for developing physical aggression after playing violent video games? An individual differences perspective from early adolescence to emerging adulthood. *Journal of youth and adolescence*, *52*(4), 719-733.

Den Hamer, A. H., Konijn, E. A., Plaisier, X. S., Keijer, M. G., Krabbendam, L. C., & Bushman, B. J. (2017). The content-based media exposure scale (C-ME): Development and validation. *Computers in human behavior*, *72*, 549-557.

Haris, A. R., Harib, S. S., & Hussin, N. (2017). Information Security Challenges: A Malaysian Context. *International Journal of Academic Research in Business and Social Sciences*, *7*(9), 2222-6990.

Hainuddin, M. F. F., Sohaimi, M. S., Adnan, N. A. I. M., Hasim, N., & Salam, S. N. A. (2023). On Game Addiction Among Studenat Public University in Malaysia. International Journal of Advanced Public Health, 4(3).

Ismail, N., Tajjudin, A. I., Jaafar, H.,Nik Jaafar, N.R., Baharudin, A., & Ibrahim, N.(2021). The Relationship Between Internet Addiction, Internet Gaming and Anxiety Among Medical Students in A Malaysian Public University During Covid-19Pandemic. *Inter*

Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, *30*(3), 607–610.

Lacko, D., Dufkova, E., & Machackova, H. (2022). The Short-Term Effects of Violent Video Game Streaming on State Aggression in Adolescents: The Role of Aggressive and Non-Aggressive Commentary by Streamers.

Lee, Z. W., Cheung, C. M., & Chan, T. K. (2021). Understanding Massively Multiplayer Online Role-Playing Game Addiction: A Hedonic Management Perspective.*Information Systems Journal*, *31*(1), 33-61.

Liao, W. (2019). *Put your smartphone down: Preliminary evidence that reducing smartphone use improves psychological well-being in people with poor mental health* [Unpublished master thesis]. University of Otago.

Lokithasan, K., Chua, A. F., Joanna, K. H. T., Subramanian, R., Zaman, W. K., & Krishnan, S. (2020). The Correlation between Aggression, Self-esteem and Cyberbullying among Undergraduates in Malaysia: Hubungan Antara Agresi, Harga-diri dan Perbuatan Buli Siber dalam Kalangan Pelajar Sarjana Muda di Malaysia. *Sains Insani*, *5*(1), 205-211.

Marzo, R. R., Ahmad, A., Bhattacharya, S., Mun, F. Y., Rahman, J.A., Anwar Batcha, S.,Rajiswaran, S. & Hon, L. C. (2019). Effects Of Playing Violent Video Games on Teenagers' Behavior–An Experience From Malaysia, *Indian Journal of Community Health*, *31*(2),179-184.

Raine, A., Dodge, K., Loeber, R., Gatzke-Kopp, L., Lynam, D., Reynolds, C., Stouthamer-Loeber,M. & Liu, J. (2006). The Reactive–Proactive Aggression Questionnaire: Differential correlates of reactive and proactive aggression in adolescent boys. *Aggressive Behavior*, *32*(2), 159-171.

Skobkareva, A. (2020). *Aggression in Dark Personalities: The Role of Self-Esteem* (Doctoral dissertation, University of Windsor (Canada).

T'ng, S. T., Ho, K. H., & Pau, K. (2022). Need Frustration, Gaming Motives, And Internet Gaming Disorder in Mobile Multiplayer Online Battle Arena (Moba) Games: Through the Lens Of Self-Determination Theory. *International Journal of Mental Health and Addiction*, 1-21.

Yunus, M. Y. H., Yusoff, N. H., & Ng, C. Y. (2021). Factors Influencing the Involvement of Malaysian Youths In Massively Multiplayer Online Role-Playing Games (MMORPGS). *Journal Of Techno-Social*, *13*(1), 59-67.

Zhong, Z. J. (2011). The effects of collective MMORPG (Massively Multiplayer Online Role-Playing Games) play on gamers' online and offline social capital. *Computers in Human Behavior*, 27(6), 2352–2363.