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Internet Gaming Disorder and Aggression: A Cross-Sectional Study

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Main Points

- Pakistan, a technologically advanced country, produces limited research on topics concerning IGD and aggression. Hence, the current research was conducted to address this gap and provide empirical evidence.
- The findings of the current study revealed that adolescent gamers exhibited elevated levels of IGD and aggression in comparison to non-gamers. Furthermore, it was shown that males displayed higher levels of aggression than girls.
- The findings of this study are highly significant for parents, educators, and mental health professionals who engage with adolescents. It indicated the significance of monitoring and restricting gaming habits in adolescents, especially in males who may have a greater susceptibility to acquiring aggressive inclinations.
- The outcomes of this study can be utilized by mental health practitioners to create efficacious programs that address both gaming behavior and aggressive inclinations.

Abstract

The prevalence of Internet gaming disorder (IGD) is growing on a global scale, leading to heightened concerns around adolescents' aggressiveness. The presence of competition and lack of supervision in online gaming might provoke aggressive tendencies. Adolescents might be influenced by competitive games and interactions. Pakistan, a country with advanced technology, has limited investigations on issues related to IGD and aggressiveness. This cross-sectional study examines IGD and aggression in adolescent boys (N = 240) and girls (N = 136) who play online games, recruited via a convenient sampling technique. The study also examines the aggression of gamers (G1) and non-gamers (G2). The results of two-way ANOVA show that adolescent boys and girls differ in IGD and Aggression scores with the evidence of the significance of the main effect for the assessment of IGD with $F(1.374) = [6.362]$, $p = .014$. In addition, results indicated evidence of the significance of the main effect for the assessing aggression with $F(1.374) = [6.645]$, $p = .010$. Further results of mixed factorial ANOVA indicated significant differences in the aggression of G1 and G2, male and female participants with the significant main effect of aggression with $F(1.374) = [49.530]$, $p < .001$. The findings emphasize the importance of monitoring and regulating adolescents' gaming behaviors, especially excessive gaming. Parents, educators, and healthcare professionals can help identify adolescents at risk of IGD and provide appropriate support and therapies. Promoting appropriate gaming habits and preventing the detrimental effects of excessive gaming in adolescents is essential.

Keywords: Aggression, adolescents, Internet gaming disorder

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Introduction

The Internet plays a crucial role in daily life in this age of technological growth. However, adolescents and emerging adults may be at risk when using the Internet. Internet forums and other interactive components have attracted a wide global user base to various websites and mobile apps, including online gaming sites. Due to self-regulation concerns, younger users may require assistance with

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mastering the Internet. The addictive nature of these applications has been linked to poor self-regulation in persons with dysregulated and disordered internet usage patterns, which exacerbates the concerns discussed above (Stevens et al., 2021). Both adults and adolescents now spend their free time playing online games as a result of advances in technology and the Internet. Internet gaming has reached its pinnacle in modern civilization. It is critical to remember that playing video games is not pathological. Disruption in daily living and functioning may indicate a health issue. Rising Internet gaming is linked with poor mental health and behavioral changes (Imataka et al., 2022).

The World Health Organization (WHO) has classified gaming disorder as a medical illness due to its significant impact on personal, familial, social, educational, occupational, and other aspects of life. This disorder is recognized when it lasts for 12 months. After much controversy and acrimony, the WHO recognized IGD as a separate form of online addiction and classified it as a medical illness in the International Classification of Diseases (ICD-11). Healthcare practitioners apply the nine APA diagnostic criteria for Internet gaming disorder (IGD) in the current Diagnostic and Statistical Manual (DSM) of Mental Disorders. According to the American Psychological Association (2022), IGD is a unique condition identified by excess online gaming.

As per the DSM-5-TR, persistent and recurring utilization of the Internet for gaming purposes, usually involving interaction with other players, leading to considerable impairment or distress as demonstrated by the presence of at least five of the following criteria within a 12-month period: The criteria for diagnosing Internet gaming disorder include: (1) excessive focus on Internet games; (2) experiencing withdrawal symptoms when unable to engage in Internet gaming; (3) developing a tolerance and needing to spend more time playing Internet games; (4) unsuccessful attempts to control or limit Internet game participation; (5) loss of interest in previous hobbies and entertainment, except for Internet games; (6) persistent excessive use of Internet games despite awareness of negative effects on one's social and psychological well-being; (7) deceiving family members, therapists, or others about the amount of time spent on the Internet; (8) using Internet games as a means to escape or alleviate negative moods; and (9) jeopardizing or losing important relationships, employment, educational, or career opportunities due to excessive involvement in Internet games (American Psychological Association, 2022).

IGD in Adolescents

In a recent study, Khalid and Mukhtar (2022) examined the epidemiology and underlying variables of IGD in two age groups: those aged 13 – 17 and older. Empirical studies have shown that IGD is more common among younger persons, particularly those aged 16 – 21 years, compared to adults (Sun, 2023). Recent studies have shown that adolescents tend to be drawn to a particular feature of the Internet, which may result in increased engagement in certain activities. This propensity can be ascribed to their recurrent discontent with bodily appearance and other internal preoccupations (Sun, 2023). Adolescents can use the Internet to experiment with several identities, helping them discover which ones match their particular preferences and potentially satisfy unmet psychological or social needs. Scholars have investigated how teenagers might create virtual identities using various platforms such as chat rooms and online role-playing games (Zhu et al., 2022; Sun, 2023).

Adolescents can create screen identities or use other pseudonyms on these platforms, which allows them to be anonymous and different from their real selves' offline. While social networking site users may not enjoy absolute anonymity, they do have the ability to carefully curate their accounts and decide which aspects of their personality to showcase, as well as which images they deem to be an authentic representation of themselves. As per the findings of Musetti et al. (2022), people may demonstrate heightened perceptiveness and an improved ability to portray themselves.

Moreover, there was concern about the possible postponement of resolving an identity crisis that could emerge from the adoption of many personas. During adolescence, there is a possibility that the differences between an individual's real-life characteristics and their online persona may become less clear as their online identity evolves. Some scholars have suggested that the concerns adults have about these new identities and behaviors may not be as well-founded as previously thought. It is argued that these new forms of identity and behavior could potentially provide a safe and advantageous way for individuals to explore and express themselves (Tovar et al., 2023).

Adolescents who participate in online identity deception are more likely to continue engaging in such conduct to mock their friends, rather than to explore a desired or potential identity. The emergence of the Internet has offered folks a new method of forming connections, a pastime that appeals to the majority of people. Due to their inherent feelings of seclusion, adolescents may be especially vulnerable to the appeal of the Internet. As a result, online relationships have become more important in the lives of teenagers. Unfortunately, the Internet may only give the impression of a close association because there is a possibility of false and easily disconnected links that may be accessed with a single mouse click (Caldera, 2022).

Gender and IGD

The current state of research on IGD is primarily in its early phases, with a primary focus on investigating the extent of the illness and investigating possible differences between genders. Extensive research has been carried out on IGD in Pakistan. Research findings indicate that computer gaming is widely popular among university students in Pakistan, regardless of their gender. Zahra et al. (2019) discovered that male university students displayed a greater prevalence of online gaming in comparison to females.

Subsequent inquiries aimed to evaluate the frequency of troublesome Internet gaming among young adults and adolescents. The findings revealed a greater occurrence of problematic gamers in comparison to non-problematic gamers, with males demonstrating a stronger inclination toward problematic gaming behavior. Moreover, participating in online gaming has shown a more pronounced correlation with IGD in comparison to offline gaming. It has been concluded that gender and game genre preferences can have an impact on excessive gaming (Gan et al., 2022).

Few studies have shown gender disparities in IGD (Gomez et al., 2022; Fatima et al., 2023). Gender differences are also evident

in the motivations that drive involvement in online gaming. According to Yang et al. (2023), there is a significant disparity in achievement motivations between males and females when participating in online gaming. Boys generally have more pronounced achievement motives in comparison to girls. Conversely, girls appear to have greater motivation for engaging in online gaming due to socialization factors. Hence, the research conducted by Yang et al. (2023) revealed that males exhibit a higher susceptibility to reporting heightened levels of IGD in comparison to females.

Nevertheless, the research conducted by Gan et al. (2022) demonstrated that both males and females demonstrate similar socialization motivations when participating in gaming activities. In contrast, Xiang et al. (2022) found a significant gender gap, with boys showing a greater inclination than girls to engage in gaming for enjoyment, competition, achievement, cognitive stimulation, and emotional factors such as excitement, relaxation, and anger management. Furthermore, there is a virtually equal distribution of motivated individuals, both male and female, who demonstrate notable levels of drive derived from their creativity and curiosity.

Kakul and Javed (2023) discovered a notable and affirmative correlation between symptoms of sadness and anxiety and IGD. In addition, the study found that males displayed elevated levels of both despair and anxiety in comparison to females. Nevertheless, stress levels were discovered to be largely comparable among genders. A recent study conducted by Wang et al. (2022) found a significant discrepancy in the prevalence of IGD between males and females, with males showing higher levels of IGD. Furthermore, a distinct inquiry into Internet addiction discovered a substantial correlation between IGD and individuals self-identifying as masculine (Yu et al., 2021).

IGD and Aggression

Aggression encompasses a spectrum of actions that have the potential to cause bodily or psychological damage to oneself, others, or things in the surroundings. This behavior is characterized by the deliberate infliction of physical or emotional harm to another person, which greatly increases the risk of injury, death, psychological damage, impaired development, or deprivation (Weltens et al., 2021). The presence of competition and lack of supervision in online gaming might provoke aggressive tendencies (Fatima et al., 2023). Researchers have consistently investigated the correlation between online gaming throughout adolescence and aggressive behavior (Li et al., 2023). Nevertheless, a scarcity of research has directly linked IGD with aggressive conduct. During the early 21st century, numerous studies focused on examining media's impact on adolescents' aggressive behavior (Vannucci et al., 2020; Li et al., 2023).

Researchers have examined the possible correlation between online gaming and violent or aggressive conduct due to the advancement of online gaming. However, the findings have been inconclusive and varied (Li et al., 2023). Moreover, it has been found that regular exposure to violent media and excessive Internet gaming increases the likelihood of engaging in risky behavior with firearms (Deng et al., 2024). Nevertheless, a tenuous association between engaging in video games and displaying aggressive behavior has been observed (Li et al., 2023). These associations, however, were found to lack statistical significance over 5 years (Coyne et al., 2020). In addition, hostility is intricate, diverse, and influenced by multiple factors. The absence of inquiry into the association between Internet gaming-related characteristics and aggression hampers efforts to prevent potential aggressive conduct among adolescents with IGD (Ghali et al., 2023).

Adolescents are well recognized to exhibit emotional instability and impulsive behavior as part of their psychological makeup. Prior research has indicated that adolescents who engage in excessive and habitual online gaming are very susceptible to engaging in violent behaviors, including suicide and acts of aggression. Adolescents tend to engage in addictive activities. Additionally, it was found that Internet addiction worsens aggressive behavior as time goes on. Furthermore, there is a correlation between maladaptive Internet use and heightened levels of irritation and unpleasant emotions, which might potentially amplify aggressive inclinations (Bersani et al., 2022) (Figure 1).

Theoretical Framework of IGD and Aggression

Social Learning Theory

Social learning theory (SLT) posits that individuals learn through observation and imitation of others (Bandura, 1977). In the context of online gaming, exposure to aggressive behavior by peers or characters within the game may contribute to the development and reinforcement of aggressive tendencies. Continuous exposure to virtual violence and aggressive themes in games may lead to desensitization, reducing sensitivity to real-world aggression and making aggressive behavior more acceptable or normalized (Li et al., 2023).

Frustration-Aggression Theory

This theory states that frustration within the gaming environment, such as losing a match or facing obstacles, could trigger aggressive responses (Breuer & Elson, 2017). The competitive nature of many online games may heighten frustration levels, leading to increased aggression both within the gaming context and potentially in real-life interactions (Yilmaz et al., 2023).

Cognitive Neo-association Model

This model suggests that certain environmental cues can activate aggressive thoughts and feelings. In the context of IGD, specific gaming situations, interactions, or perceived threats within the

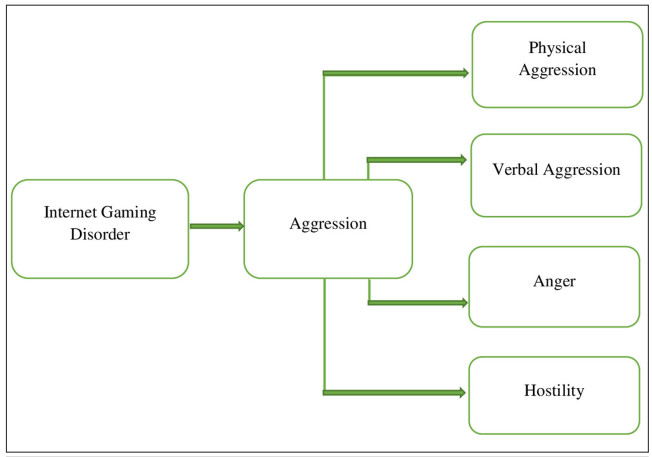

Figure 1. Integrated model of IGD and aggression

game environment may serve as triggers for aggressive behavior (Berkowitz, 2012).

Hypotheses

- The levels of IGD and aggression (including Physical Aggression, Verbal Aggression, Anger, and Hostility) are higher in adolescent boys as compared to adolescent girls.
- Mean scores of aggression (including Physical Aggression, Verbal Aggression, Anger, and Hostility) would differ across gamer and non-gamer adolescents.

Material and Methods

Research Design and Participants

The study has chosen a cross-sectional design to investigate the variations in the hypotheses indicated above, using a convenient sampling technique. The study comprised a total of 376 participants, with 240 males and 136 females. The age range of the participants was between 14 and 19 years. They were selected from a variety of private colleges and schools in the twin cities. The sample size was determined using G-Power software. The study included only those participants who voluntarily agreed to participate and possessed a sufficient level of English proficiency to comprehend and complete the forms.

Ethical Committee Approval

The study was conducted after obtaining ethical approval from the Institutional Review Board at Bahria University Islamabad, Pakistan (approval number: 01032023; Date 15th March, 2023), and adhering to Helsinki criteria.

Measures

Participants were instructed to provide their demographic information on a data sheet, which contained details such as gender, age, education level, and other relevant information. In addition, they filled out two questionnaires, namely the Internet Gaming Disorder Scale 9—Short Form (IGDS9-SF; Pontes & Griffiths, 2015) and Buss and Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992).

Demographic Variable Sheet

The demographic sheet included data on age, gender, education, and socio-economic status.

Internet Gaming Disorder Scale 9—Short Form

The IGDS9-SF was developed by Pontes and Griffiths in 2015. The criteria for IGD, as outlined in the DSM5 (2013), served as the basis for it. The overall score can be determined by summing the responses of participants to the nine items, which range from 9 to 45. A higher score indicates a higher level of IGD. The authors confirmed the scale's adequate reliability by thoroughly analyzing the additional data.

Buss – Perry Aggression Questionnaire

BPAQ, which stands for the Buss – Perry Aggression Questionnaire, is alternatively referred to as the Aggression Questionnaire (Buss & Perry, 1992). It consists of 29 items presented in a 5-point Likert format, ranging from 1 (indicating "very uncharacteristic of me") to 5 (indicating "highly characteristic of me"). It further consists of four subscales, which were determined by component analyses. These subscales include Physical Aggression (PA; nine items), Verbal Aggression (VA; five items), Anger (A; seven items), and Hostility (H; eight items). The authors confirmed the adequate reliability of the scale by confirming: PA (.82), VA (.68), A (.70), and H (.75).

Procedure

A cohort of 376 individuals (240 males, 136 females) aged between 14 and 19 were chosen from various educational institutions in the twin towns of Rawalpindi and Islamabad. The data from the participants were obtained using a convenient sampling technique. Data were gathered in two distinct phases: the initial phase encompassed the collecting of data, while the subsequent phase focused on the analysis of the collected data. A signed informed consent was obtained from the participants, and upon granting their consent, they proceeded to complete the questionnaire. The data were examined using SPSS 25 (IBM SPSS Corp.; Armonk, NY, USA) once it was collected. The data were subjected to two-way and mixed factorial analysis of variance (ANOVA) using SPSS.

Ethical Consideration

The participants were provided with comprehensive information about the research and obtained their written consent. They were guaranteed that the results would remain confidential. The individuals willingly participated and were granted complete autonomy to withdraw from the research at any point. Finally, the participants were appreciative of their involvement in the research project.

Results

The above table displays the descriptive statistics of demographic variables. Frequencies and percentages were calculated for categorical variables revealing that 140 (37.2%) participants fell into the 14 – 16 age group, while 236 (62.8.5) participants fell into the 17 – 19 age group (Table 1). Additionally, 240 (63.8%) were male, and 136 (36.2%) were female. Moreover, 53 (14.1%) participants were in secondary school, 89 (23.7%) were in matriculation, 153 (40.7%) in FSc, and 81 (21.5%) were undergraduate

Table 1.
Frequencies and Percentages of the Demographic Characteristics of Participants of the Study (N = 376)

Characteristics of the Participants	Categories	*f*	%
Age	14 – 16	140	37.2
	17 – 19	236	62.8
Gender	Males	240	63.8
	Females	136	36.2
Education	Secondary	53	14.1
	Matric	89	23.7
	F.Sc.	153	40.7
	Undergraduate student	81	21.5
Socio-economic status	Lower	55	14.6
	Middle	147	39.1
	Upper middle	141	37.5
	Upper class	33	8.8
Gaming groups	Non-gamers	294	78.2
	Gamers	82	21.8

Note: *f* = Frequency.

students. Furthermore, 55 (14.6%) participants were from the lower, 147 (39.1%) were from the middle class, 141 (37.5%) were from the upper-middle class, and 33 (8.8%) were from the upper class. However, 294 (78.2%) were non-gamers, and 82 (21.8%) were gamers.

The results of the two-way ANOVA illustrate a significant main effect of IGD, Physical aggression, Verbal aggression, Anger, and Hostility across male and female participants (Table 2). The results indicate evidence of the main effect for the assessment of IGD with $F(1.374) = 6.362$, $p = .014$ (Figure 2A). Further results indicated evidence of the significance of the main effect for the assessment of Aggression with $F(1.374) = [6.645]$, $p = .010$, PA with $F(1.374) = [5.270]$, $p = .021$, VA with $F(1.374) = [4.619]$, $p = .033$, Anger with $F(1.374) = [5.269]$, $p = .032$, and Hostility with $F(1.374) = [4.711]$, $p = .031$, respectively. See Figure 2B and 2C.

The results of mixed factorial ($2 \times 2 \times 2$) ANOVA illustrated a significant main effect of Aggression (including PA, VA, A, and H) across male and female participants of both groups (G1 and

Table 2.
Two-way (2 × 2) ANOVA for the Assessment of IGD and Aggression (Including PA, VA, A, and H) across Male and Female Participants (N = 376)

	Male ($N = 240$)		Female ($N = 136$)				
Variables	**M**	**SD**	**M**	**SD**	**F(1,374)**	***p***	η^2
IGD	27.11	8.68	24.27	9.89	6.362	.014	.018
BPAQ	81.02	22.16	74.63	24.68	6.645	.010	.017
PA	25.10	7.62	22.03	9.03	5.270	.021	.014
VA	14.93	4.70	14.82	4.13	4.619	.033	.012
A	19.71	6.22	18.15	6.50	5.269	.022	.014
H	21.28	6.95	19.62	7.40	4.711	.031	.012

Note: η^2 = Eta square; M = Mean; SD = Standard deviation.

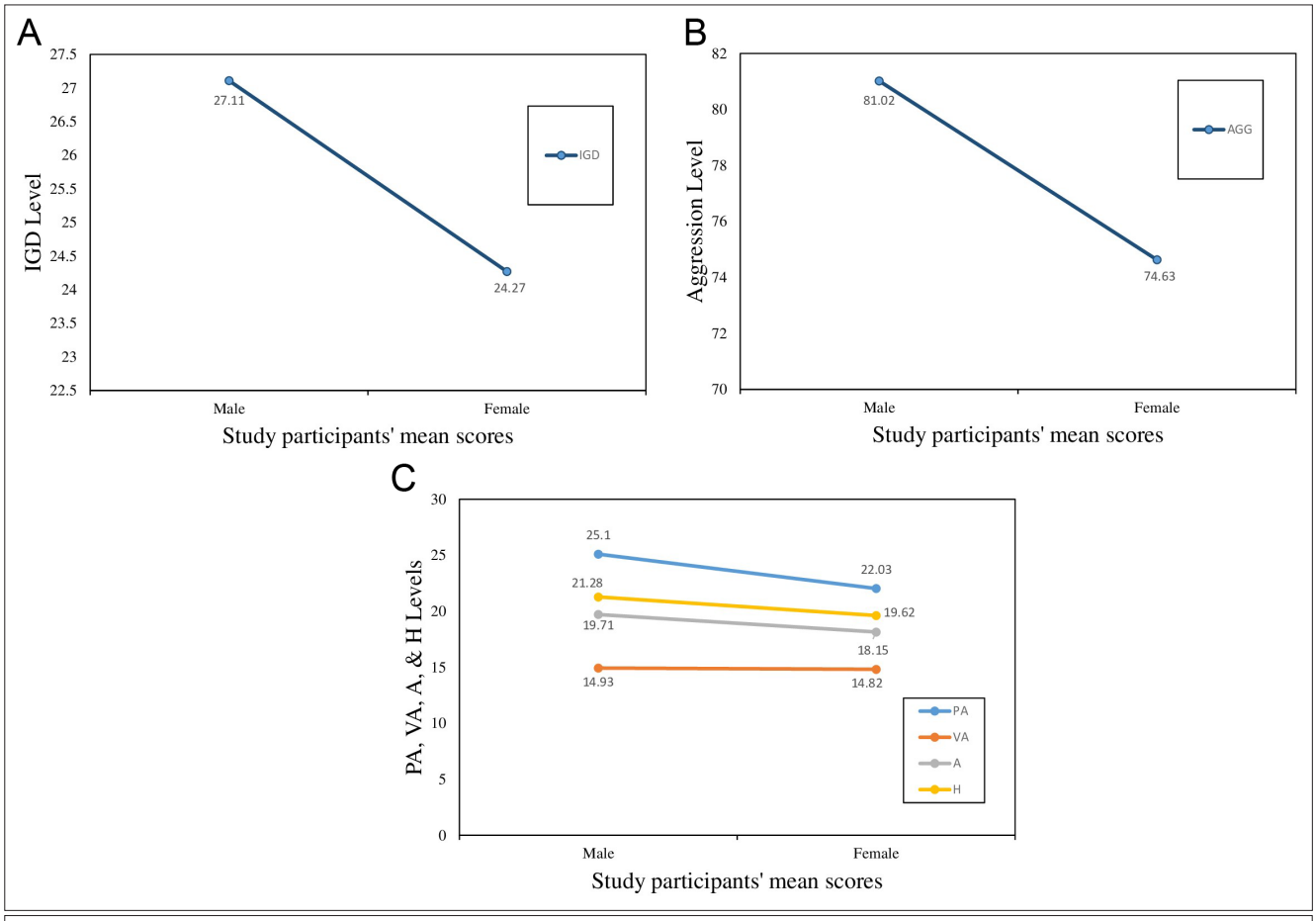

Figure 2. (A) Mean differences of IGD across male and female participants. (B) Mean differences of aggression across male and female participants. (C) Mean differences of PA, VA, Anger, and Hostility across male and female participants.

Table 3.
Mixed Factorial (2 × 2 × 2) ANOVA for the Assessment of PA, VA, Anger, and Hostility across Male and Female Participants of Gamers and Non-Gamers Groups (N = 376)

	Gamers (G1) (*N* = 82)				Non-gamers (G2) (*N* = 294)						
	Male (*N* = 63)		Female (*N* = 19)		Male (*N* = 177)		Female (*N* = 117)				
Variables	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F(1,374)**	***p***	η^2
BPAQ	96.21	28.40	93.02	24.66	76.75	19.56	71.12	22.25	49.530	.001	.117
PA	32.53	7.60	29.75	7.77	23.54	6.90	20.84	8.39	57.825	.001	.134
VA	18.26	5.09	16.90	5.52	14.00	4.60	13.84	3.86	33.944	.001	.083
A	25.37	7.52	22.13	6.82	18.83	5.85	17.31	6.80	30.459	.001	.075
H	28.84	7.46	24.24	7.47	20.15	6.51	18.56	6.68	37.149	.001	.090

Note: η^2 = Eta square; M = mean; SD = Standard deviation.

G2) (Table 3). The results indicate evidence of the significance of the main effect for the assessment of Aggression with $F(1.374) = [49.530]$, $p < .001$, PA with $F(1.374) = [57.825]$, $p < .001$, VA with $F(1.374) = [33.944]$, $p < .001$, A with $F(1.374) = [30.459]$, $p < .001$, and H with $F(1.374) = [37.149]$, $p < .001$, respectively. See Figure 3A, 3B, 3C, 3D, and 3E.

Discussion

Internet gaming disorder has received increasing scientific scrutiny on a global scale; however, there have been limited investigations undertaken in Pakistan. The main aim of this study was to assess the frequency of IGD and aggression among adolescents in Pakistan. This study aims to investigate the relationship between IGD, gender, and the resulting Aggression effects in adolescents by formulating two hypotheses. The primary hypothesis posits that the levels of IGD and Aggression (including PA, VA, Anger, and Hostility) are higher in adolescent boys as compared to adolescent girls.

The two-way ANOVA results indicate a statistically significant main effect of IGD and Aggression (including PA, VA, A, & H) among male and female participants. Results indicated evidence of the main effect for the assessment of IGD with $F(1.374) = [6.362]$, $p = .014$, Aggression with $F(1.374) = [6.645]$, $p = .010$, PA with $F(1.374) = [5.270]$, $p = .021$, VA with $F(1.374) = [4.619]$, $p = .033$, Anger with $F(1.374) = [5.269]$, $p = .022$, and Hostility with $F(1.374) = [4.711]$, $p = .031$, respectively. These results support the hypothesis and conclude that the levels of IGD and Aggression are higher in adolescent boys compared to adolescent girls.

The primary hypothesis posits that the prevalence of IGD and aggression is higher among adolescent males than among adolescent females, and the results align with previous research findings. Cultural norms and gender roles may influence the conduct of adolescents in Pakistan (Rasheed et al., 2021). Gender disparities may exist in terms of the accessibility of gaming platforms, technological resources, and societal views toward gaming. The study conducted by Shabbir et al. (2021) on technology access and gaming activity in Pakistan could provide insights into potential gender discrepancies between boys and girls. Interactions among peers and the process of socialization have a vital impact on the formation of aggressive behavior. An investigation of the impact of peer influence and social dynamics on IGD and aggression in adolescents is persistent (Yu et al., 2021).

Multiple studies consistently show that boys display greater levels of engagement in excessive gaming, both in terms of how often they play and how long they play, as compared to girls. The gender discrepancy in gaming behavior can be attributed to various factors, including societal norms, individual gaming preferences, and peer influence (Gomez et al., 2022; Yang et al., 2023). Whereas, the gaming business has historically prioritized targeting a male audience, hence leading to a higher prevalence of gaming among adolescent boys with a greater inclination toward specific genres of games, such as those involving competition, action, and aggressiveness (Millington, 2020). Additionally, online gaming can be fiercely competitive and may entail encounters that incite hostility and result in a greater susceptibility to experiencing heightened degrees of IGD and aggression as opposed to females (Lacko et al., 2022). Thus, the results and previous investigations confirm the initial hypothesis.

The secondary hypothesis posits that mean scores of Aggression (including PA, VA, Anger, and Hostility) would differ across gamer and non-gamer adolescents, based on the premise that engagement in video gaming may have an impact individuals' aggressive tendencies. Recent studies have explored the relationship between gaming and aggression in adolescents, with some suggesting that mean scores of aggression (including PA, VA, Anger, and Hostility) differ across gamer and non-gamer adolescents (Jang et al., 2021; Rosenthal & Belmas, 2021). It has been observed that adolescent gamers had higher levels of aggression compared to non-gamers, with a significant difference in physical aggression, and indicated that males were more likely to engage in verbal and physical aggression than females (Kort - Butler, 2021; Li et al., 2023).

Several studies found that adolescent gamers had higher levels of aggression than non-gamers (Charmaraman et al., 2020: Kort - Butler, 2021; Macur & Pontes, 2021). Additionally, it has been found that males had higher levels of aggression than females (Deng et al., 2024). Moreover, adolescent gamers demonstrated higher levels of aggression, including physical aggression, verbal aggression, and hostility, compared to non-gamers (Li et al., 2023). Furthermore, the relationship between gaming and aggression was stronger for males than females (Yu et al., 2021). Overall, recent literature suggests that mean scores of aggression may differ across gamer and non-gamer adolescents, with adolescent gamers exhibiting higher levels of aggression than

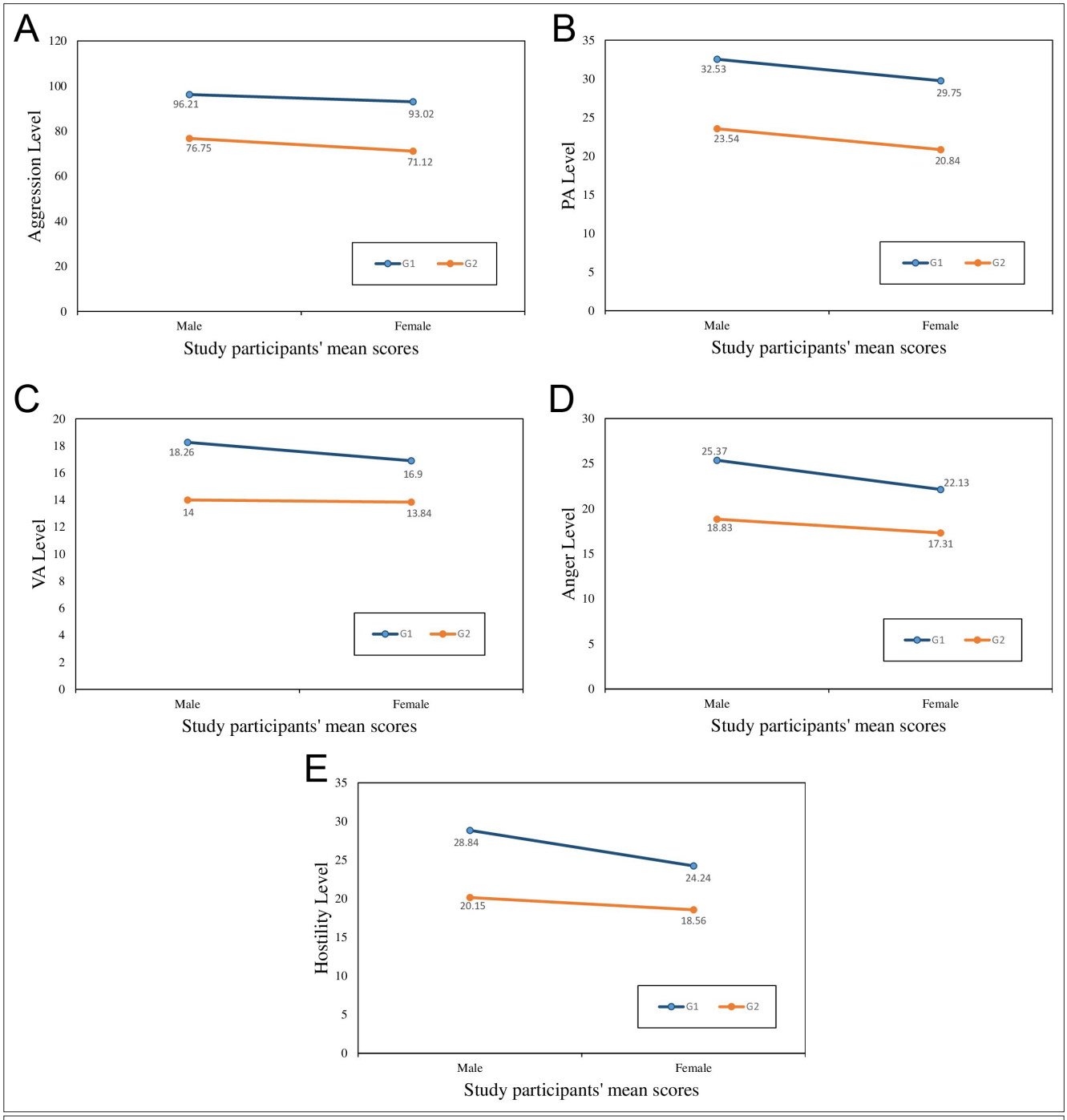

Figure 3. (A) Mean differences of aggression across male and female participants of G1 and G2. (B) Mean differences of physical aggression across male and female participants of G1 and G2. (C) Mean differences of verbal aggression across male and female participants of G1 and H2. (D) Mean differences of anger across male and female participants of G1 and G2

non-gamers. Thus, the results and previous investigations support the hypothesis.

A thorough investigation of the association between IGD and aggression in adolescent males and females, both gamers and non-gamers, could uncover the intricate linkages between these two factors. The study is significant due to the widespread popularity of Internet gaming, particularly among adolescents. The study's pertinence to conduct in the digital technology era is heightened. The study establishes a link between IGD, aggression, and gender differences among gamers and non-gamers. This comprehensive study investigates IGD and aggression, particularly in adolescent males and females. The focus is on examining the role of aggression among gamers and non-gamers.

To create effective treatment and prevention approaches for IGD and aggression, it is crucial to have a comprehensive understanding of these specific traits. To comprehend the psychological roots of IGD, it is necessary to analyze the motivations behind people's engagement in gaming, such as the desire to achieve

victory or attain success. Aggression and IGD have a significant impact on public health. There is a growing global awareness regarding the negative impact of excessive gaming on mental health. The findings could assist in customizing treatments aimed at mitigating the symptoms of IGD and the aggression of Pakistani adolescents. Gaining this information is essential for customizing Internet gaming therapies to align with the objectives of adolescents.

The applicability to wider adolescent populations depends on the size and representativeness of the study sample. Results can have advantageous implications outside the sample. The presence of a competitive mindset has an impact on both IGD and aggression. Consequently, implementing early intervention measures may prove beneficial. Early identification of these traits enables the development of preventive and targeted therapies to mitigate the harmful effects of excessive gaming. The study aims to enhance the existing literature on IGD by examining the link between IGD, aggression, and gender differences among gamers and non-gamers. The effects of IGD on aggression in adolescent boys and girls can catalyze gender-specific therapy and uncover gender disparities. This study has the potential to address forthcoming challenges.

The study revealed that adolescent gamers exhibited elevated levels of IGD and aggression compared to non-gamers. Furthermore, it was shown that males displayed higher levels of aggression than girls. The study additionally proposed that an abundance of gaming could potentially contribute to the emergence of aggressive conduct in adolescents. The findings of this study hold significant significance for parents, educators, and mental health professionals who engage with adolescents. The results indicate the significance of monitoring and restricting gaming habits in adolescents, especially in males who may have a greater susceptibility to acquiring aggressive inclinations.

Moreover, the research emphasizes the necessity of prompt intervention and therapy for adolescents who display indications of IGD and aggressive conduct. The outcomes of this study can be utilized by mental health practitioners to create efficacious programs that address both gaming behavior and aggressive inclinations. Ultimately, the study yields significant insights into the link between IGD and aggression among adolescent males and females. The findings can be utilized to guide preventative and intervention initiatives targeted at mitigating the adverse consequences of excessive gaming and fostering sound adolescent growth.

Limitations and Recommendations

This study has some limitations. First, the study is cross-sectional, therefore causality cannot be established. Gaming and aggression may be affected by pre-existing mental health concerns. Second, the study used self-reported gaming and aggression, which may be biased and unreliable. Participants may have misreported their gaming or aggression. Third, the study only included adolescent males and females, limiting its applicability. Finally, the study did not address game content or social support, which could affect gaming, IGD, and aggression. Despite these limitations, the study sheds light on IGD and adolescent aggression.

The study suggests longitudinal investigations to establish causality and track the development of aggressive tendencies to gaming behavior, IGD, and aggression. Alongside self-reported gaming activity, in-game statistics or parental reports can be used. Studies on how game content and social support affect gaming, IGD, and aggression. Intervention trials to reduce adolescent gaming and aggression. The study sheds information on gaming, IGD, and aggression in adolescents and emphasizes the need for more research.

Ethics Committee Approval: This study was approved by the ethics committee of Bahria University, Pakistan (approval number: 01032023; Date 15th March, 2023).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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References

American Psychiatric Association (2022). *Diagnostic and statistical manual of mental disorders* (5th ed), Text Revision. American Psychiatric Publishing. [CrossRef]

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs: Prentice-Hall.

Berkowitz, L. (2012). A cognitive-neoassociation theory of aggression. *Theories of Social Psychology*, *2*, 99 – 117.

Bersani, F. S., Accinni, T., Carbone, G. A., Corazza, O., Panno, A., Prevete, E., Bernabei, L., Massullo, C., Burkauskas, J., Tarsitani, L., Pasquini, M., Biondi, M., Farina, B., & Imperatori, C. (2022). Problematic use of the internet mediates the association between reduced mentalization and suicidal ideation: A cross-sectional study in young adults. In *Healthcare 10*(5). [CrossRef]

Breuer, J., & Elson, M. (2017). *Frustration-aggression theory* (pp. 1 – 12). Wiley Blackwell.

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63*(3), 452 – 459. [CrossRef]

Caldera, K. (2022). *Is Social Media Prolonging Identity Commitment? The Effects of Social Media Use on Adolescent Identity Formation*. Arizona State University: Doctoral dissertation.

Charmaraman, L., Richer, A. M., & Moreno, M. A. (2020). Social and behavioral health factors associated with violent and mature gaming in early adolescence. *International Journal of Environmental Research and Public Health*, *17*(14), 4996. [CrossRef]

Coyne, S. M., Stockdale, L. A., Warburton, W., Gentile, D. A., Yang, C., & Merrill, B. M. (2020). Pathological video game symptoms from adolescence to emerging adulthood: A 6-year longitudinal study of trajectories, predictors, and outcomes. *Developmental Psychology*, *56*(7), 1385 – 1396. [CrossRef]

Deng, X., Hu, Y. B., Liu, C. Y., Li, Q., Yang, N., Zhang, Q. Y., Liu, L., Qiu, J. N., Xu, H. B., Xue, L., Shi, Y. W., Wang, X. G., & Zhao, H., Qiu, J. N., Xu, H. B., Xue, L., Shi, Y. W., Wang, X. G., & Zhao, H. (2024). Psychological distress and aggression among adolescents with internet gaming disorder symptoms. *Psychiatry Research*, *331*, 115624. [CrossRef]

Fatima, A., Ambreen, F., & Amin, R. (2023). Internet gaming disorder and competitiveness: A cross-sectional study. *Qlantic Journal of Social Sciences and Humanities*, *4*(4), 248 – 259. [CrossRef]

Gan, X., Qin, K. N., Li, M., Li, H., Jin, X., & Yu, C. F. (2022). The relationship between positive youth development and internet gaming disorder in Chinese adolescents: a moderated mediation model. *PLoS One*, *17*(11), e0276174. [CrossRef]

Ghali, S., Afifi, S., Suryadevara, V., Habab, Y., Hutcheson, A., Panjiyar, B. K., Davydov, G. G., Nashat, H., & Nath, T. S., Nashat, H., & Nath, T. S. (2023). A systematic review of the association of Internet gaming disorder and excessive social media use with psychiatric comorbidities in children and adolescents: Is it a curse or a blessing? *Cureus 15*(8), e43835. [CrossRef]

Gomez, R., Stavropoulos, V., Tullett-Prado, D., Schivinski, B., & Chen, W. (2022). Network analyses of internet gaming disorder symptoms and their links with different types of motivation. *BMC Psychiatry*, *22*(1), 76. [CrossRef]

Imataka, G., Sakuta, R., Maehashi, A., & Yoshihara, S. (2022). Current status of Internet gaming disorder (IGD) in Japan: New lifestyle-related disease in children and adolescents. *Journal of Clinical Medicine*, *11*(15), 4566. [CrossRef]

Jang, J. H., Chung, S. J., Choi, A., Lee, J. Y., Kim, B., Park, M., Park, S., & Choi, J. S., & Choi, J. S. (2021). Association of general cognitive functions with gaming use in young adults: A comparison among excessive gamers, regular gamers and non-gamers. *Journal of Clinical Medicine*, *10*(11), 2293. [CrossRef]

Kakul, F., & Javed, S. (2023). Internet gaming disorder: An interplay of cognitive psychopathology. *Asian Journal of Social Health and Behavior*, *6*(1), 36. [CrossRef]

Khalid, A., & Mukhtar, N. (2022). *Internet Gaming Disorder and Mental Health in Pakistani youth: a Path Analysis with Impulsivity and Emotional Intelligence*.

Kort - Butler, L. A. (2021). Gamers on gaming: A research note comparing behaviors and beliefs of gamers, video game players, and non - players. *Sociological Inquiry*, *91*(4), 962 – 982. [CrossRef]

Lacko, D., Dufková, 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.

Li, S., Wu, Z., Zhang, Y., Xu, M., Wang, X., & Ma, X. (2023). Internet gaming disorder and aggression: A meta-analysis of teenagers and young adults. *Frontiers in Public Health*, *11*, 1111889. [CrossRef]

Macur, M., & Pontes, H. M. (2021). Internet Gaming Disorder in adolescence: Investigating profiles and associated risk factors. *BMC Public Health*, *21*(1), 1547. [CrossRef]

Millington, B. (2020). Video games and the political and cultural economies of health-entertainment. In *Re: thinking Publications Leisure in a Digital Age*, 31 – 49.

Musetti, A., Manari, T., Billieux, J., Starcevic, V., & Schimmenti, A. (2022). Problematic social networking sites use and attachment: A systematic review. *Computers in Human Behavior*, *131*, 107199. [CrossRef]

Pontes, H. M., & Griffiths, M. D. (2015). Measuring DSM-5 internet gaming disorder: Development and validation of a short psychometric scale. *Computers in Human Behavior*, *45*, 137 – 143. [CrossRef]

Rasheed, A., Ahsan, S., & Zaheer, S. (2021). Impact of internet gaming disorder on self-appraisal among university students: Moderating role of gender. *Pakistan Journal of Psychological Research*, *36*(3), 451 – 471. [CrossRef]

Rosenthal, H. M., & Belmas, G. I. (2021). Cyber-recapitulation? What online games can teach social media about content management. *Jurimetrics*, *61*, 331.

Shabbir, T., Shahid, S., Jahangir, S., & Sharafat, S. (2021). DIGITALMEDIA communication and its impacton genders sentiments (a comparative study OF MALE versus FEMALE in Karachi). *PalArch's Journal of Archaeology of Egypt/Egyptology*, *18*(10), 1675 – 1691.

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian and New Zealand Journal of Psychiatry*, *55*(6), 553 – 568. [CrossRef]

Sun, Y. (2023). The role of family on internet addiction: A model analysis of co-parenting effect. *Cogent Social Sciences*, *9*(1), 2163530. [CrossRef]

Tovar, M., Rosillo, M., & Spaniardi, A. (2023). Social Media's influence on identity formation and self expression. In *Teens, screens, and social connection: An evidence-based guide to key problems and solutions* (pp. 49 – 61). Cham: Springer International Publishing.

Vannucci, A., Simpson, E. G., Gagnon, S., & Ohannessian, C. M. (2020). Social media use and risky behaviors in adolescents: A meta-analysis. *Journal of Adolescence*, *79*, 258 – 274. [CrossRef]

Wang, P., Pan, R., Wu, X., Zhu, G., Wang, Y., Tian, M., Sun, Y., & Wang, J., & Wang, J. (2022). Reciprocal associations between shyness, depression, and Internet gaming disorder among Chinese adolescents: A cross-lagged panel study. *Addictive Behaviors*, *129*, 107256. [CrossRef]

Weltens, I., Bak, M., Verhagen, S., Vandenberk, E., Domen, P., van Amelsvoort, T., & Drukker, M. (2021). Aggression on the psychiatric ward: Prevalence and risk factors. A systematic review of the literature. *PLOS ONE*, *16*(10), e0258346. [CrossRef]

Xiang, G. X., Gan, X., Jin, X., Zhang, Y. H., & Zhu, C. S. (2022). Developmental assets, self-control and internet gaming disorder in adolescence: Testing a moderated mediation model in a longitudinal study. *Frontiers in Public Health*, *10*, 808264. [CrossRef]

Yang, X., Ebo, T. O., Wong, K., & Wang, X. (2023). Relationships between psychological flexibility and internet gaming disorder among adolescents: Mediation effects of depression and maladaptive cognitions. *PLOS ONE*, *18*(2), e0281269. [CrossRef]

Yilmaz, R., Sulak, S., Griffiths, M. D., & Yilmaz, F. G. K. (2023). An exploratory examination of the relationship between internet gaming disorder, smartphone addiction, social appearance anxiety and aggression among undergraduate students. *Journal of Affective Disorders Reports*, *11*, 100483. [CrossRef]

Yu, Y., Mo, P. K. H., Zhang, J., Li, J., & Lau, J. T. F. (2021). Why is Internet gaming disorder more prevalent among Chinese male than female adolescents? The role of cognitive mediators. *Addictive Behaviors*, *112*, 106637. [CrossRef]

Zahra, S., Kiani, S., & Shahbaz, K. (2019). Internet gaming disorder: An emerging addiction among Pakistani university students. *NUST Journal of Social Sciences and Humanities*, *5*(1), 87 – 104.

Zhu, K., Xie, X., Liu, Q., Meng, H., & Song, R. (2022). Internet addiction: Prevalence and relationship with academic burnout among undergraduates during widespread online learning. *Perspectives in Psychiatric Care*, *58*(4), 2303 – 2309. [CrossRef]