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Understanding Proactive Aggression and Its Association with Internet Gaming Disorder in Adolescents

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Abstract

Internet Gaming Disorder (IGD) has become a prevalent concern among adolescents worldwide, including in India, where approximately 19.4% of adolescents exhibit problematic gaming behaviors. This study investigates the relationship between IGD and proactive aggression among 845 adolescents in Visakhapatnam, aged 14-21 years, using the Internet Gaming Disorder Scale - Short Form (IGDS9-SF) and the Reactive-Proactive Aggression Questionnaire (RPQ). Demographic variables including age, gender, and education levels were examined for their influence on IGD and aggression. Results indicated that late adolescents, males and rural residents showed higher levels of both IGD and proactive aggression, while middle adolescents exhibited heightened proactive aggression. Rural and postgraduate students also demonstrated increased aggression, emphasizing the impact of socio-environmental factors on behavioral outcomes. The study highlights the need for targeted interventions to address gaming addiction and aggressive behaviors among adolescents in diverse socio-cultural contexts.

Keywords: Adolescents, Gaming Addiction, Youth Behavior, Mental Health

Introduction

Internet gaming disorder (IGD) has emerged as a significant behavioral concern, particularly among adolescents. This phenomenon is characterized by excessive and compulsive use of internet games, leading to negative consequences in various aspects of life, such as academic performance, social relationships, and psychological well-being. The prevalence of IGD among adolescents is increasing globally, and India is no exception. A study conducted by Yadav et al. (2019) revealed that approximately 19.4% of Indian adolescents exhibited problematic gaming behavior, indicating a pressing need to understand and address this issue within the Indian context.

Aggression, a multifaceted construct that includes both reactive and proactive forms, has been widely studied in relation to IGD. Reactive aggression is an impulsive response to perceived threats, while proactive aggression is a deliberate behavior aimed at achieving a specific goal. Research suggests that excessive gaming, particularly involving violent games, can be linked to increased aggressive behaviors in adolescents. A meta-analysis by Anderson et al. (2010) found a consistent association between violent video game exposure and heightened aggressive behavior, aggressive cognitions, and aggressive affect. In India, the rapid proliferation of smartphones and internet accessibility has made it easier for adolescents to engage in prolonged gaming sessions, raising concerns about the potential for increased aggression. Studies have highlighted that the content of the games, the time spent playing, and the immersive nature of gaming can contribute to aggression in adolescents (Chakraborty et al., 2021).

According to the World Health Organization (WHO), adolescence spans from ages 10 to 19, which is further divided into early adolescence (10-13 years), middle adolescence (14-16 years), and late adolescence (17-19 years). Similarly, UNICEF and UNESCO follow these age ranges, recognizing the transitional phases adolescents go through as they mature into adulthood. Adolescents in this stage often experience increased independence and may encounter conflicts with parents as they seek autonomy (UNICEF, 2011). India, with its vast and diverse population, has a substantial proportion of adolescents. According to the Census of India 2011, adolescents (ages 10-19) constituted about 20% of the total population, making India home to one of the largest adolescent populations in the world. This demographic group is crucial for the country's socio-economic development.

Adolescence is a critical developmental period characterized by significant physical, psychological, and social changes. It is typically categorized into three stages: early, middle, and late adolescence. In the Indian context, middle adolescence typically spans from 14 to 17 years, while late adolescence includes individuals aged 18 to 21. These classifications are based on various developmental milestones and the transition from dependence to independence. Middle adolescence is marked by rapid physical growth, sexual maturation, and a heightened focus on peer relationships. During this stage, adolescents begin to form their identity and may experience increased conflict with parents as they seek autonomy (Steinberg, 2014). Late adolescence, on the other hand, is characterized by the consolidation of identity and the pursuit of long-term goals, such as higher education and career planning. This stage is also marked by continued cognitive development, with improvements in abstract thinking and decision-making abilities (UNESCO, 2017). In the Indian context, late adolescence is also a time when individuals face significant societal and familial expectations regarding their future roles and responsibilities (Arnett, 2000).

During the COVID-19 lockdown, adolescents significantly increased their internet gaming activity as a way to cope with restricted movement and social isolation. Studies, such as those by King et al. (2020) and Bhattacharya et al. (2021), reported a substantial rise in gaming time and addiction among adolescents, driven by the need for entertainment and social interaction online. This surge in gaming was associated with both positive benefits, like stress relief and social connections, and negative outcomes, such as exacerbated symptoms of internet gaming disorder (IGD) and increased aggressive behaviors. Reduced face-to-face interactions and prolonged exposure to competitive and violent gaming content were noted as contributing factors to heightened aggression among adolescents, as observed in research by Coyne et al. (2020) and Kuss et al. (2021).

Given the significant increase in internet gaming among adolescents and its associated negative impacts, such as heightened aggressive behaviors, there is a pressing need to further investigate

this phenomenon. Understanding the specific factors that contribute to the escalation of aggression in the context of increased gaming is essential for developing effective interventions and support mechanisms. The aim of this study is to investigate the effect of and relationship between Internet Gaming Disorder (IGD) and proactive aggression, as measured by the Reactive-Proactive Aggression Questionnaire (RPQ), among adolescents. Additionally, the study will examine how various demographic variables, such as age, gender, and socio-economic status, influence this relationship. The findings will provide critical insights for educators, parents, and policymakers to address the emerging challenges of internet gaming addiction and its repercussions on youth behavior.

Objectives

1. To examine the significance of demographic variables in relation to Internet Gaming Disorder (IGD) and Reactive-Proactive Aggression Questionnaire (RPQ) among adolescents.
2. To investigate the relationship between Internet Gaming Disorder (IGD) and proactive aggression (RPQ) by analyzing the correlation between these two variables.
3. To assess the impact of Internet Gaming Disorder (IGD) on proactive aggression (RPQ) through regression analysis, determining the predictive value of IGD on levels of proactive aggression among adolescents.

Hypotheses

1. Demographic variables significantly influence the levels of Internet Gaming Disorder (IGD) and proactive aggression (RPQ) among adolescents.
2. There is a positive correlation between Internet Gaming Disorder (IGD) and proactive aggression (RPQ) among adolescents.
3. Internet Gaming Disorder (IGD) significantly predicts proactive aggression (RPQ) among adolescents, with higher levels of IGD leading to increased proactive aggression.

Method

Sample

A sample of 845 adolescents was collected from various schools and colleges in Visakhapatnam, ensuring confidentiality and obtaining all necessary permissions for the study. The sample is divided into two age groups, 14-17 years (middle adolescence) comprising 45.8% (387 participants) and 18-21 years (late adolescence) comprising 54.2% (458 participants). The gender distribution includes 39.5% males (334 participants) and 60.5% females (511 participants). Educational levels of the participants vary, with 16.6% (140 participants) in secondary education, 29.2% (247 participants) in intermediate education, 37.0% (313 participants) pursuing undergraduate degrees, and 17.2% (145 participants) in postgraduate studies.

Measures

Internet Gaming Disorder Scale - Short Form (IGDS9-SF), developed by Pontes and Griffiths in 2015, is a brief and widely used tool to assess Internet Gaming Disorder (IGD) in adolescents and adults. It consists of nine items aligned with the DSM-5 diagnostic criteria for IGD, rated on a 5-point Likert scale from "never" (1) to "very often" (5). With strong psychometric properties, including high reliability and validity, the IGDS9-SF is a reliable measure of gaming addiction severity across different populations (Pontes & Griffiths, 2015)

Reactive-Proactive Aggression Questionnaire (RPQ), developed by Raine et al. in 2006, is a self-report tool designed to distinguish between reactive and proactive aggression in children and adolescents. It consists of 23 items divided into two subscales: reactive aggression (11 items) and proactive aggression (12 items). Reactive aggression involves impulsive, retaliatory responses to perceived threats, while proactive aggression is deliberate and goal-directed. Each item is rated on a 3-point scale: "never" (0), "sometimes" (1), and "often" (2). The RPQ is widely validated and used in research to assess aggressive behaviors and understand their underlying motivations in youth populations (Raine et al., 2006).

Demographic Information Sheet was used to collect various demographic information about the sample including age, gender, area of residency and education.

Statistical Techniques

Descriptive and inferential statistics will be used. The data is analyzed using SPSS software 27th version. 't' test and one-way ANOVA, Correlation and Multiple Regression are used to analyze the data.

Results and Discussion

Table 1. Independent Samples t-Test for IGD and RPQ Scores by Age

	AGE	N	Mean	SD	t	p
INTERNET GAMING DISORDER	14-17	387	16.50	7.330	-3.411**	.001
	18-21	458	18.23	7.399		
REACTIVE AGGRESSION	14-17	387	8.61	4.346	1.026	.305
	18-21	458	8.31	4.201		
PROACTIVE AGGRESSION	14-17	387	5.66	4.657	2.112*	.035
	18-21	458	5.00	4.522		
TOTAL AGGRESSION	14-17	387	14.28	7.822	1.797	.073
	18-21	458	13.31	7.828		

Significant value: ** $P < 0.01$, * $P < 0.05$

Table 1, independent samples t-test was conducted to compare IGD and RPQ scores between middle adolescence (14-17 years) and late adolescence (18-21 years). Results revealed that adolescents aged 18-21 had significantly higher IGD scores ($M = 18.23$, $SD = 7.399$) compared to those aged 14-17 ($M = 16.50$, $SD = 7.330$), $t = -3.411$, $p = .001$, indicating a greater propensity for internet gaming disorder in late adolescents. However, proactive aggression scores were significantly higher in middle adolescence ($M = 5.66$, $SD = 4.657$) compared to late adolescence ($M = 5.00$, $SD = 4.522$), $t = 2.112$, $p = .035$, indicating that younger adolescents are more likely to exhibit proactive aggressive behaviors. In terms of reactive aggression ($M = 8.61$, $SD = 4.346$ for 14-17 years; $M = 8.31$, $SD = 4.201$ for 18-21 years), $t = 1.026$, $p = .305$ and total aggression ($M = 14.28$, $SD = 7.822$ for 14-17 years; $M = 13.31$, $SD = 7.828$ for 18-21 years), $t = 1.797$, $p = .073$, no significant difference was observed between the two age groups.

Late adolescents exhibit higher levels of Internet Gaming Disorder (IGD) due to increased autonomy, greater access to digital devices, and higher exposure to online gaming environments. A study by Müller et al. (2015) found that older adolescents and young adults reported higher levels of problematic gaming behaviors compared to their younger counterparts, suggesting that age plays a significant role in the prevalence of IGD. Middle adolescents exhibit higher proactive aggression due to developmental changes, the quest for social dominance, and the influence of peer dynamics. According to Raine et al. (2006), proactive aggression is more prevalent during early to middle adolescence, as this is a critical period for social and emotional development where aggressive behaviors may be used to navigate peer relationships and social hierarchies.

Table 2. Independent Samples t-Test for IGD and RPQ Scores by Gender

	GENDER	N	Mean	SD	t	p
INTERNET GAMING DISORDER	MALE	334	20.46	7.641	10.139***	.000
	FEMALE	511	15.46	6.554		
REACTIVE AGGRESSION	MALE	334	8.80	4.228	1.935	.053
	FEMALE	511	8.22	4.283		
PROACTIVE AGGRESSION	MALE	334	6.41	4.906	5.762***	.000
	FEMALE	511	4.58	4.229		
TOTAL AGGRESSION	MALE	334	15.21	8.322	4.416***	.000
	FEMALE	511	12.80	7.354		

Significant value: * $P < 0.001$, ** $P < 0.01$, * $P < 0.05$**

Table 2, results revealed that male adolescents had significantly higher Internet Gaming Disorder (IGD) scores ($M = 20.46$, $SD = 7.641$) compared to female adolescents ($M = 15.46$, $SD = 6.554$), $t(843) = 10.139$, $p < .001$, indicating a greater propensity for internet gaming disorder among males. Although males ($M = 8.80$, $SD = 4.228$) exhibited slightly higher reactive aggression scores than females ($M = 8.22$, $SD = 4.283$), the difference was not statistically significant, $t(843) = 1.935$, $p = .053$. For proactive aggression, males also scored significantly higher ($M = 6.41$, $SD = 4.906$) than females ($M = 4.58$, $SD = 4.229$), $t(843) = 5.762$, $p < .001$. In terms of total aggression, males ($M = 15.21$, $SD = 8.322$) showed significantly higher scores compared to females ($M = 12.80$, $SD = 7.354$), $t(843) = 4.416$, $p < .001$.

Males exhibit higher levels of Internet Gaming Disorder (IGD) due to greater engagement in competitive gaming, higher exposure to gaming culture. A study by Griffiths et al. (2016) found that males are significantly more likely to exhibit problematic gaming behaviors, suggesting that gender is a critical factor in the prevalence of IGD. Males exhibit higher proactive aggression due to socialization patterns that encourage assertiveness and has a greater tendency towards competitive and physical activities. According to Card et al. (2008), males exhibit higher levels of proactive aggression to achieve specific goals or assert social dominance, and a meta-analysis by Archer (2004) found that males generally display higher levels of physical aggression than females, supporting the findings of increased total aggression scores among male adolescents.

Table 3. Independent Samples t-Test for IGD and RPQ Scores by Area of residency

	AREA OF RESIDENCY	N	Mean	SD	t	p
INTERNET GAMING DISORDER	RURAL	228	19.15	7.972	3.906***	.000
	URBAN	617	16.80	7.099		
REACTIVE AGGRESSION	RURAL	228	8.64	4.551	.745	.457
	URBAN	617	8.38	4.161		
PROACTIVE AGGRESSION	RURAL	228	6.29	5.275	3.491***	.000
	URBAN	617	4.94	4.261		
TOTAL AGGRESSION	RURAL	228	14.93	8.935	2.442*	.015
	URBAN	617	13.31	7.348		

Significant value: * $P < 0.001$, ** $P < 0.01$, * $P < 0.05$**

Table 3, Welch's t-test results revealed that adolescents from rural areas had significantly higher Internet Gaming Disorder (IGD) scores ($M = 19.15$, $SD = 7.972$) compared to those from urban areas ($M = 16.80$, $SD = 7.099$), $t(368) = 3.906$, $p < .001$, indicating a greater propensity for internet gaming disorder among rural adolescents. Proactive aggression scores were also significantly higher in rural adolescents ($M = 6.29$, $SD = 5.275$) compared to urban adolescents ($M = 4.94$, $SD = 4.261$), $t(342) = 3.491$, $p < .001$ and total aggression scores were significantly higher in rural adolescents ($M = 14.93$, $SD = 8.935$) compared to their urban counterparts ($M = 13.31$, $SD = 7.348$), $t(347) = 2.442$, $p = .015$. No significant difference was found in reactive aggression scores between rural ($M = 8.64$, $SD = 4.551$) and urban adolescents ($M = 8.38$, $SD = 4.161$), $t(376) = .745$, $p = .457$.

Adolescents in rural regions might exhibit higher Internet Gaming Disorder (IGD) scores than those in urban areas. This disparity is often due to fewer recreational activities and social opportunities in rural settings, causing adolescents to rely more on online gaming for entertainment and socialization. According to a study by Lam and Peng (2010), rural adolescents are more likely to engage in excessive gaming due to fewer alternative leisure activities and social outlets. Rural adolescents display higher levels of proactive and total aggression due to lack of mental health care plans by government or concerned authorities, and limited awareness of effective coping mechanisms. According to Chen and Astor (2009), rural youth are often exposed to socialization practices that may foster proactive aggressive behaviors, and research by Piko and Fitzpatrick (2007) indicates that rural adolescents face unique challenges, such as isolation and limited access to mental health resources, which can exacerbate these aggressive behaviors.

Table 4. One-Way ANOVA Results for IGD and RPQ Across Educational Levels

		N	Mean	SD	F	p
	SECONDARY	140	14.89	5.821	7.918***	.000
	INTER	247	17.41	7.927		

INTERNET GAMING DISORDER	UG	313	17.96	7.241		
	PG	145	18.82	7.721		
	Total	845	17.44	7.414		
REACTIVE AGGRESSION	SECONDARY	140	9.79	4.371	6.897***	.000
	INTER	247	7.95	4.198		
	UG	313	8.09	3.937		
	PG	145	8.79	4.701		
	Total	845	8.45	4.268		
PROACTIVE AGGRESSION	SECONDARY	140	4.31	3.672	11.184***	.000
	INTER	247	6.43	4.977		
	UG	313	4.56	4.171		
	PG	145	5.93	5.090		
	Total	845	5.30	4.594		
TOTAL AGGRESSION	SECONDARY	140	14.09	6.907	3.438*	.016
	INTER	247	14.38	8.308		
	UG	313	12.65	7.160		
	PG	145	14.72	8.970		
	Total	845	13.75	7.835		

Significant value: * $P < 0.001$, ** $P < 0.01$, * $P < 0.05$**

Table 4, results revealed significant differences in Internet Gaming Disorder (IGD) scores across different educational levels. Postgraduate (PG) students had the highest IGD scores ($M = 18.82$, $SD = 7.721$), followed by undergraduates (UG) ($M = 17.96$, $SD = 7.241$), intermediate (Inter) students ($M = 17.41$, $SD = 7.927$), and secondary students ($M = 14.89$, $SD = 5.821$), $F(3, 841) = 7.918$, $p < .001$, indicating an increase in IGD with higher educational levels. For reactive aggression, significant differences were also found across educational levels. Secondary students had the highest reactive aggression scores ($M = 9.79$, $SD = 4.371$), followed by postgraduate (PG) students ($M = 8.79$, $SD = 4.701$), undergraduates (UG) ($M = 8.09$, $SD = 3.937$), and intermediate (Inter) students ($M = 7.95$, $SD = 4.198$), $F(3, 841) = 6.897$, $p < .001$. Proactive aggression scores varied significantly as well, with intermediate (Inter) students scoring the highest ($M = 6.43$, $SD = 4.977$), followed by postgraduate (PG) students ($M = 5.93$, $SD = 5.090$), secondary students ($M = 4.31$, $SD = 3.672$), and undergraduates (UG) ($M = 4.56$, $SD = 4.171$), $F(3, 841) = 11.184$, $p < .001$. Postgraduate (PG) students had the highest total aggression scores ($M = 14.72$, $SD = 8.970$), followed by intermediate (Inter) students ($M = 14.38$, $SD = 8.308$), secondary students ($M = 14.09$, $SD = 6.907$), and undergraduates (UG) ($M = 12.65$, $SD = 7.160$), $F(3, 841) = 3.438$, $p = .016$.

Postgraduate students exhibit higher levels of Internet Gaming Disorder due to greater access to digital devices and gaming consoles. A study by Kuss and Griffiths (2012) found that

university students, especially those in postgraduate programs, are at a higher risk of developing IGD due to the combined factors of academic stress and increased autonomy in managing their time and activities. Reactive aggression tends to be more prevalent among secondary students due to ongoing social adjustments and peer interactions. Proactive aggression is often observed among intermediate students, influenced by new social environments and peer group dynamics. Postgraduate (PG) students commonly exhibit higher levels of total aggression, possibly due to elevated academic and social pressures. According to Tremblay et al. (2004), aggressive behaviors, including reactive aggression, peak during early adolescence amidst complex social dynamics and emotional development. Vitaro and Brendgen (2005) suggest that proactive aggression is influenced by social learning and reinforcement, which becomes more pronounced during the intermediate educational stages as students acclimate to new social environments and peer groups. Card et al. (2008) further supports these findings, indicating that older adolescents and young adults may exhibit higher levels of total aggression due to increased exposure to stressors and complex social interactions compared to younger students.

Table 5. Pearson Correlation Coefficients Between IGD and RPQ Variables

	INTERNET GAMING DISORDER	REACTIVE AGGRESSION	PROACTIVE AGGRESSION	TOTAL AGGRESSION
INTERNET GAMING DISORDER	1	.237**	.415**	.373**

** . Correlation is significant at the 0.01 level (2-tailed).

Table 5, correlation analysis revealed significant positive relationships between Internet Gaming Disorder (IGD) and various forms of aggression. IGD showed a strong positive correlation with proactive aggression ($r = .415$, $p < .01$), indicating that higher levels of IGD are particularly associated with increased proactive aggressive behaviors. Additionally, IGD was significantly correlated with reactive aggression ($r = .237$, $p < .01$) and total aggression ($r = .373$, $p < .01$).

Internet Gaming Disorder (IGD) is highly correlated with proactive aggression due to the immersive and often violent nature of many video games, which can reinforce aggressive behaviors and desensitize individuals to violence. Additionally, the emotional reactivity and stress associated with IGD can manifest as both reactive and proactive aggression in real-life situations. According to Festl, Scharkow, and Quandt (2013), excessive gaming can lead to increased aggressive behaviors as gamers emulate the aggressive tactics and strategies portrayed in games, reinforcing proactive aggression in real-life situations. Grüsser, Thalemann, and Griffiths (2007) found that individuals with IGD often experience heightened emotional reactivity, manifesting as increased reactive aggression. This comprehensive link between IGD and aggression aligns with Gentile et al. (2011), who reported that pathological gaming is associated with a range of aggressive behaviors, both reactive and proactive.

Table 6: Multiple Regression Analysis Predicting Proactive Aggression

	B	Std. Error	Beta	t	p
(Constant)	4.620	.969		4.768	.000

INTERNET GAMING DISORDER	.241	.021	.389	11.727	.000
AGE	-3.186	.579	-.346	-5.498	.000
GENDER	-.538	.308	-.057	-1.748	.081
AREA OF RESIDENCY	-.549	.325	-.053	-1.688	.092
EDUCATION	1.257	.304	.263	4.134	.000

Note: $R^2=0.211$, $F(5,839)=44.950$, $p<.001$

Dependent Variable: PROACTIVE AGGRESSION

Predictors: (Constant), EDUCATION, GENDER, AREA OF RESIDENCY, INTERNET GAMING DISORDER, AGE

Table 6, A multiple regression analysis was conducted to examine the impact of Internet Gaming Disorder (IGD), age, gender, area of residency, and education on proactive aggression among adolescents. The overall model was significant, $R^2=0.211$, $F(5,839)=44.950$, $p<.001$, explaining 21.1% of the variance in proactive aggression. IGD was a significant positive predictor of proactive aggression, $B=0.241$, $SE=0.21$, $\beta=0.389$, $t=11.727$, $p<.001$. This suggests that higher levels of IGD are associated with increased proactive aggressive behaviors. Age was a significant negative predictor of proactive aggression, $B=-3.186$, $SE=0.579$, $\beta=-0.346$, $t=-5.498$, $p<.001$, indicating that younger adolescents are more likely to exhibit proactive aggressive behaviors. Education was a significant positive predictor, $B=1.257$, $SE=0.304$, $\beta=0.263$, $t=4.134$, $p<.001$, with higher educational levels being associated with higher proactive aggression scores. Gender ($p=.081$) and area of residency ($p=.092$) were not significant predictors of proactive aggression.

This multiple regression analysis confirms that IGD significantly impacts proactive aggression. Additionally, age and education were found to be significant predictors, with younger adolescents and those with higher educational levels showing higher proactive aggression. However, gender and area of residency did not significantly predict proactive aggression.

Conclusion

The comprehensive analysis reveals several significant insights into the dynamics of Internet Gaming Disorder (IGD) and aggression among adolescents. Late adolescents are particularly susceptible to IGD, attributed to increased autonomy and extensive engagement with digital gaming environments. Similarly, middle adolescents exhibit heightened proactive aggression, influenced by developmental changes and the pursuit of social dominance within peer groups. Males, characterized by their greater involvement in competitive gaming and assertive socialization patterns, show elevated levels of both IGD and proactive aggression. Adolescents in rural regions may have higher Internet Gaming Disorder (IGD) scores due to fewer recreational and social opportunities, leading to increased reliance on online gaming. Rural adolescents, facing challenges such as limited mental health resources and effective coping mechanisms, also demonstrate higher levels of aggression. Postgraduate students, with

enhanced access to gaming technologies and coping with academic pressures, are identified as another at-risk group for IGD. The correlation between IGD and aggression underscores the impact of gaming on behavioral tendencies, highlighting the need for targeted interventions and support systems to mitigate these effects among vulnerable populations. The multiple regression analysis indicates that IGD significantly impacts proactive aggression, with age and education also being significant predictors.

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