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Gaming Disorder as a Buffer Against Juvenile Delinquency in Abused Children:Competing Mediating Roles of Machiavellianism and Psychopathy

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Abstract: Child abuse is a very serious and widespread social problem. Recent studies indicate that adverse childhood experiences can significantly contribute to negative outcomes, such as gaming disorder, negative personality traits, and aggressive or deviant tendencies. Consequently, it is natural and logical to assume that these negative outcomes might reinforce each other and lead to more harmful consequences, like crime or juvenile delinquency, forming a “dark spiral”. However, this paper challenges this common perspective. Our investigation provides direct empirical evidence based on a census of 378 adolescents with behavioral issues in all juvenile training schools in Chongqing, China. Our results show that child abuse indeed leads to negative personality traits, such as Psychopathy and Machiavellianism, which, in turn, result in juvenile delinquency. However, we found that gaming disorder mediates the effects of child abuse and psychopathy on juvenile delinquency, with a negative indirect effect. This suggests that gaming disorder may protect children and adolescents from the harmful influences of abuse and negative personality traits. If these youth with delinquent behavior do not play too many video games, they might be more likely to engage in crime. Video games can provide an alternative way for teenagers to experience excitement and a sense of belonging, potentially reducing their desire to seek illegal ways to meet these needs. This partially supports the unstructured leisure time theory.

Keywords: Child Abuse, Psychopathy, Machiavellianism, Gaming Disorder, Juvenile delinquency

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Data Availability Statement After acceptance for publication, it will be uploaded to https://github.com/dianshili/GamingDisorder.

Ethics Committee Approval This study was approved by the Chongqing Juvenile Delinquency Prevention Research Association.

Informed Consent This study has obtained informed consent from all participants. For minors participating in this questionnaire, informed consent has been freely given by their guardians.

Declaration of Interests The authors declare no competing interests.

Child abuse is a very serious and widespread social problem. Recent studies indicate that adverse childhood experiences can significantly contribute to negative outcomes, such as gaming disorder, negative personality traits, and aggressive or deviant tendencies. Consequently, it is natural and logical to assume that these negative outcomes might reinforce each other and lead to more harmful consequences, like crime or juvenile delinquency, forming a "dark spiral".

However, this paper challenges this common perspective. Our investigation provides direct empirical evidence based on a census of 378 adolescents with behavioral issues in all juvenile training schools in Chongqing, China. Our results show that child abuse indeed leads to negative personality traits, such as Psychopathy and Machiavellianism, which, in turn, result in juvenile delinquency. However, we found that gaming disorder mediates the effects of child abuse and psychopathy on juvenile delinquency, with a negative indirect effect. This suggests that gaming disorder may protect children and adolescents from the harmful influences of abuse and negative personality traits. If these youth with delinquent behavior do not play too many video games, they might be more likely to engage in crime. Video games can provide an alternative way for teenagers to experience excitement and a sense of belonging, potentially reducing their desire to seek illegal ways to meet these needs. This partially supports the unstructured leisure time theory.

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Introduction

Child abuse casts a long, dark shadow over the lives of many, with its insidious negative effects permeating every level of society (Council et al., 1993). The scars left by such abuse are profound, manifesting not only in emotional trauma but also in troubling statistics: individuals with a history of contact with the criminal justice system report significantly higher rates of childhood abuse than the general population (Dargis et al., 2016). The psychological wounds inflicted by this abuse don't stop there; they are also a breeding ground for mental health issues, especially the haunting phenomenon of hallucinations. But perhaps most alarmingly, these childhood adversities are the seeds from which a harvest of unlawful behaviors—crime, bullying, and physical aggression—spring forth (Barra et al., 2022; Fox et al., 2015).

Real-world evidence is growing, showing that child abuse is not only a risk factor but also a main cause of both gaming disorder and juvenile delinquency. Gaming disorder, a modern problem in today's digital world, can lead to many negative outcomes, such as aggressive actions and violence. This view suggests that gaming disorder might be a pathway to illegal behavior, making the already serious effects of childhood abuse even worse. This idea has received strong support in academic discussions. However, this argument often relies on self-reported surveys, which, whether they come from random or convenient groups, may not always provide a full picture (D eLisi et al., 2013). The accuracy of self-reported surveys depends on how honest the participants are. If they are not truthful, they might hide their gaming problems and any criminal tendencies or behaviors. On the other hand, they could also exaggerate or falsely report these issues (Fluke et al., 2021; J. Laurin et al., 2018). Therefore, this

measurement bias could make the connection between gaming disorder and juvenile delinquency appear stronger than it is. Additionally, it is important to recognize that, while there is evidence linking gaming disorder to negative attitudes and behaviors, like violent tendencies, these do not necessarily lead to criminal actions or illegal activities. All these points seem to challenge a viewpoint that might initially seem both logical and intuitive.

The current lack of empirical evidence may be attributed to data accessibility issues (Liu, 2008). In most countries and regions, gaming disorder is prevalent among adolescents. However, juvenile criminal records are often considered private (Liu, 2008; Liu & Li, 2024). To protect juveniles, prevent adverse impacts on their future, and ensure opportunities for rehabilitation, obtaining approval to conduct surveys on juvenile offenders is exceedingly challenging (Wu & Wu, 2023; Zhang et al., 2023).

This study offers direct empirical evidence that challenges the common view that gaming disorder leads to illegal behavior while also influencing the strong positive effect of child abuse on such behavior. We argue that, based on the "unstructured leisure time" theory, individuals are more likely to take part in criminal activities when they have too much free time. (Kretschmer et al., 2014; Riley, 1987). This theory suggests that even if negative childhood experiences give individuals reasons to commit crimes or make criminal behavior more likely, having unstructured leisure time is a major factor that influences whether they engage in such actions (Jungef & Wiegersma, 1995; Mirić, 2016). In other words, if adolescents are not absorbed in games, they may be more inclined to commit crimes. Furthermore, following the Routine Activity Theory (RAT) (Cohen & Felson, 2010), Criminal behavior is likely to happen when three key elements come together: a person who is motivated to offend, a suitable target, and no capable guardian to prevent the crime. Video games provide another way for adolescents to engage themselves, which could satisfy their needs for excitement and belonging. If these needs are not met, they might turn to criminal acts instead. Through gaming disorder, young people may find a sense of self-fulfillment and achievement, which could reduce their motivation to seek illegal alternatives.

In this study, we surveyed all adolescents with behavioral problems (N=378) who were subjected to compulsory measures for serious behavioral issues or involved in unlawful activities at all seven Juvenile Training Schools in Chongqing, China. Our analysis of this data has confirmed the hypothesis.

Literature Review

Abuse, Psychopathy, and Machiavellianism

During childhood, experiences like physical or emotional abuse, neglect, broken family structures, or parental divorce are often seen as major traumatic events that can greatly impact psychological development (Baglivio et al., 2020; Mei et al., 2022). These experiences leave a deep mark on a child's psychological state, potentially causing a variety of complex emotional responses, such as fear, anxiety, shame, and distrust in relationships with others (J. Laurin et al., 2018; Stinson et al., 2021).

Psychological trauma often interferes with a child's normal growth in areas like emotional expression, empathy development, and social skills. This obstacle in development may cause behavioral problems in children, such as aggression, impulsiveness, or antisocial behaviors, which are often outward signs of underlying psychological trauma (Al Odhayani et al., 2013). Over time, if these harmful behaviors and psychological problems are not

quickly addressed and treated, they may gradually build up and become ingrained, leading to traits associated with psychopathy, such as emotional detachment, a lack of compassion, and the tendency to manipulate others (Baglivio et al., 2020). Among them, emotional detachment and lack of empathy are typical manifestations of psychopathy, while manipulation of others is a notable hallmark of Machiavellianism (Wilson et al., 1996). Together, these two dimensions form highly representative components of the Dark Triad, which are widely discussed and studied in the fields of psychology and criminology (Furnham et al., 2013).

Juvenile Delinquency and Psychopathy

Juvenile delinquency has become a serious challenge for public safety and is widely seen as a major problem in many countries around the world (Young et al., 2017). Given the incomplete development of personality, along with the immature worldview and values of many adolescents, they are particularly susceptible to external influences that may lead them toward illegal or criminal behavior (Lening & Jianhong, 2007). In response, various countries have implemented numerous corrective policies and platforms. Nevertheless, to effectively prevent juvenile delinquency, it is essential to identify the key risk factors contributing to such behavior from the outset (Liu & Liu, 2016).

Many studies have examined the causes of juvenile delinquency by looking at personality traits, especially the impact of psychopathy and Machiavellianism on illegal behaviors (Nisar et al., 2015; Peterson et al., 1961; Sakuta, 1996). As a key aspect of the Dark Triad, psychopathy is a complex personality disorder with multiple dimensions. It is marked by core traits like callousness, lack of responsibility, and impulsive risk-taking tendencies, which make individuals more likely to engage in aggressive behavior (De Brito et al., 2021). A substantial body of existing research supports this view, indicating that psychopathy can significantly predict the occurrence of criminal conduct (Harris et al., 1991). A large amount of existing research supports this view, showing that psychopathy can strongly predict the likelihood of criminal behavior (Dhingra & Boduszek, 2013; Heilbrun, 1979). The behavioral traits of individuals with psychopathy are based on the interaction between their abnormal brain function and negative developmental environments. This interaction increases their impulsivity, which further encourages the growth of criminal tendencies. Moreover, the criminal behavior of psychopathic individuals often has a clear, goal-oriented nature; they usually plan and carry out crimes with specific objectives, which is quite different from the impulsive crimes often committed by non-psychopathic individuals (Woodworth & Porter, 2002).

Juvenile Delinquency and Machiavellianism

Machiavellianism, another key aspect of the Dark Triad, is a personality trait marked by a willingness to use any method to reach one's goals. Among adolescents, Machiavellianism— defined as a tendency to manipulate others to achieve personal aims—can be linked to emotional and behavioral problems (Lau & Marsee, 2013). Adolescents with Machiavellian traits may show less emotional and moral concern in their social interactions and are more likely to treat others in a calculated, goal-driven way (Kerig & Sink, 2011). This tendency may cause them to rely on more negative coping strategies, like avoidance and denial, instead of actively looking for solutions when they face problems. These negative coping styles can worsen emotional and behavioral issues, such as anxiety, depression, and impulsive behaviors. Research shows that Machiavellianism is strongly negatively related to positive coping strategies in adolescents, while it is strongly positively related to negative coping styles and emotional and behavioral problems (Ali et al., 2009; Dahling et al., 2012). This suggests that

people with high levels of Machiavellianism are less likely to use helpful coping methods, like problem-solving and emotional control, and more likely to rely on unhelpful strategies, which can contribute to or worsen their emotional and behavioral problems. Research has shown that Machiavellianism is associated with various antisocial behaviors, including juvenile delinquency and adult criminal conduct (Austin et al., 2007). This may be because such individuals often place their personal goals above social rules and the rights of others (Austin et al., 2007). This may be because such individuals often place their personal goals above social rules and the rights of others.

Gaming Disorder and Juvenile Delinquency

Gaming disorder has become a widely concerned issue in the global public health field (Paulus et al., 2018). In 2013, the American Psychiatric Association introduced the "Internet Gaming Disorder" concept in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Petry & O'Brien, 2013). In 2018, the World Health Organization (WHO) officially listed "Gaming Disorder" as a disease in the 11th edition of the International Classification of Diseases (ICD-11) (Kim et al., 2022). This decision highlighted the seriousness of gaming disorder as a mental health issue and increased global awareness and research efforts to address such addictions. Research has found that among adolescents, gaming disorder is linked to various mental health problems, including anxiety, depression, and attention deficits (Jeong et al., 2020). At the cognitive and behavioral levels, long periods of gaming can impair adolescents ' attention and executive functions, affecting their decision-making abilities. It may also lead to problems with impulse control and a greater risk of violent and aggressive behavior (Li et al., 2023).

While there is considerable research exploring the link between gaming disorder and aggressive tendencies, it's important to note that aggression does not always translate to illegal behavior (Li et al., 2019). The relationship between juvenile delinquency and gaming disorder is still not well understood, with the current evidence being scattered, inconsistent, and lacking strong empirical support. One major challenge lies in the data itself. Privacy protections and ethical concerns often keep information on juvenile offenses confidential and difficult to access. Moreover, much of the available data is biased; for instance, many studies rely on self-reports from adolescents, which may lack objectivity. If young people hide their gaming habits, they might also conceal their involvement in illegal activities, creating a bias that could greatly affect research findings (Assembly, 1989). Furthermore, according to the Routine Activity Theory raised by Cohen and Felson (1979), a crime occurs when three basic conditions are met: first, there is the presence of attractive targets (like valuable property or vulnerable individuals); second, there is a lack of adequate supervision (such as monitoring by police, family, or community); and third, there are potential offenders (people who have the opportunity and desire to commit crimes). Based on the definition of gaming disorder, if an adolescent is deeply involved in gaming, especially games with violent themes, they may express their emotions through gaming, which could lower their willingness and mental state to commit crimes.

Additionally, the unstructured leisure time theory suggests that if adolescents have a lot of free time, they are more likely to get involved in criminal activities (Riley, 1987a). However, according to the definition of gaming disorder, adolescents are so absorbed in gaming that they find it difficult to pull themselves away, which reduces their amount of free time and may lower their chances of engaging in criminal activities. Therefore, we hypothesize that there could be an inverse relationship between adolescent gaming disorder and illegal behavior.

Hypothesis

H1: Abuse is hypothesized to have a direct and positive impact on both psychopathy and Machiavellianism.

H2: Psychopathy and Machiavellianism are anticipated to exert a direct and positive influence on illegal behavior.

H3: Psychopathy and Machiavellianism are proposed to mediate the significant positive relationship between abuse and illegal behavior.

H4: Abuse is expected to have a direct and positive influence on gaming disorder.

H5: Gaming disorder is hypothesized to have a direct and negative impact on illegal behavior.

H6: Gaming disorder is expected to mediate the significant negative relationship between abuse and illegal behavior.

This means that if the H6 is proven, the mediating effect of gaming disorder is proposed to be competitive with the mediating roles of psychopathy and Machiavellianism.

Methodology

Data Sources

In our study, we conducted a census of all students enrolled in the 7 Juvenile Training Schools located in Chongqing, China. Chongqing is a municipality directly under the central government, equivalent to a provincial unit, situated in the southwestern region of China. It is the largest municipality in the country, with an area 2.39 times that of the combined areas of Beijing, Shanghai, and Tianjin, and a permanent population of 3191.4 million as of 2023.

Juvenile Training Schools in China (known as gongdu xuexiao, 工读学校 or zhuanmen xuexiao, 专门学校, in Chinese) are specialized educational institutions established for minors with severe behavioral problems or those who have engaged in illegal behaviors. Within the scope of this census, severe behavioral problems refer to issues such as gaming addiction, severe disobedience to parents and teachers, running away from home, involvement in fights, and associating with delinquent peers. The illegal behaviors primarily include theft, property damage, public disturbances, prostitution, and robbery. The primary objective of these schools is to help these juveniles correct their behavior and reintegrate into society through a combination of academic courses and labor activities. Attendance at these schools is mandatory for minors with severe behavioral problems or those who have broken the law. This is somewhat analogous to the concept of training schools in the United States; however, in China, Juvenile Training Schools are viewed as an educational alternative to legal or criminal punishment, even though they do not constitute formal criminal measures.

The 7 schools we surveyed are in different districts of Chongqing, including Dazu District, Fengdu District, Wanzhou District, Changshou District, Tongliang District, Jiangjin District, Hechuan District, and Bishan District. Before conducting the census, we obtained approval from the judicial authorities of Chongqing, and before distributing the questionnaires, we secured informed consent from all juvenile participants. As of the day the questionnaires were distributed (August 15, 2024), there were 378 students in the Juvenile Training Schools, and we received 378 responses, achieving a 100% response rate. Although this number may appear small within a

city of over 30 million people, it is not unusual in a country with a very low crime rate like China (Liu & Wu, 2023; Zhang et al., 2007).

The survey was conducted using a real-name questionnaire that included variables such as Adverse Childhood Experiences (ACEs), self-perceived social class, drug use, the Dark Triad, gaming disorder, the Big Five personality traits, depression, and anxiety, cultural values, reasons for enrollment, and demographic variables. The variables for reasons for enrollment and demographics were adjusted based on official records. For this study, we focused on the emotional and physical abuse components of the ACEs, the dichotomous variable of whether the enrollment reason involved illegal activities, the dark triad, and the gaming disorder sections of the survey.

Measures

Abuse

To assess abuse, we utilized the abuse dimension from the Chinese adaptation of the ACE-International Questionnaire (ACE-IQ) (Ho et al., 2019; Organization, 2018). This dimension encompasses three subcategories: physical abuse, emotional abuse, and sexual abuse. Given the sensitive nature of the topic and ethical considerations, particularly since the participants are minors and the survey was conducted on a real-name basis, we excluded the item related to sexual abuse from the questionnaire. Participants rated all items using a 7-point Likert scale, where 0 represents "never" and 7 indicates "always." Rather than focusing on specific types of abuse, we averaged the scores across all items to obtain a composite measure, with higher scores reflecting greater levels of abuse. In this study, Cronbach's alpha for the abuse dimension was 0.722, indicating good internal consistency.

Psychopathy

Considering the limitations of the questionnaire length and the constraints of time, we employed the Short Dark Triad (SD3) scale to measure psychopathy (Jonason & Webster, 2010). The items "I tend to lack remorse," "I tend to be unconcerned with the morality of my actions," "I tend to be callous or insensitive," and "I tend to be cynical" correspond to the Psychopathy dimension. Responses were recorded on a 7-point Likert scale, where 1 indicates "strongly disagree" and 7 indicates "strongly agree." In our study, the Cronbach's alpha coefficient for this scale was 0.742.

Machiavellianism

We used the Short Dark Triad (SD3) scale to measure Machiavellianism (Jonason & Webster, 2010). The items "I tend to manipulate others to get my way," "I have used deceit or lied to achieve my goals," "I have employed flattery to influence others," and "I tend to exploit others for personal gain" correspond to the Machiavellianism dimension. Responses were captured on a 7-point Likert scale, with 1 representing "strongly disagree" and 7 representing "strongly agree." In the current study, the Cronbach's alpha coefficient was 0.820.

Gaming Disorder

We measured gaming disorder using a scale adapted from Petry et al. (2014), following the guidelines set by the World Health Organization (WHO). This scale encompasses nine major dimensions: Preoccupation, Withdrawal, Tolerance, Reduction or cessation of other activities, Abandonment of previous interests, Persistence despite

problems, Deception or concealment of gaming behavior, Use of gaming to escape adverse moods, and risking or losing relationships and opportunities. Participants rated each dimension on a 7-point Likert scale, where 0 indicates "never" and 7 indicates "always." An overall score for gaming disorder was derived by averaging the responses across these dimensions, with higher scores signifying greater severity of the disorder. The scale demonstrated strong internal consistency within our sample, yielding a Cronbach's alpha of 0.835.

Juvenile Delinquency

Given that adolescents' psychological development and sense of legal responsibility are not fully matured, legal systems across different countries often apply standards and procedures for juvenile offenses that differ from those used for adult crimes. The definition and treatment of juvenile delinquency can vary depending on the legal system and cultural context. Generally, juvenile delinquency refers to actions committed by individuals under the age of 18 (Assembly, 1989). These actions include not only criminal offenses as defined by law but also behaviors that, while not constituting criminal offenses, still violate social norms or legal standards, such as truancy, running away from home, substance abuse, and gang involvement. Since the subjects of this study do not meet the criteria for criminal liability under the Criminal Law of the People's Republic of China (either due to the minor nature of their actions or their age), we focus on four types of unlawful behavior: violent offenses, property offenses, sexual offenses, and drug-related offenses. Adhering to the highest ethical standards, the research ensures the fairness and transparency of its findings. Our data is sourced from authoritative and officially verified records, eschewing the potential biases inherent in self-reported information. Official records of reasons for school admissions have been obtained directly from school principals. In the data processing, we have adopted clear classification criteria: cases involving the illegal activities are marked as 1; while cases without illegal activities are marked as 0.

Data Analysis Strategy

As previously discussed, the analytical data for this study is derived from all students enrolled in the seven Juvenile Training Schools in Chongqing, China. Consequently, the sample employed in this study is representative of the population distribution. As illustrated in Table 1, the sample exhibits issues such as class imbalance and distributional skewness, which evidently violate the normality assumption of the residuals required by ordinary least squares (OLS) estimation (Freedman, 1985, 1991). Reliance on traditional OLS estimation in this context could lead to biased and inaccurate results. To address this, we employed the Percentile Bootstrap method, known for its superior performance in small and unbalanced samples, and for not relying on distributional assumptions, thereby ensuring more robust estimation outcomes (Hayes, 2017; Williams & Mackinnon, 2008).

Furthermore, to ensure that the regression coefficients are interpretable and comparable, we adopted the recently popularized Percentage Coefficient (bp) in lieu of traditional standardized and unstandardized β coefficients. The Percentage Coefficient, as systematically expounded by Zhao et al. (2024), is defined as the coefficient of a regression equation where both the dependent and independent variables are normalized within the 0-1 range. The Percentage Coefficient is considered superior to standardized and unstandardized β in terms of performance (Zhang, Qiu, et al., 2024; Zhao et al., 2024). This is because the magnitude of standardized β is dependent on the standard deviation, which varies across different variables, making interpretation challenging as it is difficult to articulate the meaning of "a one standard deviation increase" in the independent variable (Greenland et al., 1991;

Kim & Ferree Jr, 1981) Moreover, standardized β offers little to no information useful for comparing different explanatory variables and may even be seriously misleading (Freese & Kevern, 2013; King, 1986). On the other hand, unstandardized β, while having practical significance, does not intuitively convey the magnitude of the coefficients or their relative importance, especially when explanatory variables are measured in different units, rendering unstandardized β coefficients incomparable (King, 1986; Zhao et al., 2024). The Percentage Coefficient provides a more interpretable and comparable approach by indicating the percentage change in the dependent variable associated with a full-scale increase in the independent variable (Zhang, Qiu, et al., 2024; Zhao et al., 2024). A particular feature of normalizing variables to the 0-1 range is that this unit is anchored by the conceptual minimum and maximum of the entire scale. Thus, while bp represents the effect per unit, it also reflects the percentage change in the dependent variable associated with an increase in the independent variable across the entire scale, from the conceptual minimum to the maximum, i.e., the full-scale effect. This enables a certain degree of comparability between different concepts and units (Zhao et al., 2024). Recently, percentage coefficient has been widely adopted in psychology (Ao et al., 2023), medicine (Zhang, Qiu, et al., 2024), communications (Zhang, Ye, et al., 2024), criminology (Zhang, Harris Ao, et al., 2024), and so on.

To achieve the analytical objectives of this study, we utilized Python 3.11 and Stata 18.0. Initially, we employed Python 3.11 to drive Stata 18.0 for data cleaning and descriptive statistical analysis. Subsequently, following the approach of Hayes (2017); Zhao et al. (2010), we implemented percentage scaling (i.e., bp scaling) of the variables and used the Percentile Bootstrap method to estimate regression coefficients and indirect effects, thereby validating the hypotheses of this study. The code utilized in this study called the Python scripts developed by Zhao et al. (2024), which will be available for reuse at https://github.com/dianshili/GamingDisorder upon the publication of this paper.

Results

The sample characteristics of this census reveal that females constitute 10.6% of the total population. The average age is 14.676, with an age range spanning from 10 to 18 years. In addition, we surveyed respondents on their self-education expectations using the question, “What is the highest level of education you expect to attain?” The responses were recorded as follows: 1 represents “below primary school or no education”, 2 represents “primary school”, 3 represents “junior high school”, 4 represents “general high school”, 5 represents “vocational high school”, 6 represents “junior college or vocational college”, 7 represents “undergraduate degree”, 8 represents “master’s degree”, and 9 represents “doctoral degree”. The average expectation of self-education is 5.556, which means that they want to obtain a vocational high scholar and a junior college or vocational college degree on average.

It is widely recognized that the inclusion of control variables should be judicious rather than excessive; the most effective control variables are those that alleviate “omitted variable bias” (Cinelli & Hazlett, 2019; Steiner & Kim, 2016). Conversely, “bad controls” are typically defined as variables that could be influenced by the treatment effect and, therefore, should not be included in regression models. This issue has been extensively discussed in the existing methodological literature (Cinelli et al., 2024). In this study, self-education expectations, along with gender and age, are employed as control variables, and we contend that they meet the criteria for effective control variables. Self-education expectations can more effectively reduce omitted variable bias related to the family’s economic, cultural, and social capital (Liu et al., 2009; Zhang et al., 2009).

The mean scores for Machiavellianism and Psychopathy are 3.944 and 2.607, respectively, suggesting that respondents may exhibit a stronger inclination toward "ends justify the means" behavior while showing a lesser tendency towards traits such as "cold-heartedness" and "lack of empathy" associated with psychopathy. The mean score for abuse is 2.056, indicating that respondents experience emotional and physical abuse from their parents at a frequency that falls within the "rarely" category. The average score for Gaming Disorder is 2.692, suggesting that the respondents exhibit a relatively low level of gaming disorder. Finally, the mean score for juvenile delinquency is 0.602, implying that 60% of the respondents have engaged in unlawful activities, which generally include offenses such as theft, fighting, prostitution, and robbery.

Table 1. Descriptive Characteristics of the Sample (N = 378)

Variable	Mean	SD	Min	Max
Gender (female = 1)	.106	.308	0	1
Age	14.676	1.293	10	18
Self-education Expectation	5.556	1.613	1	9
Machiavellianism	3.944	1.72	1	9
Psychopathy	2.607	1.092	1	7
Abuse	2.056	1.176	1	7
Gaming disorder	2.692	1.158	1	7
Juvenile Delinquency	.602	.490	0	1

Establishing Mediation

Table 2 and Figure 1 show the regression coefficients and the direct and remainder effects of this mediation model. The term "direct and remainder effect" is a refined terminology increasingly adopted in recent publications, reflecting a more accurate description than the traditional "direct effect" or the effect of the "d path" (Ao et al., 2023; Zhao et al., 2010). The "d path" encompasses not only the direct effect of the independent variable on the dependent variable but also includes other effects that are not mediated by intermediary variables (Han et al., 2023; Hayes, 2017; Jiang et al., 2021; Zhao et al., 2010). Hence the term "direct and remainder effect" may be more appropriate in this context.

The positive effect of Abuse on Psychopathy is statistically significant (bp =.197, p<.001), as is its effect on Machiavellianism (bp =.316, p<.001), thus confirming H1. However, the effect of Psychopathy on Juvenile Delinquency is not statistically significant (bp =.083, p>.05), while the positive effect of Machiavellianism on Juvenile Delinquency is significant (bp =.28, p<.05), partially validating H2. The positive effect of Abuse on Gaming Disorder is also significant (bp =.133, p<.05), confirming H4, and the negative effect of Gaming Disorder on Juvenile Delinquency is significant (bp = -.393, p<.01), thus confirming H5.

Table 3 illustrates the magnitude and significance of all indirect effects within the Mediation model, along with their 95% confidence intervals. The indirect effect of the path Abuse → Psychopathy → Juvenile Delinquency is not significant (bp = -.017, p>.05), whereas the indirect effect of the path Abuse → Machiavellianism → Juvenile

Delinquency is positively significant (bp =.088, p<.05), partially validating H3. In the paths Abuse → Gaming Disorder → Juvenile Delinquency and Abuse → Psychopathy → Gaming Disorder → Juvenile Delinquency, Gaming Disorder exerts a significant negative effect on Juvenile Delinquency (bp = -0.393, p < 0.01 and bp = -0.086, p < 0.01, respectively), confirming H6.

When comparing different mediation pathways, it is evident that the effects of Psychopathy and Machiavellianism on Juvenile Delinquency are in a competitive relationship with the effect of Gaming Disorder on Juvenile Delinquency. While high Psychopathy and Machiavellianism are significantly associated with a positive influence on Juvenile Delinquency, the introduction of Gaming Disorder as a mediator attenuates this positive influence, even converting it into a negative effect. Therefore, Gaming Disorder can be regarded as an inhibitory factor in this context, mitigating the facilitative effect of Abuse on Juvenile Delinquency through elevated Psychopathy and Machiavellianism.

Table 2. Regression Coefficient or Direct and Remainder Effect of Mediation Models (N = 378)

Regression Coefficient or Direct and Remainder Effect	**Coef. (SE)**	**95% CI**
Abuse → Psychopathy	.197 (.061) ***	.079 to.320
Self-education expectations → Psychopathy	-.01 (.006) ***	-.023 to.002
Age → Psychopathy	.004(.009)	-.012 to.022
Gender → Psychopathy	-.005 (.033)	-.066 to.063
Abuse → Machiavellianism	-.316 (.070) ***	.177 to.449
Self-education expectations → Machiavellianism	.009 (.007)	-.005 to.022
Age → Machiavellianism	.009 (.009)	.009 to.027
Gender → Machiavellianism	-.025 (.035)	-.094 to.041
Machiavellianism → Gaming disorder	.086 (.062)	-.035 to.208
Psychopathy → Gaming disorder	.169 (.079) *	.011 to.320
Abuse → Gaming disorder	.133 (.057) *	-.016 to.244
Self-education expectations → Gaming disorder	.007 (.006)	-.005 to.018
Age → Gaming disorder	-.009 (.008)	-.025 to.007
Gender → Gaming disorder	.015 (.031)	-.047 to.076
Gaming disorder → Juvenile delinquency	-.393 (.127) **	-.644 to -.138
Machiavellianism → Juvenile delinquency	.28 (.120) *	.039 to.510
Psychopathy → Juvenile delinquency	-.083 (.139)	-.359 to.192
Abuse → Juvenile delinquency	-.032 (.127)	-.212 to.283
Self-education expectations → Juvenile delinquency	-.059 (.013) ***	-.086 to -.033
Age → Juvenile delinquency	.016 (.020)	-.022 to.056

Regression Coefficient or Direct and Remainder Effect	Coef. (SE)	95% CI
Gender → Juvenile delinquency	-.502 (.082) ***	-.656 to -.336

*p <.05, **p <.01, ***p <.001

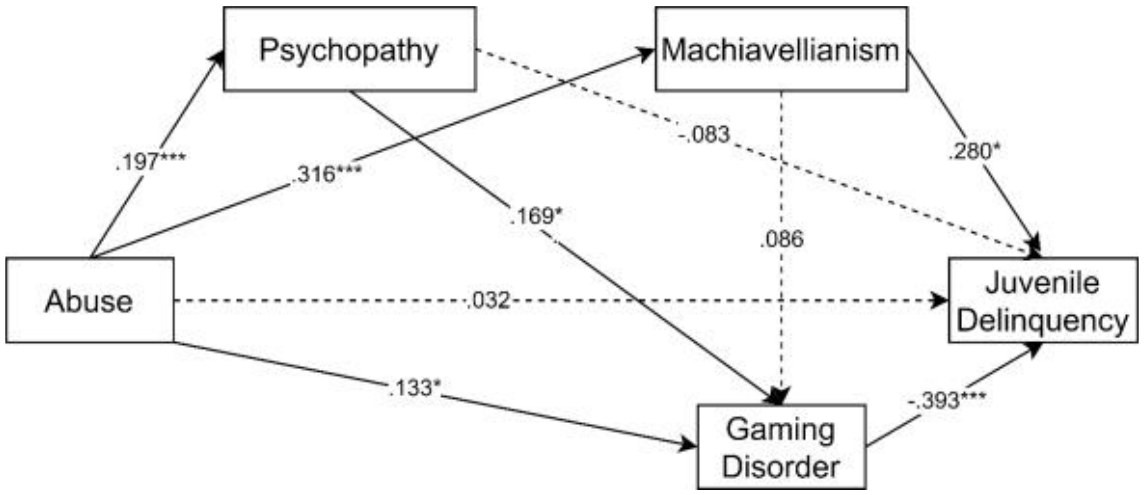
Table 3. Indirect Effects of Mediation Models (N = 378)

Indirect Effect	Coef. (SE)	95% CI
Abuse → Machiavellianism → Gaming disorder	.088 (.044) *	-.012 to.182
Age → Machiavellianism → Gaming disorder	.002 (.003)	-.002 to.010
Gender → Machiavellianism → Gaming disorder	-.007 (.011)	-.003 to.013
Self-education expectations → Machiavellianism → Gaming disorder	.002 (.002)	-.001 to.008
Abuse → Psychopathy → Gaming disorder	.033 (.019) *	-.002 to.077
Age → Psychopathy → Gaming disorder	-.000 (.002)	-.004 to.003
Gender → Psychopathy → Gaming disorder	.000 (.005)	-.010 to.013
Self-education expectations → Psychopathy → Gaming disorder	.001 (.002)	-.002 to.005
Self-education expectations → Gaming disorder → Juvenile delinquency	.039 (.023)	.002 to.091
Abuse → Gaming disorder → Juvenile delinquency	-.086 (.038) **	-.168 to -.022
Age → Gaming disorder → Juvenile delinquency	.003 (.004)	-.004 to.0114
Gender → Gaming disorder → Juvenile delinquency	.003 (.014)	-.026 to.0328
Machiavellianism → Gaming disorder → Juvenile delinquency	-.034 (.028)	-.096 to.013
Psychopathy → Gaming disorder → Juvenile delinquency	.066 (.039) *	-.156 to.003
Age → Psychopathy → Gaming disorder → Juvenile delinquency	-.000 (.001)	-.002 to.001
Gender → Psychopathy → Gaming disorder → Juvenile delinquency	.000 (.003)	-.005 to.006
Abuse → Psychopathy → Gaming disorder → Juvenile delinquency	-.013 (.009) *	-.036 to -.000
Self-education expectations → Psychopathy → Gaming disorder → Juvenile delinquency	.001 (.001)	-.000 to.002
Age → Machiavellianism → Gaming disorder → Juvenile delinquency	.000 (.000)	-.001 to.000
Gender → Machiavellianism → Gaming disorder → Juvenile delinquency	-.001 (.002)	-.002 to.005
Abuse → Machiavellianism → Gaming disorder → Juvenile delinquency	-.011 (.009)	-.032 to.004

Indirect Effect	Coef. (SE)	95% CI
Self-education expectations → Machiavellianism → Gaming disorder → Juvenile delinquency	-.000 (.000)	-.001 to.000
Abuse → Psychopathy → Juvenile delinquency	-.017 (.029)	-.084 to.038
Abuse → Machiavellianism → Juvenile delinquency	.088 (.044) *	.012 to.182

*p <.05, **p <.01, ***p <.001

Figure 1. Mediation Model of Child Abuse on Juvenile Delinquency through Psychopathy, Machiavellianism, and Gaming Disorder (N = 378)



Discussion

The findings are consistent with our hypothesis that child abuse constitutes a formidable risk factor for juvenile delinquency. This outcome corroborates the results of previous research (Finkelhor et al., 2009; Finkelhor et al., 2013; Swanston et al., 2003). Importantly, this investigation delves into the complexities of personality development by incorporating the constructs of psychopathy and Machiavellianism, which are seldom jointly examined in the context of gaming disorder and juvenile delinquency. Our findings highlight two distinct yet interconnected pathways through which child abuse influences delinquent behavior in adolescents. The first pathway indicates that early abuse may lead to the development of psychopathic traits, which in turn heightens the risk of gaming disorder. Interestingly, this gaming disorder seems to reduce the likelihood of engaging in delinquent acts. This inverse relationship could be due to the immersive nature of gaming, which occupies time and mental energy that might otherwise be directed toward antisocial activities.

A possible explanation for these findings can be drawn from the Routine Activity Theory (Cohen & Felson, 2010). This theory posits that the occurrence of crime depends on the simultaneous presence of three essential elements: a motivated offender, a suitable target, and the absence of capable guardians. Gaming disorder might reduce juvenile delinquency by decreasing exposure to criminal opportunities and offering alternative forms of gratification. Firstly, video games consume a significant amount of time and attention, thereby reducing the likelihood of adolescents encountering potential crime targets and triggering criminal motivation. Additionally,

video games act as a substitute activity, providing an outlet for releasing negative emotions such as anger, which may otherwise lead to criminal behavior (Chen, 2021).

Another perspective comes from the unstructured leisure time theory (Abbott & Barber, 2007; Meeks & Mauldin, 1990; Osgood et al., 2005), which argues that unstructured leisure time— time without specific activities or plans —can increase the risk of adolescents engaging in delinquent behavior, as they may seek to fill this time with illegal or inappropriate activities. Gaming disorder, by occupying a considerable number of adolescents ' free time, reduces the time available for engaging in criminal opportunities in real life. Furthermore, gaming disorder might provide a virtual form of "escape from reality" (Jauregui et al., 2023), lowering the likelihood of delinquent behavior driven by boredom, stress, or adverse social influences.

This prompts a profound reevaluation of the conclusions of many studies, which often directly link gaming disorder to criminal behavior. However, the numerous factors contributing to this perspective warrant thorough exploration (Nwanosike et al., 2022). From a methodological perspective, the issue of common method bias cannot be overlooked. For instance, research on child abuse presents unique challenges in quantitative studies. Although researchers strive to assess the prevalence of child abuse, the quality of the data collected can be inconsistent. This is particularly true when relying on self-reported data, where respondents may omit or inaccurately recall experiences due to the discomfort of remembering painful events (Jessica Laurin et al., 2018), especially in sensitive areas such as physical and sexual abuse. This undoubtedly weakens the reliability and validity of self-reported information.

Moreover, due to the sensitivity of the topic and the need for confidentiality in surveys (Liu, 2008), most studies recruit volunteers from adolescent groups or through outsourced platforms, rather than directly targeting criminal populations. This approach raises a series of concerns. First, the selection bias of survey subjects cannot be ignored. A propensity for violence does not equate to actual violent behavior. To accurately investigate the relationship between gaming disorder and criminal behavior, it is essential to examine criminal populations directly, rather than relying solely on data from the general population. Applying findings from the general population to criminal groups could lead to serious misinterpretations. Second, the non-random nature of sample selection further challenges the accuracy of research conclusions. This study, through careful design, avoids the flaws mentioned above, providing more accurate and reliable research outcomes in revealing the true relationship between gaming disorder and criminal behavior.

This study encourages a re-examination of the link between gaming disorder and juvenile delinquency, particularly challenging the widespread notion that electronic games are the primary cause of such behavior. Although gaming disorder can indeed have certain negative impacts on the academic performance and health of adolescents, some countries have an extreme fear of electronic games and have even adopted stringent measures to limit the gaming time of young people (Park & Ahn, 2010). For example, the Chinese government stipulates that minors can only play games within specified time slots, and the daily gaming time must not exceed one hour, while also prohibiting late-night gaming activities. In addition, the review of game content is also very strict (Xiao, 2020). However, this one-size-fits-all policy may overlook the individual differences among adolescents and may not, in the long run, fundamentally address the underlying issue (Colder Carras et al., 2021). As technology advances, adolescents could find ways to circumvent these restrictions. For those who rely on games for social interaction or relaxation, the absence of proper psychological support and guidance could lead to feelings of

isolation and helplessness, potentially causing them to stray off course. Therefore, more nuanced and humane strategies may be necessary to tackle this challenge effectively.

Finally, this study has some limitations. Although we conducted a comprehensive survey, the scope was limited to a single province in China. This restricts the representativeness of our findings, reflecting only the situation in certain areas rather than the entire country. As China's juvenile justice system is undergoing rapid development and reform (Jiang & Chen, 2022), the impact of regional differences in cultural, social, and legal contexts on juvenile delinquency may vary (Liu, 2009). Therefore, to enhance the generalizability and applicability of our findings, it would be beneficial to broaden the research perspective to a wider scale (Liu, 2022; Shuai & Liu, 2023). Juvenile delinquency is a widespread social issue, with different countries and regions adopting various legal systems and educational approaches to address it (Bartollas et al., 1985). By replicating this study in diverse cultural contexts, we can gain a deeper understanding of the multifaceted causes of juvenile delinquency and provide valuable insights for developing more effective prevention and intervention measures.

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