International Journal of Forensic Medicine

Armand Chatard
a) Centre National de la Recherche Scientifique, Université de Poitiers, France
b) Unité de Recherche Clinique, Centre Hospitalier Laborit, Poitiers, France

Soghra Ebrahimi Ghavam
Department of Educational Psychology, Faculty of Psychology and Educational Science, Allameh Tabatabai University, Tehran, Iran

Alexia Delbreil
a) Centre National de la Recherche Scientifique, Université de Poitiers, France
b) Unité de Recherche Clinique, Centre Hospitalier Laborit, Poitiers, France
c) Service de médecine légale, Centre Hospitalier Universitaire

Ghina Harika-Germaneau
a) Centre National de la Recherche Scientifique, Université de Poitiers, France
b) Unité de Recherche Clinique, Centre Hospitalier Laborit, Poitiers, France

Nemat Jaafari
Unité de Recherche Clinique, Centre Hospitalier Laborit, Poitiers, France
Department of Educational Psychology, Faculty of Psychology and Educational Science, Allameh Tabatabai University, Tehran, Iran

Corresponding Author:
Armand Chatard
a) Centre National de la Recherche Scientifique, Université de Poitiers, France
b) Unité de Recherche Clinique, Centre Hospitalier Laborit, Poitiers, France

From crime scenes to game screens: video game aggression among criminals with psychopathic traits and those convicted of homicide

Armand Chatard, Soghra Ebrahimi Ghavam, Alexia Delbreil, Ghina Harika-Germaneau and Nemat Jaafari

DOI: https://doi.org/10.33545/27074447.2024.v6.i1b.82

Abstract
Objective: Recent research involving real-world offenders suggests a link between aggressive behavior in video games, psychopathic traits, and the severity of committed offenses. However, it remains unclear whether these findings apply to a wider array of criminals, particularly those involved in heinous crimes like murder. Building on these initial findings, we aimed to evaluate whether criminals with psychopathic traits, in general, and more specifically murderers, display heightened aggression in video games.

Methods: We studied 111 male criminals from Iran whose offenses ranged from theft and rape to kidnapping and homicide. Participants completed validated self-report measures assessing dark personality traits, including psychopathy, and engaged in a shooting decision task to evaluate unprovoked aggression.

Results: Robust regression analyses revealed that both participants with pronounced psychopathic tendencies and the group of murderers exhibited heightened aggression in the video game setting.

Conclusions: Our findings underscore the potential of video game paradigms to investigate aggressive behaviors across varied criminal profiles, offering novel perspectives for subsequent research and risk assessment.

Keywords: Violent video games, aggression, real-world offenders, dark personality traits, psychopathy

Introduction
Understanding and measuring aggression has perennially posed a challenge for researchers striving to discern its origins and manifestations. The advent of digital games, marked by their immersive interactivity and controlled environments, have offered novel avenues for probing spontaneous hostile behaviors and aggressive predispositions (Arnoult *et al*., 2023; Correll *et al*., 2002) [7, 11]. Recent investigations involving real-world offenders highlight a connection between aggressive behaviors in video games, the severity of committed offenses, and psychopathic traits (Ghavam *et al*., 2023) [14]. Yet, the generalizability of these findings to a wider spectrum of criminals, especially those responsible for severe crimes like murder, remains in question. Using a sample of real-world convicted offenders, this study aims to ascertain whether criminals-especially those with distinct psychopathic traits and those convicted of homicide-display heightened aggression in a video game-based shooting decision task. Analyzing aggression within this unique cohort provides crucial insights into the aggressive tendencies of individuals across a spectrum of offenses, including the most grievous. Exploring these tendencies can further our understanding of aggressive behaviors and guide interventions designed to curtail violent actions.

Video games, transcending their primary entertainment role, have become invaluable instruments in psychological research, offering controlled and replicable environments for deep explorations into human behavior. For instance, gameplay has been shown to produce cognitive enhancements in areas such as spatial skills and attentional control (Spence & Feng, 2010) [23]. Multiplayer platforms, with their inherent social components, also provide opportunities for insights into group dynamics, cooperation, and competition (Marker & Staiano 2015) [19]. On the emotional front, the immersive nature of games can evoke potent responses, driving research into emotional regulation and stress alleviation mechanisms.

(Villani *et al*., 2018) [27]. Concurrently, the potential pitfalls and promises of gaming are evident in studies on addiction (Turel & Bechara, 2019) [26], juxtaposed against research lauding therapeutic potentials in cognitive rehabilitation and mood disorder mitigation (Strahler Rivero *et al*., 2015) [24].

In the realm of psychological research on video games, a focal point has been their potential connection to aggression (Adachi *et al*., 2015; Adachi & Willoughby, 2011; Arriaga *et al*., 2015; Potter *et al*., 2021; Teng *et al*., 2022) [1-2, 8, 22, 25]. This area of study garnered significant attention, particularly in the aftermath of high-profile and dramatic events like school shootings (Etchells & Chambers, 2014) [12]. Foundational works, such as those by Anderson and Dill (2000) [5], explored the possibility that violent gaming could intensify aggressive behaviors after play. A synthesis of evidence from both correlational and experimental studies, summarized in meta-analyses, underscores a consistent association between violent video game exposure and heightened aggressive tendencies (see Anderson & Bushman, 2001; Anderson *et al*., 2010; Greitemeyer & Mügge, 2014) [4, 6, 15]. This association has been rigorously examined and contextualized within a comprehensive theoretical framework (Allen *et al*., 2018; Anderson & Dill, 2000) [3, 5]. However, as expected in any expansive field of study, certain methodologically sound research has yielded differing outcomes (e.g., Kühn *et al*., 2019) [17], sparking continued academic discussion. Within this debate, the issue of causality often emerges, with some scholars positing that the observed association might stem from factors like familial violence or innate aggressive inclinations rather than being directly caused by the games themselves (Ferguson *et al*., 2008) [13].

In the present study, we also examine the link between video games and aggression but take a novel approach. Instead of emphasizing the potential behavioral consequences of violent game exposure, our study utilizes a video game paradigm to delve into the presence and intricacies of aggression among individuals with varying current criminal activities. The question of interest here is whether a video game paradigm can be used to assess aggressive tendencies among different populations of criminals, irrespective of their gaming history. To the best of our knowledge, few studies have focused on the utility of video games as assessment tools for aggressive behaviors or tendencies among criminals and offenders.

A recent study by Ghavam *et al*. (2023) [14] stands out in this domain. The researchers worked with a sample of 200 driving offenders undergoing rehabilitation. Participants in the study were asked to play a video game where their objective was to "shoot" avatars represented as armed criminals, while sparing unarmed, innocent victims. This game was adapted from the work of Arnoult *et al*. (2023) [7]. A noticeable 'shooting bias' towards unarmed characters was interpreted by the researchers as an inclination to inflict unnecessary harm on innocent figures. This bias within the game setting was found to correlate with severe real-world traffic violations. Moreover, specific elements of the Dark personality traits (Paulhus, 2014) [21] especially psychopathy-were pinpointed as predictors of both in-game aggressive behaviors and actual real-world offenses. Ghavam and colleagues' (2023) [14] results highlight the promising potential of video games as tools for identifying aggressive tendencies among offenders, establishing a link between in-game decisions and real-life actions.

Drawing inspiration from these recent findings, we delve deeper into the connection between video game conduct and the aggression of those with diverse criminal records. Of particular interest is whether patterns seen among traffic offenders extend to those committing more severe crimes, like murder. Such exploration gains prominence given the heated debate, prevalent in both scientific and political domains, regarding the connection between violent video games and grievous real-world crimes. This research is poised not only to enrich this discourse but also to highlight the relevance of video game paradigms within forensic psychology and the criminal justice landscape.

For this study, we recruited a sample of admitted criminals. Participants undertook a computerized shooting decision task and responded to a number of questionnaires that delved into their criminal history, mental health, and dark personality traits. Consistent with the findings of Ghavam *et al*. (2023) [14], we anticipated positive associations between in-game aggressive behaviors and psychopathy traits. Such results would bolster the construct validity of the video game paradigm, especially considering the aggressive nuances associated with dark personality traits, particularly psychopathy. Furthermore, we hypothesized that participants who confessed to the most heinous crimes, that is, murder, would demonstrate heightened aggressive tendencies in the shooting decision task compared to those admitting to lesser offenses like theft.

Method
The data that support the findings of this study are openly available in Open Science Framework at OSF link. The study was approved by a local ethical committee in Iran (Allameh Tabatabai University) and the participants gave their informed consent. The authors declare no conflict of interest.

Participants
The sample consisted of 111 individuals apprehended by the Tehran Police in 2021. Following their admissions of guilt, these individuals underwent face-to-face interviews with a forensic psychologist (the second author) who led the data collection process for this research. All the participants were male. Unfortunately, due to an oversight, we did not record their specific ages. However, most appeared to be middle-aged based on visual assessments. During the study, each participant, under the psychologist's direct supervision, provided responses via a laptop. Four were excluded because of an excessive error rate (over 50%) on the shooting decision task, suggesting they might not have adhered to the instructions. Consequently, the final analysis considered data from 107 participants.

Materials and Procedure
A variety of measures were collected to offer a comprehensive overview of the participants' backgrounds, behaviors, and mental health status. Unless otherwise specified, all variables were binary-coded.

Demographic Variables
Participants reported their gender, primary residence location (either rural or urban), and educational background, which was measured on a 6-point continuous scale: Elementary, secondary, diploma, bachelor's, master's, and doctorate levels.

Criminal Activity

Participants reported the crime for which they had been arrested. These crimes spanned a spectrum, from property-related offenses like burglary, car, and mobile phone theft, to more severe and violent crimes, such as money laundering, kidnapping, rape, and murder.

Criminal History

Participants indicated whether they had committed multiple crimes in the past. The legal consequences of their actions were documented, including the number of detentions, total imprisonments, and cumulative duration of incarcerations, all measured as continuous variables.

Mental Health and Psychological Profile

Participants were asked if they had experienced symptoms of personality disorders, psychotic disorders, or mood disorders in the past. They were also questioned about whether they had been victims of intra-familial physical abuse. Additionally, participants were asked to report any significant medical conditions.

Family and Employment Status

Participants' marital status was documented, indicating whether they were single or in a relationship. They also provided information on their current employment status.

Dark Personality Traits

Participants were evaluated using the dark core scale (Moshagen *et al*., 2020; Farsi translation by Ghavam *et al*., 2023) [20, 141]. The assessment includes three subscales: Psychopathy with 10 items (e.g., "People often say I'm out of control," α = .63, M=2.46, SD=0.75); Machiavellianism with 10 items, 2 of which were excluded due to poor inter-item correlations (e.g., "Whatever it takes, you must get the important people on your side," α = .64, M=3.22, SD=0.84); and Sadism with 10 items (e.g., "Sometimes, I get so angry I want to hurt people", α = .81, M=1.90, SD=1.01). Items were rated on a scale from 1 (totally disagree) to 5 (totally agree).

Shooting Decision Task

Participants engaged in a computer-based shooting decision game similar to the one used in previous studies (Arnoult *et al*., 2023; Ghavam *et al*., 2023; Mange *et al*., 2012) [14, 7, 18]. The game displayed a building facade that covered the entire screen, with four distinct windows scattered across it. In these windows, indistinct human facial figures, rendered unrecognizable, would randomly appear. Some figures were depicted holding guns and were described to players as dangerous criminals that could potentially threaten them. In contrast, others held benign objects of similar size, like a beverage bottle, symbolizing innocent victims participants were explicitly warned against targeting. The task was to quickly discern and "shoot" the dangerous criminals while sparing the innocent figures. Players pressed the "M" key to shoot and the "X" key to not shoot. If they hesitated beyond the preset 170-850 ms timeframe or made an error, a red "X" warning appeared. Before the main task, participants familiarized themselves with the game using six randomly selected practice trials.

Throughout the main task, the computer program recorded all decision-making errors, such as shooting an innocent figure (false positives) or not shooting a dangerous criminal (omissions). Following Ghavam *et al*. (2023) [14], we computed a shooting bias index reflecting the inclination to mistakenly shoot innocent victims, compared to dangerous criminals (M=83.13, SD=15.65). Higher scores on this index indicate a tendency towards unprovoked aggression against in-game characters, even when they pose no direct threat to the participant.

Results

Table 1 presents the characteristics of our criminal sample. As depicted, there is little difference between murderers and other criminals concerning family abuse, education, mental health, criminal history, and dark personality traits. Indeed, the only significant difference in this table is the number of past crimes committed; murderers had a lower count compared to other criminals, Mann-Whitney U=204, $Z = -4.38$, $p<0.001$.

Given the non-normal distribution of our primary variables (i.e., Dark personality traits and shooting bias), which was confirmed by the Shapiro-Wilk tests with p-values < 0.01, we opted for robust statistical analyses. We utilized the MASS and walrus packages in R to fit robust regression models using M-estimation. These robust statistical methods diminish the influence of outliers by giving them less weight in the analysis without the need to exclude these critical data points. Furthermore, they provide estimates that are resilient to deviations from normal distributions (Wilcox, 2012) [28].

We began our analysis with bivariate robust regression to assess the relationships between personality traits, homicide crime, and shooting bias. The results are presented in Table 2. As illustrated in this table, all Dark traits studied displayed significant associations with one another. Notably, homicide crime did not exhibit any significant association with the Dark traits. A bivariate trend was observed suggesting that psychopathy might be associated with heightened aggressive behavior in the shooting decision task, with $\beta = 2.260$, SE = 1.307, $T = 1.729$, $p = 0.086$. Moreover, homicide crime was linked with increased aggressive responses in the shooting decision task, $\beta = 6.715$, SE = 2.800, $T = 2.397$, $p = 0.018$. The M-estimation mean (SE) for murderers was -80.11 (3.43), compared to -87.53 (1.17) for other criminals.

To determine which variables retained a significant predictive relationship with shooting bias after controlling for other variables, we conducted a multiple robust regression analysis. Here, shooting bias was regressed on homicide crime, psychopathy, Machiavellianism, and sadism. The results are depicted in Table 3. This analysis revealed that only psychopathy and homicide crime demonstrated a statistically significant association with shooting bias. Psychopathy was found to be associated with increased aggressive tendencies in the game, independent of the effects of homicide crime and other Dark traits. Likewise, homicide crime was associated with heightened aggressive tendencies in the video game, irrespective of the influence of the Dark traits. Figure 1 illustrates the effect of psychopathy on shooting bias after adjusting for the other predictors.

Finally, we sought to control for other relevant variables in the model, especially those associated with criminal history: Prior multiple crimes, the number of detentions, total imprisonments, and the cumulative duration of incarcerations. Although we did not formulate specific hypotheses regarding these predictors, they might

potentially relate to aggression in the video game, similar to the established relationships with homicide crime and psychopathy. Consequently, we integrated these variables into a multiple robust regression analysis, alongside homicide crime and psychopathy, to predict shooting bias. Nevertheless, none of the criminal history variables had a significant impact on shooting bias (all ps > .10). The effect of psychopathy on shooting bias approached significance,

with $\beta = 2.307$, $SE = 1.205$, $T = 1.913$, $p = 0.058$, and the influence of homicide crime persisted as significant, with $\beta = 5.725$, $SE = 2.662$, $T = 2.150$, $p = 0.034$. The absence of a discernible effect from the criminal history variables on aggression within the video game stands out as a noteworthy observation, which might be seen as challenging our initial theoretical assumptions. We will explore this apparent discrepancy further in the subsequent discussion section.

Table 1: Demographic and Offense Details of the Criminal Sample

	Murderers (N=16)	Other criminals (N=95)
Demographic Variables		
Gender	Male (100%)	Male (100%)
Primary residence	Urban (81%)	Urban (76%)
Highest level of education	High school diploma (75%)	High school diploma (86%)
Family and Employment Status		
Marital status	Married (25%)	Married (44%)
Current employment status	Employed (75%)	Employed (66%)
Primary Offense Type	Homicide (100%)	House burglary (31%); Car and motorcycle theft (33%); Mobile phone theft (26%); Theft of industrial equipment (1%); Drug trafficking (12%); Scam (26%); Money laundering (15%); Street fight (28%); Armed robbery (6%); Kidnapping (4%); Rape (5%)
Criminal history		
Number of crimes	$M=1.75$ crimes, $SD=1.77$	$M=18.50$ crimes, $SD=27.5$
Number of detentions	$M=2.13$ detentions, $SD=2.02$	$M=2.63$ detentions, $SD=1.97$
Number of imprisonments	$M=1.44$ imprisonments, $SD=1.41$	$M=2.05$ imprisonments, $SD=1.61$
Cumulative duration of incarcerations (days)	$M=447$ days, $SD=860$	$M=619$ days, $SD=1151$
Mental and Physical Health		
Personality disorder symptoms	56%	48%
Psychotic disorder symptoms	75%	78%
Mood disorder symptoms	100%	88%
Victim of child abuse	75%	90%
Chronic physical illness	68%	75%
Dark Personality Traits		
Psychopathy	$M=2.37$, $SD=0.71$	$M=2.45$, $SD=0.76$
Machiavellianism	$M=3.26$, $SD=0.90$	$M=3.21$, $SD=0.84$
Sadism	$M=1.89$, $SD=1.03$	$M=1.89$, $SD=1.00$

Notes: Participants in the "other criminals" category may have been found guilty of multiple crimes, so the combined percentages for primary offense can exceed 100%. Dark personality traits were assessed using a 5-point Likert scale.

Table 2: Bivariate robust regression coefficients

	Homicide crime	Psychopathy	Machiavellianism	Sadism	Shooting bias
Homicide crime	-	0.003	0.186*	0.038*	6.715*
Psychopathy		-	0.648*	0.830*	2.260+
Machiavellianism			-	0.463*	1.741*
Sadism				-	0.248*
Shooting bias					-

Note: Entries are Beta (β) coefficients. N=107. * p<0.05; + p<0.10. All variables are continuous except for "Homicide crime" (coded as 1 = yes and 0 = no).

Table 3: Multiple robust regression analysis predicting aggressive behavior in the shooting decision game

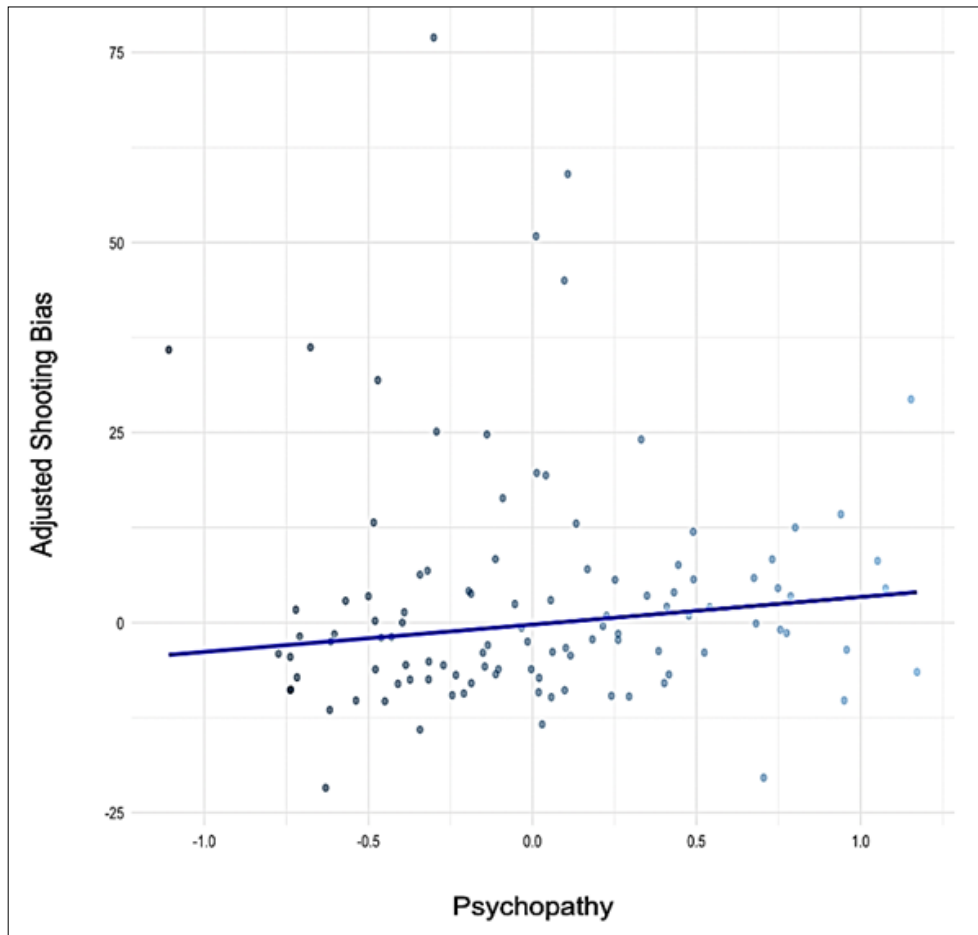|	Beta coefficient	Standard error	t-value	p-value	95% Confidence interval for beta coefficients	
					lower	Upper
Homicide crime	7.171	2.573	2.786	0.006	2.067	12.275
Psychopathy	3.640	1.773	2.052	0.042	0.122	7.157
Machiavellianism	0.741	1.272	0.582	0.561	-1.783	3.265
Sadism	-2.007	1.212	-1.655	0.101	-4.411	0.397

Note: N=107.

Fig 1: Robust regression modeling of shooting bias, impact of psychopathy with homicide, machiavellianism, and sadism as controls

Discussion

The primary aim of this study was to explore the relationship between specific personality characteristics, particularly the Dark traits, and aggressive tendencies exhibited in a video game task among a diverse group of criminals, including those who committed the most heinous crimes. Furthermore, we sought to ascertain whether individuals responsible for grave offenses, such as murder, display heightened aggressive behaviors in a shooting decision task relative to those who committed less severe crimes. Our findings offer several noteworthy insights.

One significant discovery is the link between psychopathy and aggressive tendencies in video games, which appears to be consistent regardless of the nature of the crime. This corroborates previous research that emphasized impulsivity and heightened aggressive predispositions in individuals with pronounced psychopathic traits (Blair et al., 2005; Hare, 1999) [9, 16]. Echoing the recent findings of Ghavam et al. (2023) [14] that involved traffic offenders, our results underscore the robustness and generalizability of the association between psychopathy and aggression within video game contexts across different criminal populations. This suggests the importance of evaluating psychopathy not just as an isolated trait but also as a potential enhancer or mediator of aggressive behaviors, regardless of the specific criminal offense. Future research is pivotal in further exploring whether psychopathy plays a mediating or moderating role in the relationship between video game aggression and the gravity of criminal acts.

The shooting decision task revealed another interesting pattern. As expected, homicide offenders exhibited a propensity towards greater aggressive behavior within the game setting compared to their criminal counterparts. This suggests an inherent bias or predisposition in these offenders towards violent decision-making in ambiguous contexts. Notably, these findings are consistent with recent research (Ghavam et al., 2023) [14] and lend empirical weight to the hypothesis that certain cognitive or decision-making biases in criminals might predispose them to heightened violent responses even within simulated environments. Such insights offer intriguing avenues for future research, potentially informing strategies in offender rehabilitation and risk assessments within the criminal justice system.

Furthermore, it is important to highlight that, within our sample of criminals, Dark traits-namely psychopathy, Machiavellianism, and sadism-were not significantly linked to having committed a homicide. This unexpected result diverges from longstanding assumptions in criminology and forensic psychology, which suggest that Dark traits, especially psychopathy, may predispose individuals to commit severe violent acts (Hare, 1999) [16]. Given that all our participants were involved in criminal activities, it is possible that the distinctions in psychopathic traits among them were too small to significantly influence their inclinations toward specific crimes. Our findings might also align with recent research suggesting that previous studies may have inflated the prevalence of psychopathy in criminal populations by integrating criminal behavior elements into psychopathy assessments (Boduszek et al., 2021) [10]. Although the Dark traits showed interrelations in our sample, their disconnection from homicide implies that they might not solely serve as decisive markers for the gravest

violent offenses. This underscores the importance of exploring other factors, such as performance in certain behavioral tasks like the video game in our study, that may offer better discriminative power.

Interestingly, our findings revealed that metrics of criminal history did not significantly influence the observed shooting bias. This suggests that an individual's past criminal engagements or the depth of their interactions with the criminal justice system do not necessarily determine their aggressive tendencies in ambiguous situations, at least as measured by this game. This result defies our initial theoretical assumptions, and, to some extent, challenges the robustness of our observed associations. One might expect a positive relationship between the depth of one's criminal history and their aggressive behavior within the game. The absence of this association hints that the cognitive processes underpinning aggressive decisions might be less tied to an individual's criminal past than initially thought.

Having observed the unexpected lack of correlation between criminal history and in-game aggression, it is vital to explore potential explanations for this discrepancy. A key consideration is the specificity of our task. While the shooting decision task aligns with behaviors characteristic of murder, it may not accurately capture decision-making processes tied to other crimes, such as rape or theft. Although Ghavam et al. (2023) [14] highlighted the task's potential to forecast the severity of traffic offenses, different results might appear depending on the crime in question. Additionally, a dense criminal record does not always equate to the severity of offenses. Multiple arrests could stem from repeated minor infractions, like robbery, rather than more severe crimes like homicide. Notably, the murderers in our sample did not have particularly extensive criminal histories. The precise reasons behind the absence of a link between criminal history and shooting bias warrant deeper investigation in future studies.

While our study offers distinctive insights, there are several limitations that require attention. Foremost, the sample size for our homicide offenders was relatively small. Given the inherent challenges in obtaining a sizable group of individuals who have committed severe crimes, such as murder, acquiring this sample, albeit small, is notable. Larger samples will be instrumental for improving generalizability in future studies.

Another limitation is the absence of a non-criminal control group. Arguably, comparing murderers to other criminals like theft offers a more straightforward comparison due to potential similarities among these groups. However, future studies might still find value in incorporating a non-offender control group that is demographically matched.

In terms of personality assessment, we focused on psychopathy, sadism, and Machiavellianism due to their documented connection with video game aggression in the recent study by Ghavam et al. (2023) [14]. While these traits hold significant value in the literature on Dark traits, it is conceivable that other Dark traits, such as narcissism, might also play a role. Consequently, future research would be enriched by a broader evaluation that encompasses additional Dark traits, offering a more in-depth and multidimensional perspective on personality.

Furthermore, our sample was predominantly male, which, although aligning with crime statistics indicating higher male involvement in violent crimes, limits our generalizability to female criminal populations. Therefore, there is a compelling necessity for future studies to incorporate female participants to enrich the understanding of gender-specific dynamics in crime and aggression.

Finally, our study was conducted within a specific geographical context, namely a Middle Eastern country, which could introduce cultural biases. Subsequent studies exploring these patterns across diverse cultures would be invaluable in determining the universality of these associations.

In summary, our study establishes a link between real-world violent behaviors and aggression in virtual environments. Both criminals with pronounced psychopathic tendencies and those convicted of the gravest crimes, such as murder, demonstrated heightened aggressive behaviors in video games. Our findings extend the boundaries of conventional video game-aggression studies, underscoring the promise of video game simulations as diagnostic instruments to dissect various criminal tendencies. Pursuing research in this domain has the potential to revolutionize our understanding of criminal behavior, rehabilitation processes, and risk management.

Conflict of Interest
Not available

Financial Support
Not available

References

1. Adachi PJ, Hodson G, Willoughby T, Zanette S. Brothers and sisters in arms: Intergroup cooperation in a violent shooter game can reduce intergroup bias. Psychology of Violence. 2015;5(4):455. Available from: https://doi.org/10.1037/a0037407

2. Adachi PJ, Willoughby T. The effect of video game competition and violence on aggressive behaviour: Which characteristic has the greatest influence? Psychology of Violence. 2011;1(4):259. Available from: https://doi.org/10.1037/a0024908

3. Allen JJ, Anderson CA, Bushman BJ. The general aggression model. Current Opinion in Psychology. 2018;19:75-80. Available from:https://doi.org/10.1016/j.copsyc.2017.03.034

4. Anderson CA, Bushman BJ. Effects of violent video games on aggressive behaviour, aggressive cognition, aggressive affect, physiological arousal, and prosocial behaviour: A meta-analytic review of the scientific literature. Psychological science. 2001;12(5):353-359. Available from: https://doi.org/10.1111/1467-9280.00366

5. Anderson CA, Dill KE. Video games and aggressive thoughts, feelings, and behaviour in the laboratory and in life. Journal of Personality and Social Psychology. 2000;78(4):772-790. Available from: https://doi.org/10.1037/0022-3514.78.4.772

6. Anderson CA, Shibuya A, Ihori N, Swing EL, Bushman BJ, Sakamoto A, et al. Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. Psychological Bulletin. 2010;136(2):151-173. Available from: https://doi.org/10.1037/a0018251

7. Arnoult M, Selimbegović L, Hirschberger G, Pyszczynski T, Chatard A. Under the veil of tolerance: A justification-suppression approach to anti-Islamic

implicit bias in reaction to terrorist attacks. Journal of Personality and Social Psychology. 2023;125(2):237-258. Available from: https://doi.org/10.1037/pspa0000337

8. Arriaga P, Adrião J, Madeira F, Cavaleiro I, Maia e Silva A, Barahona I, *et al*. A "dry eye" for victims of violence: Effects of playing a violent video game on pupillary dilation to victims and on aggressive behavior. Psychology of Violence. 2015;5(2):199. Available from: https://doi.org/10.1037/a0037260

9. Blair J, Mitchell D, Blair K. The psychopath: Emotion and the brain. Blackwell Publishing.

10. Boduszek D, Debowska A, Sherretts N, Willmott D, Boulton M, Kielkiewicz K, *et al*. Are prisoners more psychopathic than non-forensic populations? Profiling psychopathic traits among prisoners, community adults, university students, and adolescents. Deviant Behavior. 2021;42(2):232-244. Available from: https://doi.org/10.1080/01639625.2019.1665221

11. Correll J, Park B, Judd CM, Wittenbrink B. The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. Journal of Personality and Social Psychology. 2002;83(6):1314-132.

12. Etchells P, Chambers C. Is there any evidence of a link between violent video games and murder. The Guardian. 2014;14(6).

13. Ferguson CJ, Rueda SM, Cruz AM, Ferguson DE, Fritz S, Smith SM. Violent video games and aggression: Causal relationship or byproduct of family violence and intrinsic violence motivation? Criminal Justice and Behavior. 2008;35(3):311-332. Available from: https://doi.org/10.1177/0093854807311719

14. Ghavam SE, Delbreil A, Germaneau HG, Davignon G, Cailleau V, Arnoult M, *et al*. No mercy for victims: exploring the link between dark personality traits, aggressive video game behavior, and severe traffic violations. Aggressive Behavior. 2023;49(5):492-498. Available from: https://doi.org/10.1002/ab.22085

15. Greitemeyer T, Mügge DO. Video games do affect social outcomes: A meta-analytic review of the effects of violent and prosocial video game play. Personality and Social Psychology Bulletin. 2014;40(5):578-589. Available from: https://doi.org/10.1177/0146167213520459

16. Hare RD. Without conscience: The disturbing world of the psychopaths among us. Guilford Press.

17. Kühn S, Kugler DT, Schmalen K, Weichenberger M, Witt C, Gallinat J. Does playing violent video games cause aggression? A longitudinal intervention study. Molecular psychiatry. 2019;24(8):1220-1234. Available from: https://doi.org/10.1038/s41380-018-0031-7

18. Mange J, Chun WY, Sharvit K, Belanger JJ. Thinking about Arabs and Muslims makes Americans shoot faster: Effects of category accessibility on aggressive responses in a shooter paradigm. European Journal of Social Psychology. 2012;42(5):552-556. Available from: https://doi.org/10.1002/ejsp.1883

19. Marker AM, Staiano AE. Better together: Outcomes of cooperation versus competition in social exergaming. Games for Health Journal. 2015;4(1):25-30. Available from: https://doi.org/10.1089/g4h.2014.0066

20. Moshagen M, Zettler I, Hilbig BE. Measuring the dark core of personality. Psychological Assessment. 2020;32(2):182-196. Available from: https://doi.org/10.1037/pas0000762

21. Paulhus DL. Toward a taxonomy of dark personalities. Current Directions in Psychological Science. 2014;23(6):421-426. Available from: https://doi.org/10.1177/0963721414547737

22. Potter SJ, Demers JM, Flanagan M, Seidman M, Moschella EA. Can video games help prevent violence? An evaluation of games promoting bystander intervention to combat sexual violence on college campuses. Psychology of Violence. 2021;11(2):199. Available from: https://doi.org/10.1037/vio0000365

23. Spence I, Feng J. Video games and spatial cognition. Review of General Psychology. 2010;14(2):92-104. Available from: https://doi.org/10.1037/a0019491

24. Strahler Rivero T, Herrera Nuñez LM, Uehara Pires E, Amodeo Bueno OF. ADHD rehabilitation through video gaming: A systematic review using PRISMA guidelines of the current findings and the associated risk of bias. Frontiers in Psychiatry. 2015;6:151. Available from: https://doi.org/10.3389/fpsyt.2015.00151

25. Teng Z, Yang C, Stomski M, Nie Q, Guo C. Violent video game exposure and bullying in early adolescence: A longitudinal study examining moderation of trait aggressiveness and moral identity. Psychology of Violence. 2022;12(3):149-159. Available from: https://doi.org/10.1037/vio0000424

26. Turel O, Bechara A. Little video-gaming in adolescents can be protective, but too much is associated with increased substance use. Substance Use & Misuse. 2019;54(3):384-395. Available from: https://doi.org/10.1080/10826084.2018.1496455

27. Villani D, Carissoli C, Triberti S, Marchetti A, Gilli G, Riva G. Videogames for Emotion Regulation: A Systematic Review. Games for health journal. 2018;7(2):85-99. Available from: https://doi.org/10.1089/g4h.2017.0108

28. Wilcox RR. Introduction to robust estimation and hypothesis testing (3rd ed.). Academic Press. 2012. Available from: https://doi.org/10.1016/C2011-0-09067-9