Nexus Science Review
INTERNATIONAL JOURNAL OF INTERDISCIPLINARY RESEARCH

Received: 15/08/2026 - **Accepted:** 15/09/2026
Vol: 01.05
DOI: 10.66104/1ax5x030
Pages: 1-28

BEYOND THE "VIOLENT GAME" DEBATE: AGGRESSION, CAUSAL INFERENCE, PLAYER CONTEXT, AND EVIDENCE-BASED POLICY

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Abstract
The relationship between violent content in digital games and human aggression remains one of media psychology's most contested questions. Public discussion often treats laboratory aggression, everyday conflict, and serious real-world violence as interchangeable, although they differ substantially in definition, frequency, determinants, and evidence. This integrative narrative review critically examines experimental, cross-sectional, longitudinal, preregistered, and meta-analytic research. It distinguishes aggressive cognition and affect from behavioral aggression and criminal violence; evaluates the General Aggression Model and competing explanations; and analyzes effect size, measurement validity, publication bias, researcher degrees of freedom, confounding, selection, and developmental context. The literature supports a cautious conclusion. Some meta-analyses report small average associations between violent-game exposure and aggression-related outcomes, while preregistered and methodologically conservative studies often find effects that are negligible, inconsistent, or absent. Longitudinal syntheses disagree partly because of different inclusion rules, covariate decisions, outcome measures, and interpretations of practical importance. Evidence does not justify attributing serious violence to video games, and the American Psychological Association has stated that available research is insufficient to establish a causal connection with violent behavior. Game frustration, competition, social interaction, family environment, prior aggression, peer dynamics, and socioeconomic stress may explain more than content labels alone. The article proposes a research and policy framework centered on transparent measurement, preregistration, multi-informant longitudinal designs, age-appropriate content information, parental mediation, digital literacy, and attention to established risk factors. Video-game violence should be studied as one possible influence within a complex developmental ecology, not as a single or dominant cause of violence.

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Keywords: violent video games; aggression; media effects; causal inference; adolescents; rating systems; digital games; public policy

1. Introduction

Digital games are a major cultural form combining narrative, rules, competition, cooperation, audiovisual representation, and player agency. Because many popular games depict conflict, they have repeatedly become a focus of concern after highly publicized violent events. The scientific question, however, is not whether games contain violence, but whether specific forms of exposure measurably cause particular outcomes under defined conditions (American Psychological Association [APA], 2020a; Ferguson, 2015).

Public arguments frequently move between different outcomes without acknowledging the shift. A temporary increase in hostile words, a competitive laboratory response, a parent's rating of irritability, a physical confrontation, and serious criminal violence are not equivalent. Evidence for one cannot be used automatically to claim another. Clear definitions are therefore the first requirement for a credible review (Elson et al., 2014; Hilgard et al., 2017).

The controversy persists because studies differ in design, population, game selection, exposure measurement, covariates, and outcome validity. Some influential meta-analyses report statistically reliable small effects, whereas critical reanalyses and preregistered studies find weaker or null relationships. Disagreement concerns both the numerical result and what a small average association means outside research settings (Mathur & VanderWeele, 2019; Przybylski & Weinstein, 2019).

Causal inference is difficult because players choose games. Preferences may reflect age, peers, personality, family rules, prior aggression, and broader interests. Experiments improve control but usually test brief sessions and artificial outcomes; longitudinal studies improve time ordering but remain vulnerable to confounding and measurement error. No design alone resolves the question (Ferguson, 2015).

This article evaluates the evidence without assuming that games are either harmless or a major cause of violence. Its objectives are to distinguish outcomes, examine mechanisms, compare research designs, explain the meta-analytic dispute, identify moderators, and develop proportionate recommendations for families, industry, researchers, and policymakers.

2. Methodology

2.1 Review design and scope

This article uses an integrative narrative review to compare heterogeneous evidence on violent digital games, aggression-related outcomes, serious violence, player context, and policy. The design accommodates experiments, cross-sectional surveys, longitudinal panels, preregistered studies, meta-analyses, theoretical

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papers, methodological critiques, and institutional guidance. It does not claim the exhaustive coverage or pooled estimation of a registered systematic review. Its purpose is to identify mechanisms, compare inferential strengths, and explain why apparently similar studies produce different conclusions (Snyder, 2019; Whittemore & Knafl, 2005).

2.2 Information sources and search date

The final search was conducted on September 6, 2026. PubMed/MEDLINE and Google Scholar were searched directly. PsycINFO and Scopus were not directly queried; records described in this review as indexed in those databases were located through Google Scholar, backward citation tracing, publisher search interfaces, and bibliographic metadata. Publisher platforms were used only to retrieve or verify full texts, and official repositories of the American Psychological Association, the Entertainment Software Rating Board (ESRB), Pan European Game Information (PEGI), and Brazil's Ministry of Justice and Public Security were consulted for institutional and classification documents. Backward citation tracing identified foundational theory, influential meta-analyses, methodological critiques, and studies cited across competing positions.

2.3 Search strategy

Direct searches used combinations of ("violent video game" OR "violent digital game") AND (aggression OR aggressive behavior OR violent behavior); (video game AND aggression) AND (longitudinal OR experimental OR preregistered OR meta-analysis); (violent game) AND (publication bias OR measurement validity OR competitive reaction time task); and (game rating OR parental mediation) AND (policy OR adolescent OR child). Focused supplementary searches combined video game or gaming with frustration, competition, desensitization, prosocial behavior, telemetry, well-being, immersion, virtual reality, online multiplayer, toxicity, livestreaming, moderation, recommendation systems, live-service, ESRB, PEGI, and Classificacao Indicativa. Search syntax was adapted to each interface.

2.4 Eligibility and exclusion criteria

Eligible analytical publications directly examined violent-game exposure, aggression-related constructs, player context, research methodology, or relevant policy through empirical data, meta-analysis, explicit theory, or transparent institutional assessment. Peer-reviewed primary studies, preregistered reports, longitudinal syntheses, and meta-analyses representing competing interpretations were prioritized. Sources were excluded when they conflated laboratory proxies with serious violence, provided no transparent method, relied on promotional claims, duplicated a stronger source, or consisted of Wikipedia or unsourced commentary. Official documents were retained

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for policy statements and classification procedures rather than treated as causal evidence.

2.5 Selection process and corpus composition

The sole author conducted title and abstract screening, full-text eligibility assessment, extraction, coding, appraisal, and synthesis. A contemporaneous record-level search log was not retained; consequently, reliable counts for initially identified records, duplicates, screened records, full texts assessed, and exclusions cannot be reconstructed without risking false precision. The principal exclusion reasons were construct conflation, absence of a transparent method, promotional or unsourced content, duplication by a stronger source, and lack of relevance to the review questions. The final corpus contains 32 sources: 25 peer-reviewed analytical, theoretical, methodological, or review publications and seven institutional or review-method sources. This limitation is reported explicitly rather than presenting a retrospective PRISMA-style flow as if the review had been prospectively systematic.

2.6 Data extraction and coding

For each retained source, the author recorded design, sample or evidence unit, exposure definition, outcome definition, time horizon, comparison condition, preregistration status when applicable, covariate strategy, principal finding, and major limitation. Evidence was coded into seven domains: construct definition; short-term experimental effects; observational and longitudinal associations; meta-analytic disagreement; moderators and alternative mechanisms; contemporary platform context; and policy relevance. Findings concerning aggressive cognition, affect, proxy behavior, everyday aggression, and serious violence were kept analytically separate.

2.7 Critical appraisal and synthesis rules

Evidence strength was appraised according to outcome validity, exposure measurement, temporal ordering, control of confounding, preregistration, statistical power, transparency of exclusions and scoring, independence of informants, and practical magnitude. Statistical significance was not treated as social importance. Experiments were considered informative for immediate causal mechanisms but weak for persistent real-world outcomes; longitudinal evidence improved temporal inference but remained vulnerable to residual confounding; meta-analyses inherited the strengths and weaknesses of their included studies. When syntheses disagreed, conclusions were calibrated to the most defensible shared boundary rather than selected by authority.

2.8 Single-author procedure and limitations

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All review stages were completed by one author. Inter-rater agreement statistics were therefore unavailable and inappropriate. Explicit search terms, source roles, coding fields, appraisal criteria, and the supplementary evidence matrix improve auditability but do not eliminate selection or confirmation bias. The absence of a retained record-level search log prevents reconstruction of a defensible selection-flow diagram. The review is also limited by English-language emphasis, rapid technological change, inconsistent operational definitions, reliance on self-report in parts of the literature, and limited transferability of older short-session studies to contemporary online and live-service platforms. The conclusions are a structured critical synthesis rather than an exhaustive systematic estimate.

3. Defining Violence, Aggression, and Harm

Violent game content refers broadly to intentional actions represented as causing harm to characters. This category covers highly stylized fantasy, competitive combat, realistic military simulation, slapstick interaction, and narrative violence with different meanings and mechanics. Treating all such content as one dose ignores visual realism, moral framing, reward, perspective, repetition, and social context (APA, 2020b).

Aggression is behavior intended to harm someone who wishes to avoid that harm, but studies often measure related constructs such as aggressive thoughts, angry affect, arousal, hostility, or reduced helping. These outcomes can be theoretically relevant without being interchangeable. A cognition measure does not establish aggressive conduct, and neither establishes serious violence (Anderson & Bushman, 2002; Elson et al., 2014).

Serious violence is rarer, more consequential, and shaped by multiple interacting risks. Prior violence, family conflict, exposure to real-world violence, peer processes, substance use, social disadvantage, and access to means can be important depending on the outcome studied. The APA's 2020 clarification stated that evidence was insufficient to support a causal link between violent video games and violent behavior (APA, 2020a).

Harm may also arise through pathways not specific to violent content, including sleep displacement, excessive play, harassment, monetization pressure, or conflict over limits. Conversely, games can provide enjoyment, competence, social connection, and opportunities for learning. A content-only debate can obscure both broader risks and benefits (Granic et al., 2014; Johannes et al., 2021).

A sound research question identifies the content, player, context, exposure period, comparator, and outcome. "Do violent games cause violence?" is too broad to test. Questions about whether a specific mechanic produces a short-term change in a validated behavior under defined conditions are narrower and more scientifically answerable (Elson et al., 2014).

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4. Theoretical Models and Competing Explanations

The General Aggression Model proposes that personal and situational inputs influence cognition, affect, and arousal, which shape appraisal and behavior. Repeated exposure may contribute to learned scripts and beliefs. The model provides a framework for integrating short- and long-term mechanisms, but its breadth can make disconfirmation difficult if many different measures are interpreted as evidence of the same process (Anderson & Bushman, 2002, 2018).

Social-cognitive explanations emphasize observation, rehearsal, reward, and accessibility of aggressive scripts. Interactivity may matter because players make decisions rather than watch passively. Yet players also understand fictional conventions and adopt strategic goals that do not imply endorsement. Meaning, identification, moral framing, and perceived realism may moderate learning (Anderson & Bushman, 2018).

The frustration hypothesis offers a content-independent account for some immediate effects. Difficult controls, unfair rules, repeated failure, lag, or mismatched difficulty can provoke anger. Experiments that compare a difficult violent game with an easy nonviolent game may confound content with competence frustration, pace, and challenge (Przybylski et al., 2014).

Competition and social interaction provide additional mechanisms. Competitive games can produce arousal and antagonism regardless of imagery, while cooperative play can promote coordination even inside a violent fictional setting. Online outcomes also depend on teammates, norms, voice chat, anonymity, and platform moderation. The unit of analysis may therefore be the social system of play rather than content alone (Adachi & Willoughby, 2011).

Selection and third-variable explanations propose that aggressive individuals may prefer violent games or share environments that influence both exposure and behavior. Longitudinal cross-lagged models can examine directionality, but results depend on stable measurement and adequate confounder control. Causal language should remain proportional to the design (Ferguson, 2015).

A developmental/ecological account locates play within interacting individual, family, peer, school, community, and cultural systems. It predicts heterogeneous trajectories rather than a uniform content effect and requires repeated, multi-informant measurement across contexts and developmental transitions. Evidence that distinguishes this account from an exposure-only model must show within-person change while addressing baseline aggression and time-varying context.

Taken together, the theories make distinguishable predictions. GAM emphasizes changes in aggressive knowledge structures, affect, arousal, appraisal, and behavior following violent content. Competence-thwarting predicts effects when control, difficulty, or failure frustrates psychological need satisfaction. Competition/arousal

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accounts predict effects from competitive structure independent of imagery. Selection accounts predict that prior aggression or preferences precede exposure. Third-variable explanations predict attenuation after credible control of shared causes. Developmental/ecological models predict that effects vary across player histories and social environments. Discriminating among them requires factorial content-by-competition experiments, validated mediators, temporal ordering, preregistered adjustment sets, and convergent longitudinal evidence.

5. Experiments and the Problem of Measurement

Experiments randomly assign participants to game conditions and can test immediate causal effects. Their strength is control; their limitation is ecological validity. Sessions are brief, games may be unfamiliar, and participants know they are in a study. Outcomes are often proxies selected because meaningful harm cannot ethically be induced (Elson et al., 2014).

The Competitive Reaction Time Task (CRTT) has allowed participants to set an unpleasant stimulus for an opponent, but laboratories have scored the task in numerous ways. Flexible exclusion and scoring rules can change results. Without preregistration, a researcher may unknowingly select an analysis that supports expectations, reducing reproducibility (Elson et al., 2014).

Other measures include filling missing letters with aggressive words, assigning hot sauce, evaluating story endings, or self-reporting hostility. These tasks may measure accessibility, competitiveness, suspicion, or demand characteristics as well as aggression. Their validity must be established rather than assumed because the label attached to a measure is not evidence that it predicts harmful behavior (Hilgard et al., 2017).

Game matching is a fundamental design problem. Violent and nonviolent games can differ in difficulty, pace, perspective, controls, competition, enjoyment, and complexity. Statistical adjustment after play may not repair a poor comparison. Researchers should pilot games, report player experience, and manipulate content within otherwise similar conditions where possible (Przybylski et al., 2014).

Preregistered analysis plans, adequate power, blinded coding, validated outcomes, and open materials can reduce flexibility. Experiments remain useful for mechanisms and immediate states, but even a well-designed short experiment does not directly estimate persistent aggression or criminal violence (Hilgard et al., 2017).

6. Cross-Sectional and Longitudinal Evidence

Cross-sectional surveys can study large real-world samples, but exposure and outcome are measured at the same time. Associations may reflect selection, common-method bias, family rules, peers, or broader media habits. Self-reported

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game violence can also be contaminated by participants' perceptions and knowledge of the hypothesis (Ferguson, 2015).

Longitudinal designs establish temporal order by measuring exposure before later aggression. They can test stability and bidirectionality, yet they remain observational. Small differences in covariates, follow-up length, attrition, and outcome definition influence estimates, particularly when baseline aggression explains much of later aggression (Drummond et al., 2020).

Prescott and colleagues synthesized longitudinal studies and reported a small positive association between violent gameplay and later physical aggression after controlling baseline aggression. The authors interpreted the pooled effect as consistent with a prospective relationship, while acknowledging modest magnitude and variation among samples (Prescott et al., 2018).

Drummond and colleagues reexamined longitudinal evidence using methodological distinctions and concluded that studies did not support a substantive long-term relationship between aggressive game content and youth aggression. Their conclusion illustrates how the same broad literature can yield different interpretations when analyses emphasize corrected estimates and practical significance (Drummond et al., 2020).

Przybylski and Weinstein combined adolescents' reports with caregiver ratings and official game classifications in a preregistered study. They found no evidence that recent violent-game engagement was associated with caregiver-rated aggressive behavior, highlighting the value of preregistration and independent exposure coding (Przybylski & Weinstein, 2019).

7. Meta-Analyses and the "Meta-Analytic Wars"

Meta-analysis can increase precision by synthesizing studies, but it cannot remove weaknesses in included measures. Results depend on eligibility rules, independence of effects, coding, covariates, publication bias, and whether different outcomes are combined. A pooled number is not automatically more valid than the underlying studies (Hilgard et al., 2017).

Anderson and colleagues reported effects across experimental, cross-sectional, and longitudinal research and argued that violent game exposure increases aggressive outcomes and reduces prosocial behavior. This work strongly influenced the field and the General Aggression Model tradition (Anderson et al., 2010).

Ferguson and other critics argued that effect estimates were inflated by publication bias, weak measures, and selective covariate practices. Meta-analytic disagreements became unusually adversarial, sometimes turning methodological choices into camps. The controversy demonstrates why data, code, and decision rules should be transparent (Ferguson, 2015).

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Hilgard and colleagues reported evidence of selective reporting and excess significance in parts of the literature. Bias-adjusted estimates were smaller than conventional estimates, although methods for correcting publication bias also rely on assumptions. The appropriate lesson is not that every finding disappears, but that small effects are especially vulnerable to research and publication decisions (Hilgard et al., 2017).

Mathur and VanderWeele sought common ground and concluded that violent games may increase aggressive behavior in many settings, but effects are usually very small. This formulation separates whether a nonzero average association exists from whether it explains meaningful real-world harm. Policy should attend to magnitude, uncertainty, and opportunity cost (Mathur & VanderWeele, 2019).

8. Effect Size, Practical Significance, and Causality

A statistically significant effect can be too small to guide policy, especially in large samples. Practical interpretation requires absolute risk, outcome validity, persistence, and comparison with stronger predictors. Small average effects may matter across a population, but only if the measure represents a meaningful outcome and the causal assumptions are credible (Mathur & VanderWeele, 2019).

Measurement error in exposure can attenuate or distort estimates. Asking participants to name favorite games, estimating content from genre, or averaging ratings can misclassify actual play. Objective telemetry offers precision but raises privacy concerns and may still omit social setting and player interpretation (Johannes et al., 2021).

Covariates are not neutral. Controlling a mediator can remove part of a causal effect, while controlling a collider can create bias; omitting confounders can inflate an association. Researchers should use causal diagrams and preregister adjustment sets rather than select controls according to whether significance changes (Rohrer, 2018).

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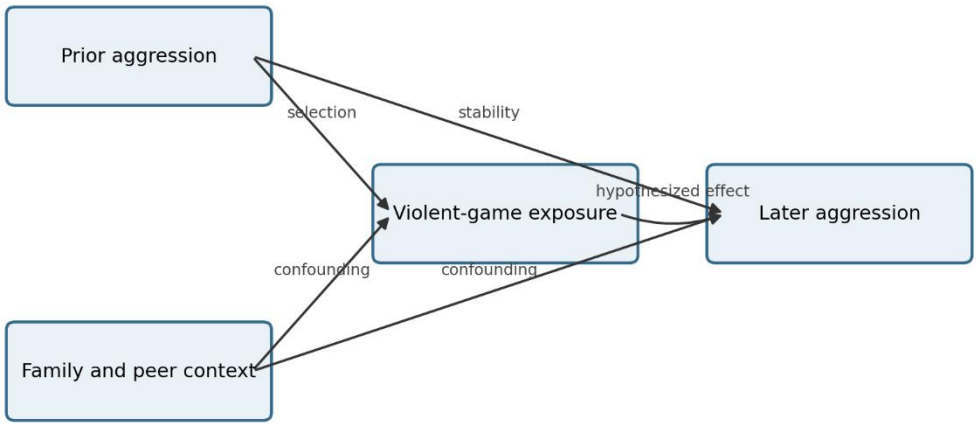

Figure 1. Conceptual directed acyclic graph illustrating prior aggression, family and peer context, violent-game selection, and later aggression.

Figure 1 makes the identification problem concrete. Prior aggression may affect both later aggression and selection into violent games, while family and peer context may affect both exposure and the outcome. Unless these shared causes are measured appropriately, the exposure-outcome association can reflect confounding or reverse selection. The arrow from exposure to later aggression is the causal effect under investigation, not an effect assumed by the diagram (Rohrer, 2018).

Reverse causality remains plausible: aggressive preferences or peer groups may lead to violent-game selection. Bidirectional models are useful but depend on time intervals and measurement invariance. Natural experiments and within-person designs can add evidence, though each brings different assumptions (Ferguson, 2015).

Causal confidence should emerge from convergence across methods with different biases. If laboratory proxies shift but preregistered field and longitudinal measures do not, the discrepancy is itself informative. A responsible conclusion describes which outcomes change, for how long, and under what uncertainty instead of using a single causal slogan.

9. Individual, Family, and Social Moderators

Average effects can conceal heterogeneity. Age, prior aggression, emotional regulation, sensation seeking, family conflict, peer norms, and motives for play may shape response. Moderator claims require adequate power and replication because subgroup analyses readily produce false positives (Burkhardt & Lenhard, 2022). A

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Chinese cross-sectional study also linked violent-game exposure, deviant peer affiliation, and broad problem behavior, but its design cannot determine whether exposure caused the outcome or whether shared peer and individual factors generated the association (Wei et al., 2022).

Family environment influences both access and interpretation. Co-play, discussion, consistent limits, and interest in a child's gaming may support media literacy more effectively than surveillance alone. Restriction without conversation can be difficult to enforce and does not teach players to evaluate content (Granic et al., 2014).

Social play complicates a simple exposure model. A violent cooperative game can involve teamwork, communication, and friendship, while a nonviolent competitive game can produce conflict. Researchers should measure who played, with whom, toward what goal, and what occurred in communication rather than treating the software label as the complete experience (Adachi & Willoughby, 2011).

Developmental vulnerability should be considered without assuming uniform susceptibility. Children differ in comprehension of fantasy, moral framing, and emotion regulation. Longitudinal meta-analysis has examined age-dependent effects, but heterogeneity and small estimates counsel against simple age thresholds as scientific facts (Burkhardt & Lenhard, 2022).

Broader stressors can dominate. Economic hardship, discrimination, neighborhood conditions, exposure to real conflict, school climate, and family instability have direct relevance to aggression and well-being. Focusing public concern narrowly on games may divert attention from these more consequential and actionable determinants (APA, 2020a).

10. Real-World Violence and Public Narratives

The leap from aggression proxies to serious violence is the most consequential error in public debate. Serious violent behavior is rare and multifactorial, making prediction difficult. The APA explicitly cautioned public officials and media against attributing violent behavior to violent video games on the basis of insufficient evidence (APA, 2020a).

After violent events, games can become a culturally convenient explanation because they are visible and widely discussed. This narrative may simplify uncertainty and assign blame without examining stronger individual and structural factors. It can also stigmatize millions of players whose entertainment does not imply dangerousness (APA, 2019).

Racial stereotypes influence attribution. APA-supported research found that commentators were more likely to mention violent games when perpetrators were described as White than when they were described as Black, suggesting that game-blaming can participate in narratives about whose violence needs an external explanation (Markey et al., 2020).

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Population trends cannot by themselves prove or disprove individual effects, but they provide a plausibility check. Gaming has expanded across societies without a corresponding simple increase in serious youth violence. Ecological correlations remain weak evidence in either direction because many social changes occur simultaneously (Ferguson, 2015).

Responsible communication should state that evidence on minor aggression-related outcomes is contested and effect sizes are small, while evidence does not support video games as a primary explanation for serious violence. This wording is more accurate than either “games cause violence” or “games can never influence anyone.”

11. Frustration, Competition, Online Toxicity, and Design

Game content is only one design dimension. Difficulty, unreliable controls, imbalance, random rewards, and perceived unfairness affect emotion. Przybylski and colleagues found that thwarted competence and difficult interfaces could increase aggressive feelings and behavior, demonstrating the need to separate frustration from represented violence (Przybylski et al., 2014).

Competition can increase arousal and antagonism independently of violent imagery. Studies comparing violent competitive games with calm noncompetitive games risk attributing competitive effects to content. Factorial designs that vary violence and competition separately offer stronger tests (Adachi & Willoughby, 2011).

Online toxicity includes harassment, exclusion, hostile communication, sabotage, and other interpersonal conduct. These are behaviors enacted through gaming environments, not measures of fictional violent content. Recent work suggests that moral disengagement, social dominance orientation, online disinhibition, platform norms, anonymity, team dependence, and moderation can shape in-game aggression, but cross-sectional evidence does not establish temporal or causal direction (Gan et al., 2024).

Design interventions can target reporting, moderation, matchmaking, communication defaults, penalties, and positive norms. Recent evidence shows that interpersonal dependence, power, and player passion are associated with both toxic and prosocial conduct in multiplayer games (Zhu et al., 2022), underscoring that platform-mediated social relations deserve direct study. The effectiveness of specific moderation architectures should nevertheless be tested prospectively for unintended effects, including false reports and unequal enforcement. Platform governance is a plausible and more proximal response to actual interpersonal harm than fictional-content restrictions, but the present corpus does not establish which moderation architecture is most effective.

A broader design perspective therefore improves causal specificity. It asks which mechanic or social affordance produces which outcome for which players. This shifts

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discussion from moral evaluation of a genre toward testable questions and actionable product decisions (Granic et al., 2014).

12. Rating Systems, Parental Mediation, and Brazil

Age-rating systems provide descriptive information rather than clinical risk scores. Official ESRB materials describe rating categories, content descriptors, and interactive elements, while PEGI provides age labels and content descriptors across participating European countries. Brazil's ClassInd likewise provides age recommendations and content information. These systems support informed choice but differ across jurisdictions and should not be treated as experimental measures or causal prevention tools (Entertainment Software Rating Board [ESRB], 2026; Pan European Game Information [PEGI], 2026; MJSP, 2026).

In Brazil, the Ministry of Justice and Public Security oversees Classificação Indicativa for games and applications. The system considers content axes including violence, sex and nudity, and drugs, and provides age recommendations. Physical-media games must display classification information, while digital distribution operates through applicable classification procedures (Ministério da Justiça e Segurança Pública [MJSP], 2022, 2026).

Ratings are most useful when combined with knowledge of the individual player. Parents can examine descriptors, trailers, online interaction, purchases, and communication features. A single age symbol cannot communicate difficulty, fear, toxicity, accessibility, or the social setting of play (MJSP, 2026).

Active mediation involves conversation about fiction, consequences, stereotypes, competition, and online conduct. Co-play can reveal how a child responds and creates opportunities to discuss frustration and respectful behavior. The objective is guided autonomy and media literacy rather than panic or indiscriminate prohibition (Granic et al., 2014).

Policy should preserve proportionality. Content information and child-protection tools are compatible with scientific uncertainty, whereas claims that ratings prevent criminal violence would exceed evidence. Regulation should also address privacy, manipulative monetization, harassment, and accessibility when these present clearer risks.

13. Benefits, Trade-Offs, and a Balanced Research Agenda

Games can support motivation, spatial skills, problem solving, persistence, and social connection, depending on design and context. These benefits do not prove that violent content is harmless, but they show why total play time or genre is an incomplete description. Research should measure benefits and costs in the same participants (Granic et al., 2014).

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Well-being studies using objective play records have sometimes found little evidence that play time itself predicts lower well-being, while emphasizing that experiences and motivations matter. Telemetry improves exposure measurement but does not automatically provide causal inference or represent every player (Johannes et al., 2021).

Displacement is a relevant trade-off. Gaming may replace sleep, exercise, study, face-to-face interaction, or other leisure, but it may also replace less rewarding or riskier activities. Time-use analysis should identify what gaming displaces instead of assuming that every hour has the same consequence.

Research can move beyond polarized questions by studying mechanics, contexts, and trajectories. Multiverse analyses can show how conclusions change across reasonable analytic choices. Registered reports, open data where ethical, and adversarial collaboration can reduce suspicion between theoretical camps (Hilgard et al., 2017).

A balanced agenda does not split the difference between claims regardless of evidence. It applies the same standards to harmful and beneficial effects, acknowledges uncertainty, and updates conclusions when stronger preregistered or longitudinal evidence appears.

14. Technological Change, Immersion, and Contemporary Platforms

Older studies were often conducted with short, offline games, whereas contemporary play can involve persistent worlds, voice communication, spectatorship, live updates, and algorithmic matchmaking. This evolution limits direct transferability but does not demonstrate stronger psychological effects. Because the evidence synthesized for these features is thinner than the core aggression literature, the following discussion is a forward-looking extension that separates established findings from research priorities.

Graphical realism is intuitively assumed to intensify effects, yet realism includes visual detail, plausible behavior, sound, narrative consequence, and player expectation. A highly realistic image can be experienced as clearly fictional, while stylized competition can be emotionally intense. Studies should manipulate dimensions of realism separately and measure perceived realism instead of inferring it from technical specifications (Ivory & Kalyanaraman, 2007).

Immersion and presence describe focused involvement and the feeling of being located in a mediated environment. They may intensify emotion, but strong presence is not specific to aggression and can occur in exploration, sport, creativity, or cooperation. Presence should be studied as a moderator with validated measures, not used as a synonym for loss of moral distinction between fiction and reality (Lull & Bushman, 2016).

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Virtual reality increases embodied interaction and sensory enclosure, but dedicated evidence remains limited. In two preregistered experiments, immersive ambulatory VR did not produce greater aggressive cognition, hostile affect, or aggressive behavior than comparable flat-screen play; the authors nevertheless emphasized stimulus and measurement limitations and the need for replication (Drummond et al., 2021). VR-specific claims should therefore remain outcome-bound, and novelty, physical exertion, equipment discomfort, game matching, and brief exposure should be treated as alternative explanations.

Livestreaming separates playing from watching and embeds game content within streamer-audience communities. Bibliometric research confirms rapid growth of video-game live-streaming scholarship, but it does not establish livestreaming as a modifier of violent-content effects (Cabeza-Ramirez et al., 2021). Claims concerning broadcaster commentary, peer norms, and viewer aggression should therefore be treated as hypotheses for preregistered experiments and longitudinal platform research.

Recommendation systems may repeatedly surface games or videos, while prior choices and engagement also shape what is recommended. This reciprocal exposure-selection process is a plausible causal complication, but the present corpus contains no direct evidence that recommendation systems alter violent-game effects. The claim is therefore a research priority: future studies should measure recommendation pathways, user control, content diversity, and time-varying preferences while protecting privacy.

Live-service games change through patches, seasonal content, monetization, and community practices. The present review identified no direct causal study showing that live-service structure amplifies violent-content effects. Accordingly, versioning is treated as a measurement requirement rather than an established moderator: datasets should record dates, builds, modes, and social features so findings refer to the experience actually studied.

Cross-platform ecosystems also blur boundaries among game, social network, marketplace, and competition service. Harmful communication, privacy risks, and financial pressure may occur around a game without being caused by fictional violence. Policy analysis should match the intervention to the relevant mechanism instead of using violent content as a universal proxy.

Technological sophistication should not be confused with psychological power. Higher resolution, artificial intelligence, or more realistic animation does not by itself establish a larger behavioral effect. Claims require comparative studies that isolate the feature and measure meaningful outcomes with adequate power (Ivory & Kalyanaraman, 2007).

The contemporary research agenda should therefore be feature-based and time-stamped. It should identify whether the proposed cause is narrative violence,

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competitive structure, frustration, social norms, immersive presentation, recommendation, or moderation. This specificity allows findings to remain useful as particular games and platforms change.

15. Recommendations for Research and Policy

Researchers should preregister hypotheses, exclusions, outcomes, scoring, and covariates. Studies need power for realistic small effects and should distinguish confirmatory from exploratory analyses. Materials, code, and de-identified data should be shared when ethically possible (Elson et al., 2014).

Exposure should be measured with official ratings, game-specific coding, or consented telemetry rather than only retrospective impressions. Outcome assessment should use validated behavior, multiple informants, and repeated measurement. Severe violence should not be inferred from minor laboratory proxies. Longitudinal research should test within-person change, bidirectionality, developmental transitions, and moderators with prespecified causal models. Attrition and measurement invariance need explicit analysis. Effect sizes should be reported with uncertainty and interpreted in practical units (Drummond et al., 2020).

Families should receive accurate content descriptors and practical guidance for conversation, co-play, privacy, online interaction, and healthy routines. Recommendations should be individualized and avoid presenting ordinary gaming as evidence of dangerousness (MJSP, 2026).

Policymakers and journalists should avoid causal claims about serious violence that the evidence cannot support. Resources should prioritize established risk factors and direct online harms while maintaining age-appropriate content information. Proportionate policy protects children without turning games into a scapegoat (APA, 2020a).

16. Discussion

The evidence does not support a single categorical answer because “violence” and “aggression” have been operationalized in incompatible ways. Some meta-analyses identify small relationships with aggression-related outcomes, while preregistered studies and conservative longitudinal syntheses frequently report negligible associations. This is a dispute about constructs, methods, and practical meaning as much as about statistics (Mathur & VanderWeele, 2019).

Short-term experimental effects should be interpreted at their actual level. They can inform theories about arousal, cognition, frustration, and competition, but cannot establish persistent harmful behavior without longitudinal and field evidence. Measurement flexibility further reduces confidence when outcomes are scored after results are known (Elson et al., 2014).

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Longitudinal evidence improves temporal reasoning but remains sensitive to confounding, selection, and covariate choices. The contrast between Prescott et al. (2018) and Drummond et al. (2020) demonstrates why readers should examine magnitude and analytic rules instead of citing "the meta-analysis" as if only one synthesis existed.

The clearest conclusion concerns serious violence: current evidence is insufficient to claim that violent video games cause violent behavior. Treating games as a dominant explanation is scientifically disproportionate and can distract from stronger risks. This conclusion is compatible with continued study of small, temporary, or subgroup-specific effects (APA, 2020a).

Research and policy improve when they focus on specific mechanisms, players, and contexts. Frustration, competition, online interaction, family mediation, and platform design are actionable variables. A mature field should replace moral panic and defensive dismissal with transparent, cumulative, and proportionate evidence.

17. Limitations

This narrative review is not exhaustive and does not generate a pooled effect. Study quality varies, terminology changes, and many datasets rely on self-report. The core literature on aggression constructs, experimental measurement, longitudinal evidence, and meta-analysis is represented more comprehensively than Sections 11-14, whose treatment of toxicity, livestreaming, recommendation, virtual reality, live-service environments, and platform governance is explicitly forward-looking. Rapid platform evolution limits generalization from older single-player laboratory tasks.

The review emphasizes causal and methodological questions and gives less attention to cultural analysis of violent representation. Foundational evidence is disproportionately North American or Western, limiting geographic and cultural generalizability. Norms concerning violence, competition, parenting, peer interaction, and game use may influence exposure, reporting, measurement validity, and interpretation. Rating practices and legal frameworks also vary by country; recommendations therefore require adaptation to local family, educational, cultural, and platform contexts.

18. Conclusion

Overall, violent-game exposure may be associated with small changes in some aggression-related outcomes under some conditions, but effect estimates are contested and often of limited practical magnitude. Evidence does not justify equating these outcomes with serious real-world violence (APA, 2020a; Mathur & VanderWeele, 2019).

Future progress depends on preregistration, validated measures, realistic comparisons, independent exposure data, longitudinal multi-informant designs, and

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transparent synthesis. Studies should report null and adverse findings with equal care and separate statistical detection from practical importance.
Digital games are complex social technologies, not uniform doses of violent content. Their effects emerge from interactions among design, player, peers, family, and environment. Evidence-based policy should support informed choice and safer play while directing prevention toward the established, multifactorial causes of violence.

Ethical Approval
Ethical approval was not required because this study analyzed publicly available literature and institutional documents and involved no human participants, identifiable personal data, animals, or intervention.

Funding
No external funding was received for the preparation of this article.

Conflicts of Interest
The author declares no conflicts of interest.

Generative AI Use Disclosure
Generative artificial intelligence tools were used to assist with language editing, structural revision, and preparation of the response to peer-review recommendations. The sole author reviewed and approved all substantive claims, verified citations and references, and accepts full responsibility for the accuracy, integrity, and final content of the manuscript. No AI tool is credited as an author.

Tables
Table 1. Study Designs, Inferential Strengths, and Principal Limitations

Study design or methodological feature	What it can establish	Principal limitation
Short experiment	Immediate causal change in a controlled proxy.	Brief exposure, game mismatch, proxy validity, demand characteristics.
Cross-sectional survey	Population association at one time.	Directionality, self-report, selection and confounding.
Longitudinal study	Temporal order and change across waves.	Residual confounding, attrition, covariate and interval dependence.

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INTERNATIONAL JOURNAL OF INTERDISCIPLINARY RESEARCH

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Preregistration (cross-cutting feature)	Reduces undisclosed analytic flexibility across designs.	Does not correct weak measures, poor sampling, short exposure, or confounding.
Meta-analysis	Average pattern across selected studies.	Depends on inclusion, study quality, dependence and publication bias.

Table 2. Outcome definitions and permissible inferences

Outcome level	Typical operationalization	Permissible inference	Invalid extrapolation
Aggressive cognition/affect	Word completion, hostility, anger, arousal	Temporary change in the measured state.	Persistent aggressive conduct or serious violence.
Laboratory proxy behavior	Noise, unpleasant stimulus, hot sauce, allocation task	Behavior within the specific experimental paradigm.	Criminal violence or stable disposition without validation.
Everyday aggression	Self-, peer-, teacher-, or caregiver-reported conduct	Association or change in ordinary aggressive behavior.	Rare severe violence without direct measurement.
Serious violent behavior	Official or validated measures of consequential violence	Evidence concerning the measured serious outcome.	Generalization across populations or contexts without support.

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Table 3. Narrative Assessment of Evidence Maturity

Evidence domain	Narrative assessment of evidence maturity	Best-supported conclusion	Key uncertainty
Immediate states and proxies	Moderate	Some studies report small short-term changes under controlled conditions.	Measure validity and game matching.
Long-term aggression	Low to moderate	Estimates are small and sensitive to design and synthesis choices.	Residual confounding, attrition, and covariates.
Serious violence	Low for a causal link	Available evidence is insufficient to attribute serious violence to games.	Rare outcomes and inappropriate extrapolation.
Alternative mechanisms	Moderate	Frustration, competition, and social context can explain some effects.	Moderator replication and ecological validity.
Policy and ratings	Moderate for information use	Ratings support informed choice but are not causal prevention tools.	Cross-national differences and evolving platforms.

Note. These categories summarize the sole author's structured narrative appraisal according to the criteria described in Section 2.7. They were not derived from GRADE or another validated evidence-grading framework.

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Supplementary Table S1. Source-by-Source Evidence Matrix

Note. The matrix records every source in the final 32-source corpus using the principal extraction fields employed in synthesis. “Not applicable” is implicit for preregistration in reviews, methodological papers, and institutional documents. Entries are concise audit aids and do not substitute for the outcome-specific discussion in the manuscript.

Source	Design / evidence unit	Exposure / topic	Outcome / contribution	Principal finding or role	Principal limitation
Adachi & Willoughby (2011)	Review	Violent content vs competition	Aggression	Competition may explain effects	Narrative evidence base
American Psychological Association (2019)	Institutional communication	Public attribution and race	School-shooting narratives	Supports racialized-attribution discussion	Not primary empirical report
American Psychological Association (2020a)	Institutional statement	Violent video games	Aggression vs violence	Distinguishes aggression from serious violence	Institutional position
American Psychological Association (2020b)	Policy resolution	Violent video games	Research and policy	Defines APA position and cautions	Not a primary study
Anderson et al. (2010)	Meta-analysis	Violent-game exposure	Aggression, affect, cognition, prosociality	Reports small aggregate associations/effects	Heterogeneous measures and bias dispute
Anderson &	Theoretical review	Human aggression	Mechanisms and constructs	Foundational aggression framework	Broad, not game-specific

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Bushman (2002)					
Anderson & Bushman (2018)	Theoretical review	Media violence/GAM	Aggression mechanisms	Articulates GAM predictions	Competing mechanisms remain
Burkhardt & Lenhard (2022)	Meta-analysis	Longitudinal violent-game exposure	Aggression over development	Small age-dependent longitudinal estimates	Residual confounding and study heterogeneity
Cabeza-Ramírez et al. (2021)	Bibliometric review	Game livestreaming	Research trends	Maps an emerging platform domain	Does not test aggression effects
Drummond et al. (2020)	Meta-analysis	Longitudinal gameplay	Youth aggression	Finds little support for meaningful long-term relation	Depends on inclusion and model choices
Drummond et al. (2021)	Preregistered experiments	Violent/nonviolent VR games	Affect, cognition, proxy behavior	Direct VR-specific tests	Short-term laboratory outcomes
Elson et al. (2014)	Measurement audit	CRTT	Laboratory proxy aggression	Documents scoring flexibility	Validity remains task-dependent
Entertainment Software Rating	Primary institutional source	ESRB ratings	Policy classification	Documents US/Canadian rating labels	Not causal evidence

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Board (2026)					
Ferguson (2015)	Meta-analysis	Video-game exposure	Aggression and related outcomes	Reports limited effects	Eligibility and interpretation contested
Gan et al. (2024)	Cross-sectional survey	Online gaming/social context	Aggressive behavior	Links social/individual mechanisms to aggression	Cross-sectional self-report
Granic et al. (2014)	Narrative review	Playing video games	Potential benefits	Balances risk-focused literature	Benefits vary by design and context
Hilgard et al. (2017)	Reanalysis	Short-term violent-game studies	Affect and behavior	Raises publication-bias concerns	Depends on bias-model assumptions
Ivory & Kalyanaraman (2007)	Experiment	Technology and violent content	Presence, arousal, aggression	Separates technological advancement from content	Short exposure and proxies
Johannes et al. (2021)	Telemetry-linked observational study	Actual gameplay time	Well-being	Demonstrates value of behavioral telemetry	Correlation does not establish causation
Lull & Bushman (2016)	Experiment	3D violent gameplay	Presence and angry feelings	Tests presence as mediator	Short-term affective outcome

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Markey et al. (2020)	Experiments	Race stereotypes/ media narratives	Violence attribution	Primary evidence on racialized attribution	Attribution is not behavioral causation
Mathur & VanderWeele (2019)	Methodological commentary	Meta-analysis disputes	Interpretation of effect evidence	Clarifies common ground and sensitivity	No new primary estimate
Ministério da Justiça e Segurança Pública (2026)	Primary institutional source	Brazilian ClassInd	Policy classification	Documents current games/apps guidance	Not causal evidence
Pan European Game Information (2026)	Primary institutional source	PEGI labels	Policy classification	Documents European rating labels	Not causal evidence
Prescott et al. (2018)	Meta-analysis	Longitudinal violent-game play	Physical aggression	Reports small longitudinal association	Covariate and practical-significance debate
Przybylski et al. (2014)	Experiments	Competence-thwarting games	Aggressive feelings/thoughts/behavior	Supports frustration mechanism	Short-term experimental context
Przybylski & Weinstein (2019)	Registered report	Violent-game engagement	Adolescent aggression	No association in preregistered analysis	Observational exposure measurement

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Rohrer (2018)	Methods tutorial	Causal diagrams	Confounding and adjustment	Operationalizes DAG reasoning	Illustrative rather than topic-specific
Snyder (2019)	Methods review	Literature-review methodology	Review design	Supports transparent review procedures	General methodological guidance
Wei et al. (2022)	Cross-sectional/mediation study	Violent-game exposure	Problem behavior/peer affiliation	Examines peer pathway and heterogeneity	Cross-sectional mediation limits causality
Whittemore & Knafl (2005)	Methods paper	Integrative review	Synthesis process	Foundational integrative-review method	General guidance
Zhu et al. (2022)	Survey of 782 Chinese MMO players	Multiplayer social relations	Toxic and prosocial conduct	Links dependence, power, and passion to conduct	Cross-sectional self-report; no moderation trial

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