

A commentary on methodological considerations for studying the psychological impact of social media

Tom Grimes, PhD^{1,*}, Kristen Sussman, PhD¹

¹School of Journalism and Mass Communication, Texas State University, USA

*Author for correspondence:
Email: grimes@txstate.edu

Received date: March 19, 2025
Accepted date: April 29, 2025

Copyright: © 2025 Grimes T, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Long-running debates over the psychological effects of media violence have exposed significant methodological problems embedded within 40-plus years of research. Parallel concerns have now emerged within contemporary social media research. This commentary expands on the observations recently published by Grimes and Lasser (2025) to show how social media scholars are in similar danger of relying too much on inconsistent operationalizations of key constructs and insufficient attention to individual differences among people who consume media. These same shortcomings led to oversimplified or unreliable conclusions in media violence research and could be contributing to an erroneous understanding of the relationships between social media usage and rising mental health concerns. The present work outlines a way to re-conceptualize media violence and social media research with a critical yet constructive emphasis on methodological rigor.

Keywords: Social Media, Adolescents, Media Violence, Error Terms, Replication

Introduction

A long-running debate, sometimes acrimonious [1,2], formed around the assertion that media violence consumption has psychopathological effects on the general population. This debate is embedded in 40-plus years of media violence scholarship. A parallel debate has begun to form around the use of social media [3,4]. The debate centers on this crucial question: Does media violence (and now social media) have the potential to psychopathologically harm the general population, or does it only harm unwell populations while the general population is pathologically unaffected? Bergen & Grimes [5] were among the first to assert that only psychologically unwell people are vulnerable and that well people are not vulnerable (reiterated by [6,7]). Indeed, the American Psychological Association, which had once endorsed the media violence perspective, partially reversed itself and found benefits for psychologically well adolescents who play video games [8].

We want to explore the origins of the controversy surrounding media violence research and then apply the implications to social media scholarship. Our argument is that media violence scholars allowed inconsistent operationalizations of key constructs to proliferate, and they paid insufficient attention to individual psychological differences among people who consume media violence. Inattention to these issues can result in the incorrect calculation of summative error terms, which in turn can lead to replication problems. Those problems, we believe, also threaten social media scholarship.

Improperly formulated error terms may appear to be an esoteric focus, but our critique is situated within broader concerns raised by the replication crisis (e.g., [9]). Recent calls for a new open-science agenda in communication research [10] emphasize the need for transparency in the way communication models are built. Similar issues have emerged recently regarding research into the effects of pornography consumption [11]. So, as arcane as this may appear, error terms play an important role in modelling and are central to the formulation of sampling distributions that do the work of parametric statistical analyses.

So far, the outcomes for psychologically well social media users have been ambiguous. For instance, social media use has several positive attributes that bring adolescents together in a virtual community of mutual support, which also promotes the conveyance of important health information (e.g., [12]). On the other hand, Gupta *et al.* [13] enumerates several negative attributes, such as sleep deprivation (due to late night use), which can harm everyone – the psychologically well, unwell, and people with prodromal characteristics. Yet, the American Psychological Association, after having reviewed the current body of research on social media's negative effects, suggests it is too early to conclude that using social media harms all users [14]. So, a consensus has yet to form. Our point is that whatever conclusion coalesces will be flawed if social media scholarship does not learn from the mistakes of media violence scholarship. The present work, therefore, outlines the methodological mistakes that media violence researchers made and how knowing what those mistakes are can help all media scholars better manage the integrity of their scholarship.

Background

Media violence research gained traction in the mid-20th century due to increased scholarly and governmental attention to Westerns on commercial television, a genre that featured frequent gunfights within a context of continuous interpersonal conflict [15]. Academic research began to emerge in the early 1980s, which was triggered by a second wave of congressional investigations into media violence [15] as well as investigations by the Surgeon General's office [16]. As a result, a proliferation of grant opportunities emanated from the National Science Foundation and the National Institute of Mental Health. Media violence researchers took advantage of those opportunities and found that repeated exposure in childhood was associated with increased aggression in adulthood, even after controlling for other factors [2,17,18]. However, scholarship began appearing in the late 1990s that challenged these assumptions (as documented by [19]). That evidence strongly suggested that media violence exposure poses a psychopathological risk only for individuals with pre-existing conditions, while psychologically well consumers remain pathologically unaffected.

Grimes & Lasser [19] reported that between the late 1970s and early 2000s media violence researchers increased the putative threat level of media violence exposure by equating it with life threatening somatic illnesses [20, see figure 11.5 p. 235]. Some media violence researchers strayed into hyperbole, such as when Strasburger and his colleagues compared scholars who disagree with them to Holocaust deniers [2]. And so tensions remained high between researchers who adamantly insisted that media violence can create psychopathological disturbances in otherwise well consumers [1,2,18,21], and those who believed the empirical evidence was simply not there to support that conclusion (e.g., [5,6,19,22]).

Problems with Methodology

The hypothesis that media violence consumption was a psychopathological threat to the general population began to fray in 1999 when the National Science Foundation's Social, Behavioral, and Economic Sciences Division concluded that media violence aggression models would not replicate and therefore decided that there would be no more NSF grants until this problem was addressed (personal communication with the NSF Division head, fall 1999). What made contradictory claims about media violence confusing for the public was not only the fact that congressional hearings were still raising concerns during the late 1990s, but also the correlation people intuitively made between media violence, their own negative emotions elicited by it, and destructive behaviors they anecdotally attributed to it.

Media violence scholars' failure to put exposure in context with other environmental factors, such as a violent home life, living in violent neighborhoods, or violent public schools may have helped create an inflated estimation of media violence's effect on consumers [19]. So, why did the powerful effects model appeal so strongly to media violence scholars, a model that may also influence social media research as well (see warnings about social media's putative effects on psychologically well people from [23-26])? The deceptively prosaic-sounding answer is that sampling distributions were distorted by improperly calibrated error terms and thus were feeding researchers misleading information.

The Importance of the Error Term

Nobel laureate Steven Weinberg's *The First Three Minutes* [27] reviews the astrophysical challenges of explaining the origin of the universe. He argues that to make progress, there must be agreement among astrophysicists on fundamental concepts that tie together different studies from different laboratories. Without agreement, research becomes fragmented and laboratories risk talking past one another, which prevents the development of coherent cosmological models. So, there must be an underlayment of conceptual consistency, expressed statistically as a consistency of error terms that characterize independent and dependent variables. Media violence research never had that consistency. This was because different laboratories used different variables that lacked consistency across laboratories. That inconsistency marked the origin of the error term problem.

The *National Television Violence Study*, (1996-1998) [28] classified nearly all commercial television programming as violent, ranging from cartoons, to slapstick comedies, to realistic police dramas. For instance, the *Violence Study* coded slapstick and realistic dramas as isometrically violent. One is justified in asking if slapstick comedies, and realistic police dramas, produce similar error terms. One can reduce it to this question: Are slapstick and realistic dramatic portrayals semantically similar or dissimilar? What does common sense tell us, error terms notwithstanding? If they are not semantically similar, then the error terms that they produce in a statistical analysis would probably be systemically unrelated.

The same issues arise on the dependent variable side. Are "aggressive behaviors," which are triggered by different entertainment genres, derived from the same psychological processes? What – *exactly* – constitutes behavioral aggression? Which aggressive behaviors do slapstick and realistic dramas similarly invoke, thus suggesting similar error variances? Is "giving the finger" to someone in traffic linked

to media violence exposure? Is the accumulation of moving traffic violations a form of behavioral aggression, which is driven by what people see on television? Both of these were used by Huesmann *et al.* [18] as instances of aggression in reaction to long-term exposure to media violence. Is disparaging someone's appearance an instance of aggression (as applied by [18])? These behaviors are commonly evoked by face-to-face, in-the-moment encounters, which raises the question as to whether they have a discernable relationship to media violence exposure. Would aggression provoked by face-to-face encounters, and aggression provoked by media violence, produce similar error terms?

Consider aggression and intent-to-aggress. Most laboratories in the psychological sciences use psychophysiological measures of aggression and intent-to-aggress instead of relying on observed or self-reported behaviors as have most media violence studies (e.g., [29]). The instrumentation to make these measurements is portable, affordable, and it can continuously produce data outside the laboratory. This offers a consistent standard against which to measure aggression as opposed to the interpretative differences researchers infer from the behaviors they coded as they made observations behind two-way mirrors (e.g., [30]), or recollections of participants in self-report studies [18]. But the important point is that psychophysiological measurements provide error terms rooted in species-typical endocrinological and coronary systems. These data compare apples to apples because all the apples come from one apple tree. Unfortunately, psychophysiological measures are not widely used in communication research, possibly due to the need for phlebotomy and specialized training.

Although behaviors such as giving the finger in traffic, or disparaging someone's appearance, have been widely used as dependent measures in media violence research, they present a set of problems. These behaviors were taken from the *National Youth Survey* [31]. The complication is that these *National Youth Survey* behaviors were triggered by face-to-face interactions, not media violence. Yet, media violence researchers treated them as equivalent to behaviors triggered by media exposure. Moreover, as Grimes and Lasser (2025) point out, "media violence" such as slapstick initiate behaviors unrelated to aggression, such as laughter or enjoyment (as documented by [29]). Realistic portrayals of aggression, on the other hand, often motivate behavioral restraint due to lessons one can learn about the harm violence can cause [32]. *Indeed, for psychologically well viewers, aggression is not a typical response to media violence* (as observed by [22,29,33,34]). Error term consistency among independent and dependent variables, which should bind different experiments from various laboratories in the way Weinberg described, does not exist in communication research. That, in turn, prevents a unified theory describing media effects.

Implications for Social Media Research

Among the critiques of traditional media violence scholarship is that media violence exposure's effects depend on who is watching [22]. Differentiating among viewers is the key to understanding how harm is defined as much for social media as for media violence. Harmful content is an amalgam of messages, their interaction with one's psychological inventory, and cultural prevalences. For example, Lee *et al.* [35] found that individuals often follow social media influencers due to underlying feelings of envy and materialism—traits that are not clinical disorders but may result in downstream

effects on mood and outlook. Indeed, as scholars examine the impact of social media use on youth, a growing debate has emerged around data that correlates with cultural shifts, such as the rise in digital media consumption, which can displace face-to-face interactions, and declines in sleep that began in the mid-2000s and disproportionately affected younger generations [23]. On the other side of the debate, Gupta *et al.* [13] argues that much of this research remains ambiguous, though Gupta and colleagues acknowledge a small but significant negative relationship between social media use and mental health. And, as we noted, the American Psychological Association asserted that it is too early to conclude that using social media has psychopathological effects, broadly distributed, across the social media user population [14].

Calls for Future Social Media Research

The difference between social media use and media violence consumption may have much to do with social media's interactive features and their continuous availability by virtue of the portable platforms on which they appear (as outlined by [36]). Interactivity and continuous availability may eventually yield an empirically confirmed threat pattern that is different from that of media violence [19,34,37]. Moreover, there is growing agreement that current social media platforms are driven by data-centric business models, which are developmentally inappropriate for children under the age of 13 [38]. Studies indicate that females, particularly adolescent girls, experience higher rates of body dissatisfaction and mental health issues linked to social media use compared to adolescent boys (e.g., [39]). This example illustrates the value of identifying people who are psychologically susceptible to cyberbullying, suicide ideation, cognitive and socioemotional impairments, all of which may interact with excessive screen time. And so it is that populations that coalesce around mutually shared characteristics will almost always share error variance as well.

Researchers should employ multi-method approaches, including natural language processing (NLP) for content analysis and physiological or neurocognitive measures for psychological effect. NLP is used to interpret, analyze, and manipulate natural language data for a specific purpose by applying a range of computational methods, algorithms, and tools tailored to specific tasks [40]. This can provide richer, more accurate insights than self-report measures. As Bryan *et al.* [9] argues, understanding heterogeneous populations requires researchers to reconsider traditional one-size-fits-all approaches and instead openly acknowledge that frameworks need to account for individual variation. The one-size-fits-all approach was particularly damaging to media violence research. The *a priori* assumption that everyone in the population is susceptible to the putative pathogenic effects of media violence exposure discouraged multi-method approaches. It squeezed the immense psychological diversity of the general population into one thin – and we believe, fictional – cohort. Multi-methods are important in social media research where algorithmic personalization creates vastly different user experiences. By considering heterogeneous population characteristics, which expose different populations to different levels of personalization, scholars can more accurately assess how social media influences users in diverse contexts. Lastly, the use of field experiments and real-world data collection techniques rather than reliance on self-reports, such as the self-report driven and widely used Bergen Social Media Addiction Scale [41], offer ways to capture the dynamic nature of the social media experience.

Conclusion

There is good news, and a lot of it. As we mentioned, the reason for the good news is because AI-driven methodologies, such as natural language processing and machine learning, hold promise for analyzing large-scale, longitudinal datasets that can account for individual differences in user engagement and psychological response. Researchers use NLP to interpret, analyze, and manipulate natural language data by applying a range of computational methods, algorithms, and tools tailored to specific tasks [40]. These tools can help distinguish between correlational patterns and causal mechanisms, which address the issues that have hindered past media effects research. By leveraging AI, researchers will be able to develop a reliable framework for understanding social media's impact on the people who use them.

References

- Murray JP, Wartella EA. The reification of irrelevancy: a comment on "The reification of normalcy". *J Health Commun*. 1999 Jul-Sep;4(3):227-31.
- Strasburger VC, Donnerstein E, Bushman BJ. Why is it so hard to believe that media influence children and adolescents?. *Pediatrics*. 2014 Apr 1;133(4):571-3.
- Ferguson CJ. The new moral panic: Social media. *The Hill*. 2024 May 12.
- Odgers CL. The great rewiring, unplugged. *Nature*. 2024;4:29-30.
- Bergen L, Grimes T. The reification of normalcy. *J Health Commun*. 1999 Jul-Sep;4(3):211-26.
- Browne KD, Hamilton-Giachritsis C. The influence of violent media on children and adolescents: a public-health approach. *The Lancet*. 2005 Feb 19;365(9460):702-10.
- Pruitt A, Allsop AZ. Understanding the Role of a Molecularly Defined Social Circuit. *Biological Psychiatry*. 2021 Mar 1(5):421-3.
- American Psychological Association. (2014, October 23). Are there perceptual or cognitive benefits to playing action video games? 2014.
- Bryan CJ, Tipton E, Yeager DS. Behavioural science is unlikely to change the world without a heterogeneity revolution. *Nature human behaviour*. 2021 Aug;5(8):980-9.
- Dienlin T, Johannes N, Bowman ND, Masur PK, Engesser S, Kümpel AS, et al. An agenda for open science in communication. *Journal of Communication*. 2021 Feb 1;71(1):1-26.
- Wright PJ, Tokunaga RS, Herbenick D, Paul B. To misspecify is common, to probe misspecification scientific: Common "confounds" in pornography research may actually be predictors. *Journal of Communication*. 2022 Jun 1;72(3):429-47.
- Miller D, Abed Rabho L, Awondo P, de Vries M, Duque M, Garvey P, et al. *The global smartphone: Beyond a youth technology*. London: ULC Press; 2021.
- Gupta C, Jogdand S, Kumar M, GUPTA C, Jogdand SD. Reviewing the impact of social media on the mental health of adolescents and young adults. *Cureus*. 2022 Oct 10;14(10):2-5.
- American Psychological Association. Health advisory on social media use in adolescence Available from: <https://www.apa.org/topics/social-media-internet/health-advisory-adolescent-social-media-use>
- Hoerrner KL. The forgotten battles: Congressional hearings on television violence in the 1950s. *Manship School of Mass Web Journal of Communication Research*. 1999;2(3).
- Pearl D, Bouthilet L, Lazar JB, editors. *Television and behavior: Ten years of scientific progress and implications for the eighties*. Vol. 2. Technical Reviews. Rockville, MD: National Institute of Mental Health; 1982.
- Huston AC, Donnerstein E, Fairchild H, Feshbach ND, Katz PA, Murray JP, et al. *Big World, Small Screen*. Lincoln, NB: University of Nebraska Press; 1992.
- Huesmann LR, Moise-Titus J, Podolski CL, Eron LD. Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977-1992. *Developmental Psychology*. 2003 Mar;39(2):201-21.
- Grimes T, Lasser J. The importance of the null hypothesis in the formulation of theory in media psychology. *New Ideas in Psychology*. 2025 Apr 1;77:101142.
- Bushman BJ, Huesmann LR. Effects of televised violence on aggression. In: Singer D, Singer J, (eds). *Handbook of Children and Media: Second Edition*. Thousand Oaks: Sage Publications; 2001. pp. 223-254.
- Bushman BJ, Huesmann LR. Effects of violent media on aggression. In: Singer DG, Singer JL, (Eds.). *Handbook of Children and Media: Second Edition*. Thousand Oaks: Sage Publications; 2012. pp. 231-248.
- Grimes T, Anderson JA, Bergen L. *Media violence and aggression: Science and ideology*. Los Angeles, CA: Sage Publications; 2008.
- Twenge JM, Cooper AB, Joiner TE, Duffy ME, Binau SG. Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005–2017. *Journal of abnormal psychology*. 2019 Apr;128(3):185-9.
- Haidt J, Twenge J. Social media and mental health: A collaborative review. 2023, April 19. <https://docs.google.com/document/d/1w-HOfseF2wF9Y1pXwUUtP65-oInkPyWcgF5BiAtBEy0/edit#heading=h.3f4bw03m06o8>
- Haidt J, Rausch Z, Twenge J. Social media and mental health: A collaborative review. Unpublished manuscript, New York university. Accessed at tinyurl.com/SocialMediaMentalHealthReview. 2023 Apr 17.
- Kosola S, Möro S, Holopainen E. Smartphone use and well-being of adolescent girls: a population-based study. *Archives of Disease in Childhood*. 2024 Jul 1;109(7):576-81.
- Weinberg S. *The first three minutes*. New York: Basic Books; 1993.
- National Television Violence Study (1996-1998) University of California, Santa Barbara Study. Thousand Oaks, CA: Sage Publications. ERIC Number: ED420437
- Grimes T, Bergen L. Is psychopathology the key to understanding why some children become aggressive when they are exposed to violent television programming?. *Human Communication Research*. 2004 Apr;30(2):153-81.
- Bandura A, Ross D, Ross SA. Imitation of film-mediated aggressive models. *J Abnorm Soc Psychol*. 1963 Jan;66:3-11.
- Elliott DS, Dunford FW, Huizinga D. The identification and prediction of career offenders utilizing self-reported and official data. In: Burchard JD, Burchard SN, (Eds.), *Prevention of delinquent behavior*. Thousand Oaks: Sage Publications; 1987; pp. 90-121.
- Fowles J. *The Case for Television Violence*. Thousand Oaks: Sage Publications; 1999.

33. Grimes T, Vernberg E, Cathers T. Emotionally disturbed children's reactions to violent media segments. *Journal of Health Communication*. 1997 Aug 1;2(3):157-68.
34. Brooks M, Lasser J. *Tech generation: Raising balanced kids in a hyper-connected world*. Oxford: Oxford University Press; 2018.
35. Lee JA, Sudarshan S, Sussman KL, Bright LF, Eastin MS. Why are consumers following social media influencers on Instagram? Exploration of consumers' motives for following influencers and the role of materialism. *International Journal of Advertising*. 2022 Jan 2;41(1):78-100.
36. Bekalu MA, McCloud RF, Viswanath K. Association of Social Media Use With Social Well-Being, Positive Mental Health, and Self-Rated Health: Disentangling Routine Use From Emotional Connection to Use. *Health Educ Behav*. 2019 Dec;46(2_suppl):69-80.
37. Abi-Jaoude E, Naylor KT, Pignatiello A. Smartphones, social media use and youth mental health. *CMAJ*. 2020 Feb 10;192(6):E136-41.
38. Montag C, Demetrovics Z, Elhai JD, Grant D, Koning I, Rumpf HJ, et al. Problematic social media use in childhood and adolescence. *Addictive behaviors*. 2024 Jun 1;153:107980.
39. Scully M, Swords L, Nixon E. Social comparisons on social media: online appearance-related activity and body dissatisfaction in adolescent girls. *Irish journal of psychological medicine*. 2023 Mar;40(1):31-42.
40. Khurana D, Koli A, Khatter K, Singh S. Natural language processing: state of the art, current trends and challenges. *Multimedia tools and applications*. 2023 Jan;82(3):3713-44.
41. Zarate D, Hobson BA, March E, Griffiths MD, Stavropoulos V. Psychometric properties of the Bergen Social Media Addiction Scale: An analysis using item response theory. *Addictive Behaviors Reports*. 2023 Jun 1;17:100473.