

Effects of Media Violence on Health-Related Outcomes Among Young Men

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Objective: To test the effects of media violence exposure on blood pressure, negative affect, hostile social information processing, uncooperative behavior, and attitudes toward health risk behaviors among young men varying in lifetime violence exposure within the home and community.

Design: Experimental laboratory study.

Setting: University campus situated within an urban environment.

Participants: One hundred male undergraduates aged 18 to 21 years.

Intervention: Men who had previously reported differing amounts of lifetime home and community violence were randomly assigned to play *The Simpsons: Hit and Run* (low-violence condition) or *Grand Theft Auto III* (high-violence condition).

Main Outcome Measures: Systolic and diastolic blood pressure; negative affect; hostile social information pro-

cessing; uncooperative behavior; and permissive attitudes toward violence, alcohol use, marijuana use, and sexual activity without condom use.

Results: Men randomly assigned to play *Grand Theft Auto III* exhibited greater increases in diastolic blood pressure from a baseline rest period to game play, greater negative affect, more permissive attitudes toward using alcohol and marijuana, and more uncooperative behavior in comparison with men randomly assigned to play *The Simpsons*. Only among participants with greater exposure to home and community violence, play of *Grand Theft Auto III* led to elevated systolic blood pressure in comparison with play of *The Simpsons* (mean, 13 vs 5 mm Hg).

Conclusions: Media violence exposure may play a role in the development of negative attitudes and behaviors related to health. Although youth growing up in violent homes and communities may become more physiologically aroused by media violence exposure, all youth appear to be at risk for potentially negative outcomes.

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EXPERIMENTAL STUDIES CONSISTENTLY show that media violence increases blood pressure, negative emotions, and aggressive behavior in the immediate aftermath of exposure, including physical assault (hitting, kicking, choking, wrestling), in samples of children and younger adolescents and willingness to inflict electric shock or loud aversive noises on a peer in samples of older adolescents and young adults.¹ Results from the few existing longitudinal survey studies suggest that greater exposure to television and media violence in childhood increases the occurrence of meaningful aggression-related outcomes and criminality well into young adulthood,²⁻⁵ even after statistically controlling for potential confounds, such as early aggressive behavior, family socioeconomic status, parenting characteristics, and community safety.^{4,5}

Anderson and Bushman⁶ have integrated previous influential theories of aggression⁷⁻⁹ into a comprehensive framework for understanding human aggression.

Their General Aggression Model posits that characteristics of the situation (eg, media violence exposure) influence the internal state of an individual, including cognitions (eg, proviolent attitudes), affect (eg, anger), and arousal (eg, increased blood pressure). Internal states in turn influence appraisals (eg, interpreting others' actions as hostile) and decision processes (eg, choosing to aggress). Repeated violence exposure may lead to the development of a hostile, aggressive personality.

One less understood issue is whether media violence exposure influences risky health behaviors and social interactions more broadly than aggression-related outcomes. In addition to modeling aggression, violence models general risk taking and disregard for the well-being of others. The General Aggression Model suggests that media violence exposure may increase the likelihood that individuals engage in impulsive rather than thoughtful courses of action.⁶ Although a consistent body of research links real-world violence exposure to adolescent substance use and sexual risk tak-

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ing,¹⁰⁻¹⁶ to our knowledge, only 1 study has examined the association between media violence exposure and such behaviors, and this study yielded mixed results. Male youth aged 11 to 25 years who watched television programs involving contact sports and realistic crime (eg, *COPS*) reported higher levels of risk behaviors (eg, alcohol and other drug use), while those who watched violent drama (eg, *NYPD Blue*) reported lower levels.¹⁷ Real-world violence exposure^{18,19} and media violence exposure^{1,20,21} are linked with hostile appraisals and aggressive behavior, but research has not addressed whether violence exposure influences social behaviors in ways that do not directly involve aggression, such as the decision whether to cooperate or compete with a peer.

A second less understood issue is whether some youth are at particular risk for experiencing adverse outcomes when exposed to media violence. Huesmann and colleagues²² have conceptualized societal “cultures of violence” as a potentially important moderator of media violence effects. Acute exposure to media violence may activate aggressive patterns of thought, affect, and behavior more strongly among individuals who are accustomed to aggressive styles of interaction and who have potentially developed more aggressive attitudes, appraisals of others’ actions, and behavioral scripts as a result. In a comprehensive review of children’s adjustment to real-world violence, Margolin and Gordis²³ highlighted the need to examine the cumulative effects of different types of violence exposure (eg, family, community) as well as unique effects. Previous studies have not tested whether exposure to violence within the home and/or community interacts with media violence exposure to influence outcomes.

The present study examines the effects of acute media violence exposure and lifetime home and community violence exposure on cognitive-behavioral, affective, and physiological health outcomes within the context of a quasi-experimental study design. Young men exposed to differing amounts of lifetime violence were randomly assigned to play a video game high or low in violent content. Consistent with the General Aggression Model,⁶ we hypothesized that both home and community and media violence exposure would be associated with greater increases in blood pressure during game play, greater negative affect and more permissive attitudes toward violence immediately after game play, and more hostile social information processing during a laboratory task subsequent to game play. Because violence models general risk taking and disregard for the well-being of others, we also hypothesized that home and community and media violence exposure would be associated with more permissive attitudes toward health risk behavior and with greater uncooperative behavior. Finally, we hypothesized that effects of the media violence condition would be greater among those young men high in lifetime home and community violence exposure.

METHODS

STUDY DESIGN

We recruited 100 participants from a pool of 180 undergraduate men aged 18 to 21 years who completed a survey of vio-

lence exposure and engagement in harmful health behaviors. We decided to conduct the present laboratory experiment on men because young men are known to have greater exposure to violent media in comparison with young women.²⁴

Participants identified their ethnicity as white/Caucasian (n=83), black/African American (n=10), Asian/Asian American (n=4), and Hispanic/Latino (n=2). One participant declined to identify his ethnicity. In some studies, individuals of black ethnicity have exhibited greater stress-related increases in blood pressure in comparison with individuals of white ethnicity.²⁵⁻²⁷ All but 1 of the black participants were in the highest tertile for home and community violence exposure, raising the possibility that effects of lifetime violence exposure would be confounded with ethnicity. We thus included a dichotomous ethnicity variable (white/Caucasian or minority) as a covariate in supplemental analyses.

The university institutional review board approved all parts of the study protocol and participants provided their informed consent. We matched pairs of men on ethnicity and lifetime home and community violence exposure tertile and randomly assigned them to the high- or low-violence video game. All participants began their laboratory visit by watching a relaxing video about Hawaii for 10 minutes. They then viewed 4 minutes of videotaped game play demonstrating the “mission” they would be asked to complete, followed by 10 minutes of video game play. We made blood pressure readings at minutes 5, 3, and 1 of the 10-minute resting baseline period and minutes 10, 7.5, 5, and 2.5 during game play. After game play, participants completed an affect checklist and a measure of attitudes toward harmful health behaviors and violence. In 2 subsequent tasks administered in counterbalanced order, participants watched a videotaped social scenario and responded to a structured clinical interview and then engaged in a game during which they could cooperate or compete with a confederate. At the end of the study, participants completed a paper-and-pencil measure asking them to rate features of the video game. We reimbursed participants for their time.

MEASURES

Previous Violence Exposure

Participants completed the Community Experiences Questionnaire¹⁸ during the survey, prior to their laboratory visit. The Community Experiences Questionnaire contains items assessing direct victimization (11 items [eg, hit/punched/slapped; coerced through violence/threats]) and witnessed victimization (14 items [eg, robbery; gunshots]). Participants indicated whether each item had occurred never (0), once (1), a few times (2), or lots of times (3) and indicated whether they had experienced each item within the home and within their community (including school and work). Violence exposure scores were summed to create total overall violence ($\alpha = .90$), total community violence ($\alpha = .89$), and total home violence ($\alpha = .82$) scales. Because of slight positive skew, home violence exposure was transformed by taking the square root of the original variable.

During the survey, participants estimated the typical number of hours per week they spent playing video games during grades 7 through 9 (mean [SD], 11.0 [11.9] hours per week), grades 10 through 12 (mean [SD], 10.1 [10.1] hours per week), and college (mean [SD], 6.6 [7.3] hours per week). We created a composite score by weighting each estimation according to recency of period (1, 2, or 3) and summing across scores. Because of positive skew, this composite score was transformed by taking the square root of the original variable. The resulting variable was examined as a covariate in supplemental analyses.

Video Games and Manipulation Check

We randomly assigned participants to play a video game high in violence, *Grand Theft Auto III*, or a video game comparatively low in violence, *The Simpsons: Hit and Run*. Both games involve driving through a virtual city to complete various missions. Participants randomly assigned to play *Grand Theft Auto III* played the role of a criminal and were instructed by a member of the mafia to “introduce a bat” to the face of a drug dealer who was supplying drugs to prostitutes employed by the mafia. Participants randomly assigned to play *The Simpsons: Hit and Run* played the role of Homer Simpson and were instructed by Homer’s wife, Marge, to deliver daughter Lisa’s science project to school before Principal Skinner arrived and Lisa’s science project would be marked late.

All participants began their mission in the same game location as that shown in the videotape prior to game play. Participants were instructed to complete the mission they had just viewed and to play the game “however you would like” in any remaining time after completing the mission. The percentage of participants able to complete the *Grand Theft Auto III* and *Simpsons* missions in the allotted 10-minute period was 78% and 96%, respectively. Only 1 person appeared not to attempt any part of his mission. The mean (SD) time spent engaging in mission-related game play was 5 minutes, 24 seconds (2 minutes, 34 seconds) for *Grand Theft Auto III* and 4 minutes, 42 seconds (1 minute, 21 seconds) for *The Simpsons*. Thus, virtually all participants completed the mission or spent a substantial amount of time attempting to complete the mission as instructed.

As a manipulation check, participants completed a paper-and-pencil Video Game Rating Sheet allowing them to rate features of the game on a 7-point Likert scale (1, “not at all” to 7, “very”).^{28,29} Participants perceived *Grand Theft Auto III* to be more violent in content (mean, 6.0 vs 3.1; $t = 10.8$; $P < .001$) and graphics (mean, 5.6 vs 2.4; $t = 12.8$; $P < .001$) in comparison with *The Simpsons: Hit and Run*. Ratings of difficulty, enjoyability, and frustration did not significantly differ between games. Participants perceived *Grand Theft Auto III* to be slightly more exciting and faster in action than *The Simpsons: Hit and Run* (mean differences were < 1 scale point). Within-game correlations between ratings of excitement and fast action were both 0.50. We summed ratings of excitement and fast action to create a composite score and included the score as a covariate in supplemental analyses.

Physiological Measures

We monitored systolic (SBP) and diastolic blood pressure using an IBS Model SD-700A automated blood pressure monitor (IBS Corp, Waltham, Mass) with a standard occluding cuff placed on the participant’s left arm. We averaged all measures taken during a particular period. Participants’ resting SBP ranged from 96 to 136 mm Hg (mean [SD], 113 [9] mm Hg), while resting diastolic blood pressure ranged between 41 to 84 mm Hg (mean [SD] 61 [9] mm Hg). Increases in physiological parameters from the baseline rest period to playing the video game were all significantly different from zero (**Table 1**). Change scores from the baseline rest period to playing the video game were regressed on the baseline rest measure to control for potential “ceiling effects” among individuals with greater resting blood pressures. These residualized change scores were analyzed in subsequent analyses.

Laboratory-Assessed Negative Affect

Immediately after video game play, we measured negative affect with the Reduced Profile of Mood States.³⁰ The 9-item negative affect score ($\alpha = .79$) is the sum of 3 affective subscores (anxiety, depres-

sion, and anger). Because of slight positive skew, scores were transformed by computing the square root of the original variable.

Permissive Attitudes Toward Violence and Other Harmful Health Behaviors

After video game play, participants completed the Funk et al³¹ 15-item Attitudes Towards Violence Scale ($\alpha = .76$). Participants used a 7-point Likert scale (-3 , “very harmful to my health to $+3$, “very helpful to my health”) to indicate the perceived health benefit or risk of engaging in alcohol use, marijuana use, and sex without use of a condom. Attitudes with greater negative values indicate greater perception of harm.

Hostile Social Information Processing

Participants watched a videotaped social scenario and responded to a structured clinical interview designed to measure hostile cognitive bias in evaluating the scenario.³² In the scenario, a teacher alerts his class to his suspicion that some students have cheated and dwells at length on his disappointment in students who have cheated and his pride in students who have earned their test scores. The teacher hands back a high test score to Billy and asks to speak with him at the end of class. Participants imagined that they were Billy and rated the likelihood that the teacher would accuse them of cheating on a 5-point Likert scale (1, “not at all likely” to 5, “very likely”).

Uncooperative Behavior

Participants engaged in a “mixed-motive” game with a confederate, during which they could cooperate or compete to earn points exchangeable for money at the completion of the study (all participants were later given \$5).³³ On each of 30 trials, the participant chose to divide points worth money with his “partner” (in actuality, a preprogrammed computer), either equally by clicking on the “cooperate” box on the computer screen or unequally by clicking on the “compete” box. The “partner” cooperated only 30% of the time, creating a situation that could be construed by the participant as provocation, while also providing an economic incentive for the participant to cooperate (if both the participant and partner chose to compete, both lost the maximum number of points). “Compete” responses were tallied across 30 trials.

Parental Socioeconomic Status—Covariate

When completing the survey, participants reported the maximum years of education achieved by any parent in their primary household (mean [SD], 16.6 [3.1] years [range, 11-24 years]).

Association With Deviant Peers—Covariate

During the survey, participants completed a 13-item questionnaire to indicate their association with deviant peers,³⁴ both for current ($\alpha = .83$) and high school ($\alpha = .84$) friends. The 2 scores ($r = 0.65$; $P < .001$) were summed to create an overall composite for association with deviant peers (mean [SD], 35.6 [14.0]). Low scores indicated that few of a participant’s friends had ever engaged in any deviant behavior (eg, smoking cigarettes, hitting other people, cheating on tests).

STATISTICAL ANALYSIS

For each outcome separately, we tested main effects of the media violence condition (dichotomous) and real-world violence exposure (continuous) by including both variables in the first step of a univariate general linear model. When main ef-

Table 1. Violence Exposure and Outcome Variable Distributions and Correlations*

	Mean (SD)	Violence Exposure			Laboratory Video Game Condition (<i>Grand Theft Auto III</i> = 1)	Change in Blood Pressure to Game Play		Negative Affect After Game	Permissive Attitudes Toward			Sexual Activity Without Condom	Hostile Social Information Processing
		Total	Community	Home		SBP	DBP		Violence	Alcohol	Marijuana		
Violence exposure													
Total	26.2 (14.8)												
Community	19.2 (10.6)	0.89†											
Home	7.1 (7.1)	0.72†	0.38†										
Laboratory video game condition (<i>Grand Theft Auto III</i> = 1)		-0.01	-0.02	-0.03									
Change in blood pressure to game play													
SBP	7.4 (8.4)	0.22‡	0.20‡	0.13	0.22‡								
DBP	5.0 (7.6)	0.02	0.03	-0.06	0.22‡	0.26§							
Negative affect after game play	12.9 (3.9)	0.02	0.03	0.04	0.24‡	0.09	0.01						
Permissive attitudes toward													
Violence	2.0 (0.45)	0.33§	0.33§	0.22‡	-0.01	0.02	-0.03	0.22‡					
Alcohol	-1.1 (0.95)	0.24‡	0.19	0.20‡	0.24‡	0.08	-0.02	0.03	0.43†				
Marijuana	-1.6 (1.2)	0.08	0.08	0.02	0.27§	0.18	0.15	0.02	0.25‡	0.41†			
Sexual activity without condom	-1.8 (1.0)	0.08	0.17	-0.07	0.08	-0.14	0.02	-0.08	0.21‡	0.17	0.02		
Hostile social information processing	3.5 (1.0)	0.10	-0.03	0.25‡	0.05	-0.03	0.07	0.04	-0.01	0.09	0.10	-0.09	
Competitive responses with confederate	13.6 (4.4)	-0.02	0.04	-0.12	0.21‡	0.16	0.12	-0.07	0.12	0.24‡	0.15	0.20‡	-0.06

Abbreviations: DBP, diastolic blood pressure; SBP, systolic blood pressure.

*Means and standard deviations are based on untransformed variables.

† $P < .001$.

‡ $P < .05$.

§ $P < .01$.

fects were significant, we calculated 95% confidence intervals (CIs) for mean differences between violence exposure groups based on a median split for the continuous lifetime violence exposure variables. When interaction terms (tested in a second univariate model) were significant, we conducted simple effects tests to determine whether the media violence condition was associated with an outcome within high- and low-home and community violence exposure groups and compared effect sizes within each group using partial η^2 . For all significant main effects and interactions, analyses were performed again with inclusion of covariates (composite rating of video game excitement and fast action, prior experience playing video games, ethnicity, parental socioeconomic status, association with deviant peers). We conducted separate analyses to test the effects of home, community, and total real-world violence exposure. P values $\leq .05$ (2-tailed) were considered statistically significant.

RESULTS

Table 1 presents means and standard deviations of violence exposure and laboratory outcome measures and their intercorrelations. **Table 2** presents correlations between these measures and covariates.

As hypothesized, young men randomly assigned to play *Grand Theft Auto III* exhibited greater changes in SBP (mean

difference, 3.58 [95% CI, 0.41-6.75]) and diastolic blood pressure (mean difference, 2.84 [95% CI, 0.29-5.39]), greater negative affect (mean difference, 1.86 [95% CI, 0.34-3.38]), more permissive attitudes toward using alcohol (mean difference, 0.46 [95% CI, 0.09-0.83]) and marijuana (mean difference, 0.62 [95% CI, 0.18-1.06]), and greater uncooperative behavior (mean difference, 1.89 [95% CI, 0.13-3.65]) in comparison with young adults randomly assigned to play *The Simpsons: Hit and Run* (**Table 3**). Contrary to hypothesis, the violent video game condition was not associated with hostile social information processing, permissive attitudes toward violence, and attitudes toward sexual activity without condom use.

Consistent with our hypothesis, greater total home and community violence exposure was associated with greater changes in SBP (mean difference, 3.52 [95% CI, 0.26-6.78]) (Table 3). Domain-specific analyses (Table 1) suggested that community violence exposure, in particular, was associated with greater changes in SBP. Greater total home and community violence exposure was associated with more permissive attitudes toward violence (mean difference, 0.30 [95% CI, 0.13-0.47]) and drinking alcohol (mean difference, 0.42 [95% CI, 0.05-0.79]) (Table 3). Associations remained when home and com-

Table 2. Correlations Between Covariates and Violence Exposure and Outcome Variables

	Video Game Excitement/ Fast Action	Ethnic Minority Status (1 = Minority)	Parent Education, y	Prior Experience Playing Video Games	Association With Deviant Peers
Violence exposure					
Total	0.06	0.22*	-0.09	0	0.49†
Community	0.08	0.18	0.10	-0.03	0.48†
Home	0.02	0.22*	-0.20*	0.07	0.32‡
Laboratory video game condition (<i>Grand Theft Auto III</i> = 1)	0.28‡	-0.03	-0.10	0	0.06
Change in blood pressure to game play					
SBP	-0.05	0.16	-0.20*	0.05	0.18
DBP	0.08	0	-0.03	0.17	-0.06
Negative affect after game play	0.25*	-0.15	-0.16	-0.15	0.12
Permissive attitudes toward					
Violence	0.05	-0.02	0.12	-0.13	0.30‡
Alcohol	0.03	0	0.10	-0.06	0.29‡
Marijuana	0	-0.08	-0.12	0.20*	0.38†
Sexual activity without condom	-0.06	-0.04	0.30‡	-0.01	0.08
Hostile social information processing	0.14	-0.05	0.01	-0.12	0.08
Competitive responses with confederate	-0.01	-0.14	-0.02	-0.15	0.24*

Abbreviations: See Table 1.

* $P < .05$.

† $P < .001$.

‡ $P < .01$.

Table 3. Means and Standard Deviations of Outcome Variables by Laboratory Media Violence Condition and Total Lifetime Violence Exposure

	Low Lifetime Violence, Mean (SD)		High Lifetime Violence, Mean (SD)		F Test (P Value)*		
	GTA III	Simpsons	GTA III	Simpsons	Life Violence	Video Game	Interaction
Change in blood pressure to game play†							
SBP	5.0 (6.5)	6.3 (7.7)	13.3 (9.6)	5.4 (7.3)	5.2 (.02)	5.4 (.02)‡	11.3 (.001)‡
DBP	6.5 (7.1)	3.2 (7.2)	6.2 (8.6)	4.2 (7.7)	0.03 (.86)	4.9 (.03)‡	0.46 (.50)
Total negative affect after game play§	13.4 (3.6)	11.8 (3.6)	14.3 (5.2)	12.2 (2.7)	0.06 (.80)	5.7 (.02)	0.001 (.97)
Permissive attitudes toward							
Violence	1.8 (0.33)	2.0 (0.50)	2.3 (0.48)	2.1 (0.38)	11.5 (.001)‡	0.01 (.92)	2.4 (.12)
Alcohol	-1.1 (0.74)	-1.5 (0.93)	-0.58 (1.1)	-1.1 (0.86)	6.5 (.01)	6.7 (.01)‡	0.01 (.94)
Marijuana	-1.4 (1.1)	-2.0 (1.2)	-1.2 (1.0)	-1.8 (1.2)	0.77 (.38)	7.7 (.01)‡	0.24 (.63)
Sexual activity without condom	-1.6 (1.2)	-2.2 (0.87)	-1.8 (1.1)	-1.6 (0.90)	0.71 (.40)	0.62 (.43)	1.97 (.16)
Hostile social information processing	3.3 (1.2)	3.5 (0.88)	3.8 (0.85)	3.4 (1.0)	0.98 (.32)	0.26 (.61)	1.2 (.28)
Competitive responses with confederate	15.2 (3.8)	11.4 (4.2)	14.0 (4.6)	13.8 (4.5)	0.03 (.87)	4.5 (.04)‡	3.2 (.08)

Abbreviations: DBP, diastolic blood pressure; GTA III, *Grand Theft Auto III*; SBP, systolic blood pressure; Simpsons, *The Simpsons: Hit and Run*.

*F test and P values for main effects were obtained from analyses without inclusion of the interaction term.

†Residualized change scores from the initial rest period to game play are used in analyses.

‡Finding remained significant after inclusion of covariates: composite rating of video game excitement/fast action, ethnic minority status, parental socioeconomic status, prior experience playing video games, and association with deviant peers.

§Means and standard deviations are presented using the original mood rating scale, ranging from 0 to 45 for total negative affect. The square root of the total negative affect score was used in analyses.

munity violence exposure were examined separately. Domain-specific analyses revealed that greater home violence exposure was associated with more hostile attributions during the social scenario (mean difference, 0.50 [95% CI, 0.11-0.88]). Contrary to hypothesis, real-world violence exposure variables were not associated with negative affect and uncooperative behavior.

Two interactions between lifetime violence exposure variables and media violence condition emerged (Table 3).

Within the low-total violence exposure group, the video game condition was not associated with change in SBP, while within the high-total violence exposure group, play of *Grand Theft Auto III* predicted greater changes in SBP than play of *The Simpsons: Hit and Run*. The violent video game condition explained roughly 21% of the variance in SBP change within the high-total violence exposure group and virtually none of the variance in SBP change within the low-total violence exposure group. Interac-

tions between the video game condition and both community and home violence exposure yielded identical patterns to that described for total violence exposure.

Violence exposure within the community interacted with the video game condition to predict hostile attributions during the social scenario ($F=4.0$; $P<.05$). The video game condition was not associated with hostile attributions within the low–community violence exposure group ($F=0.96$; partial $\eta^2=0.02$) but was associated with more hostile attributions within the high–community violence exposure group ($F=3.0$; $P<.10$; partial $\eta^2=0.06$).

Analyses controlling for covariates showed the same pattern of results with few exceptions: the violent video game condition was no longer associated with negative affect; lifetime violence exposure was no longer associated with SBP and alcohol use.

COMMENT

In response to playing a very popular video game, *Grand Theft Auto III*, young men exhibited increased blood pressure, more negative affect, and more hostile social information processing, consistent with the results of other experimental studies and the General Aggression Model.^{1,6} Participants randomly assigned to play *Grand Theft Auto III* also expressed more permissive attitudes toward using alcohol and marijuana and were less cooperative during a subsequent task than participants randomly assigned to play a less violent video game. To our knowledge, the present study is the first experimental study to show that media violence is associated with permissive attitudes toward health risk behaviors that do not directly involve hostility or aggression.

Young men with higher levels of home and community violence exposure may be more susceptible to certain outcomes as a result of media violence exposure. In the present study, media violence exposure was associated with greater SBP and hostile social information processing among participants with greater lifetime violence exposure. The act in *Grand Theft Auto III* that participants were asked to commit (ie, striking another person with a baseball bat) may have appeared more realistic to those who had witnessed or been victimized by violence within the home or community, thus resulting in greater physiological response. Perhaps owing to learning experiences, individuals from violent communities may have greater difficulty imagining a nonhostile interpretation for the ambiguous actions of others after playing a video game that “primes” hostile thought patterns. Main effects of media violence exposure on negative affect, uncooperative behavior, and permissive attitudes toward health risk behavior were also observed in the present study. These findings demonstrate that all young adults, regardless of background, are potentially affected by media violence exposure.

Strengths of the present study include the use of random assignment and the selection of commonly played games, which are likely to increase the generalizability of results. Limitations include the inability to generalize findings beyond young men who were sufficiently ad-

vantaged to attend a major public university. In addition, selected video games may have differed in ways other than violence; these differences, rather than violent content, may have influenced outcomes. The finding most vulnerable to this possibility is the link observed between play of *Grand Theft Auto III* and permissive attitudes toward using alcohol and marijuana. Because *Grand Theft Auto III* includes characters who are drug dealers, it is possible that observation of a drug dealer may have relaxed players’ attitudes toward alcohol and marijuana use. However, participants randomly assigned to play *Grand Theft Auto III* took a punitive stance against drugs during their “mission” (ie, striking a drug dealer with a baseball bat), raising the possibility that other mechanisms may have been responsible for the relaxing of attitudes toward alcohol and marijuana use (eg, violent content may not only appear to condone aggression but also general risk-taking and law-breaking behavior). The General Aggression Model also suggests that media violence exposure may increase the likelihood that individuals engage in impulsive rather than thoughtful courses of action.⁶

School-based research on young children shows that negative effects of media violence exposure are reduced when use of television and video games are reduced,³⁵ when attitude-change interventions emphasize the unrealistic nature of media,^{36,37} and when parents covey and comment on violent TV programs.³⁸ Results of the present study suggest that media violence exposure may predispose adolescents and young adults toward greater engagement in general health risk behaviors and toward tension and conflict in social interactions with others. Adolescents and their parents may benefit from media education campaigns.

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