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The Effects of Prosocial Video Games on Prosocial Behaviors: International Evidence from Correlational, Longitudinal, and Experimental Studies

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Abstract

Although dozens of studies have documented a relation between violent video games and aggressive behaviors, very little attention has been paid to potential effects of prosocial games. Theoretically, games in which game characters help and support each other in nonviolent ways should increase both short-term and long-term prosocial behaviors. We report three studies conducted in three countries with three age groups to test this hypothesis. In the correlational study, Singaporean middle-school students who played more prosocial games behaved more prosocially. In the two longitudinal samples of Japanese children and adolescents, prosocial game play predicted later increases in prosocial behavior. In the experimental study, U.S. undergraduates randomly assigned to play prosocial games behaved more prosocially toward another student. These similar results across different methodologies, ages, and cultures provide robust evidence a prosocial game content effect, and provide support for the General Learning Model.

Keywords

video games; prosocial behavior; empathy; media violence; General Learning Model

> "I like video games, but they're really violent. I'd like to play a video game where you help the people who were shot in all the other games. It'd be called `Really Busy Hospital.'"
>
> — Demetri Martin, Comedian

Digital electronic games, commonly called video games, are immensely popular around the world, despite a sluggish economy. The video game industry's revenues surpassed the movie

industry's several years ago, and surpassed the music industry's in 2008 (Reuters, 2007). In a nationally representative sample of U.S. teens, 99% of boys and 94% of girls played video games (Lenhart, Kahne, Middaugh, Macgill, Evans, & Vitak, 2008). The amount of time spent playing games continues to increase (Gentile & Anderson, 2003; Escobar-Chaves & Anderson, 2008).

Many researchers have addressed potential positive and negative effects of playing various types of video games. Most research has focused on deleterious effects of violent games (e.g., Anderson & Bushman, 2001; Anderson, Sakamoto, Gentile, Ihori, Shibuya, Rothstein, & Bushman, under review). Other research has found that educational games and software are effective teaching tools (e.g., Murphy, Penuel, Means, Korbak, & Whaley, 2001), that time playing video games is negatively associated with school performance (e.g., Anderson & Dill, 2000; Anderson, Gentile, & Buckley, 2007), and that action games can improve game-related visual attention skills (e.g., Green & Bavelier, 2003; Okagaki & Frensch, 1994). Thus, the simple good-bad dichotomy frequently posed by the general public ("Are video games bad for children?") is inappropriate.

Gentile and his colleagues (Gentile & Stone, 2005; Khoo & Gentile, 2007; Stone & Gentile, 2008) have suggested that there are at least five dimensions along which video games can have effects—the *amount*, *content*, *context*, *structure*, and *mechanics*—each of which is likely to have specific effects. The *amount* of game play appears most related to activity displacement effects such as poorer school performance and risk of obesity. The *content* of game play appears most related to effects such as increased aggression or increased specific educational skills. The *context* of game play may change the effects of content, such as how the social context might enhance some effects when playing a multiplayer game. The *structure* of games appears most related to improvements in visual attention skills or getting three-dimensional information from two-dimensional representations. The *mechanics* of game play appears most related to improvements in specific skills such as hand-eye coordination.

To date, a majority of the research has focused on game content, especially violent content. Much of this research has been guided by the General Aggression Model, from which violent game play is predicted to increase aggressive thoughts, feelings, and behaviors in the short term, and to reinforce aggressive scripts, perceptual schemata, aggressive attitudes, and aggression desensitization in the long term (Anderson & Bushman, 2002; Anderson et al., 2007). Like many others before us (e.g., Anderson et al., 2003; Bandura, 1977; Huesmann, 1998) we have noted that the processes underlying media violence effects on aggression are based on broader learning theories, and have offered the General Learning Model, in which any stimulus (including video games) is posited to have short-term and long-term effects through several learning mechanisms (Buckley & Anderson, 2006; Swing, Gentile, & Anderson, 2009). Specific to the present studies, the General Learning Model predicts that the kinds of associations that are activated and formed by a video game depend on the content of the game. One implication is that prosocial video games, in which players and game characters help and support each other in *nonviolent* ways, should increase both short-term and long-term prosocial behaviors.

Prosocial behaviors can be defined at several levels (Penner, Dovidio, Pilavin, & Schroeder, 2005). We define prosocial behaviors as those intended to help others. The effect of media models on children's prosocial behavior was initially studied with television and has received some support (e.g., Friedrich & Stein, 1973; Ostrov, Gentile, & Crick, 2006). However, most research on media and prosocial behavior has focused on the opposite side - how playing violent games lowers prosocial behaviors. Although several studies have documented reduced prosocial behavior in response to violent game play (e.g., Anderson &

Bushman, 2001; Anderson et al., 2007; Study 3), prosocial and antisocial behaviors are not simply opposite sides of the same coin. People can be both high in aggressive *and* prosocial behaviors (for example, hostile toward enemies and helpful toward friends). Although prosocial and aggressive constructs are not necessarily reciprocally related, they also do not tend to be entirely independent.

Theoretically, we would expect prosocial video games to facilitate several different types of learning (Gentile & Gentile, 2007; Swing et al., 2009). In a short-term context, games can provide models, give direction, require practice, and provide immediate reinforcement or feedback. These pedagogical tools are likely to produce several types of effects that could be measured in a short-term context, such as learning particular game skills and details of specific game content features. These learned aspects, however, do not explain why game content might influence subsequent behaviors outside of the game, such as aggressive or prosocial behaviors. The General Learning Model suggests that in the short term, any learning encounter can have affective, arousal, and/or cognitive effects (Figure 1). Most germane to the present research is the cognitive effect of priming scripts. If the game includes prosocial content, then prosocial scripts would be likely to be primed and rehearsed - script priming has already been demonstrated with aggressive game content and aggressive scripts (e.g., Bushman & Anderson, 2002). In addition to priming, however, games provide several opportunities for operant reinforcement or punishment. As shown in Figure 1, both the person and the situation bring several features to any social or learning encounter. Playing a video game can influence cognitions, feelings, and physiological arousal. These can interact with each other, and can also mutually reinforce each other through classical and operant mechanisms. For example, the increase in arousal that games can provide in response to specific game features (such as violence) may itself be reinforcing (people often play video games when they are bored). When provided with a game encounter that requires a decision (e.g., help or harm), the outcome of the decision (reinforcement, punishment, or no effect) feeds back into the situation and affects future cognitions, feelings, and arousal. It is therefore a continuous cycle of learning and reinforcement. In the short-term, if given an opportunity to help or harm another person after playing a game, the likelihood of which behavior the player chooses is influenced by what scripts have been primed by the game and what game behaviors have been reinforced. Therefore, if the game requires prosocial behaviors to succeed, then prosocial behaviors should be increased immediately following the game (and aggressive behaviors should increase after violent games).

If these short-term effects are practiced repeatedly, then several long-term effects could result, including changes to (1) pre-cognitive and cognitive constructs, such as perception and expectation schemata, beliefs, scripts, (2) cognitive-emotional constructs, such as attitudes and stereotypes, and (3) affective traits, such as conditioned emotional responses (e.g., equating playing violent games with “fun”) and affective traits like empathy or trait hostility. These potential long-term effects are shown in Figure 2. Some of these changes are likely to result simply from repeated exposure (such as cultivating stereotypes), some are likely to result from selective reinforcement (such as beliefs about the acceptability of aggression from playing games where violence is rewarded), and others are likely to result from playing multiple games with similar content. Specifically, one of the best ways to teach for transfer to the “real world” is to provide multiple contexts with similar solutions (Gentile & Gentile, 2007). For example, most modern video games include multiple levels with novel content and variations of prior content, yet in many cases the “solution” (shoot the enemies) remains the same. Furthermore, most players play more than one game, and if these games provide different contexts but the same solutions, this should lead to greater learning and transfer. This hypothesis has been tested and supported with violent games (Gentile & Gentile, 2007). Regardless of the specific learning mechanisms, these changes to cognitive and emotional structures result in personality changes, which then feed back into

each specific social/learning encounter as part of the person factors. The present research tests this hypothesis with prosocial games.

Empirical evidence of prosocial game effects is lacking (Hogan & Strasburger, in press). We report three new studies of the effect of playing prosocial video games on prosocial behavior, using correlational, longitudinal, and experimental methods. The studies were conducted in three countries that have quite different cultures: the U.S., Singapore, and Japan. In general, media effects research is "unevenly distributed in the world" (Von Feilitzen, 1998, p. 47), with the vast majority being conducted in the United States. Furthermore, each study used different age groups. Thus, testing the same overarching hypothesis using three different cultures, three different age groups, and three different study designs provides a particularly stringent test of the hypothesis that playing prosocial video games increases prosocial behavior.

STUDY 1

Study 1 was a cross-sectional correlational study of video game habits and prosocial behaviors with Singaporean secondary school children. We hypothesized a positive association between amount of time spent playing prosocial video games and the amount of prosocial behavior, even when controlling for other factors related to prosocial behavior.

Methods

Participants—We surveyed 727 Singaporean secondary school children (N = 446 S1--7th grade equivalent; N = 281 S2--8th grade equivalent; mean age 13.0 years, SD = 0.79). Because two of the six participating schools were boys' schools, the sample is 73% male. Seventy-five percent classified themselves as ethnic Chinese, 15% as ethnic Malay, 7% as ethnic Indian, and 3% as other ethnicities, representative of Singapore. All participants were treated in accordance with the ethical guidelines appropriate to the culture and the participating schools.

Procedures—Data were collected at the schools from March — May, 2007. Average participation rate was 94% (range 91% - 99%). We measured both video game habits and prosocial behaviors. The various surveys were administered in counterbalanced orders.

To measure prosocial and violent game exposure, participants listed their three favorite games, estimated the number of hours per week spent playing each game, and rated how often players help others in the game, and how often players hurt or kill others in the game. Prosocial and violent content of each game were multiplied by the amount of time playing that game, and averaged across the three named games (Anderson et al., 2007).

Although this is a standard approach to measuring violent video game exposure (e.g., Anderson & Dill, 2000), and has demonstrated strong construct and predictive validity, it has not previously been validated by comparing self-ratings with expert ratings. To demonstrate the validity of the self-rating approach, we compared the average violence rating provided by students in this study with expert ratings we recently obtained (Bushman et al., 2008). We compared 100 frequently-reported games, finding a large correlation of r = .75 (p < .001) between student ratings and expert ratings. To our knowledge, this is the first reported direct comparison and demonstrates strong validity of self-report ratings.

We included several measures of prosocial behavior. *Helping Behavior* was assessed using a 11-item subscale from the *Prosocial Orientation Questionnaire* (POQ) (e.g., "I would spend time and money to help those in need;" Cheung, Ma & Shek, 1998, α = .72). *Cooperation and Sharing* was measured using a 7-item subscale from the same scale (e.g., "I feel happy

when I share my things with others", α = .57). A modified version of the 16-item Children's Empathic Attitudes Questionnaire was used to assess *trait empathy* (e.g., "When I see a student who is upset, it really bothers me;" Funk, 2008; α = .86). Two scales assessed aggressive cognitions. *Approval of Aggression* was measured by the 20-item Normative Beliefs about Aggression Scale (e.g., "In general, it is OK to hit other people;" Huesmann, Guerra, 1997; α = .94). *Hostile Attribution Bias* was measured using 6 stories describing ambiguous provocative situations (e.g., someone breaks your watch). Respondents select an explanation for the event (e.g., he did it to be mean; Anderson et al., 2007; Crick, 1995; Nelson & Crick, 1999; α = .78). Finally, participants were debriefed.

Results and Discussion

Prosocial and Aggressive Behaviors and Traits—Each prosocial behavior or trait was regressed onto prosocial game exposure after controlling for sex, age, violent game exposure, and weekly amount of time spent playing video games. As predicted, prosocial game exposure was positively related to prosocial behaviors and traits (see Table 1), after controlling for total amount of gaming, violent game exposure, sex, and age. The standardized regression coefficients were: β = .49 ($p < .001$) for helping behavior, β = .18 ($p < .001$) for cooperation and sharing, β = .48 ($p < .001$) for empathy, and β = .19 ($p < .06$) for emotional awareness. In contrast, the opposite effects were found for violent game exposure. Violent game play was negatively related to the prosocial behaviors and traits (Table 1). Although prosocial and violent game exposure were highly correlated, most likely because of the way they were measured, multicollinearity did not unduly influence the regression coefficients (i.e., variance inflation factors were less than 10; Neter, Wasserman, & Kutner, 1990).

Aggressive Cognition—Our learning theory of game content effects suggests that prosocial game exposure might be a negative predictor of aggression-related variables as well as a positive predictor of prosocial behaviors and traits. As a test of discriminant validity, the identical hierarchical regression analyses were conducted predicting children's approval of aggression and their hostile attribution biases (Table 2). After controlling for the four theoretically relevant predictor variables, prosocial game exposure was negatively related to both aggressive cognition variables (approval of aggression β = -.28, $p < .01$, hostile attribution bias β = -.32, $p < .001$). Violent game exposure was positively related to both, also as expected (approval of aggression β = .26, $p < .01$, hostile attribution bias β = .34, $p < .01$).

The results from Study 1 are consistent with the hypothesis that exposure to prosocial video games increases prosocial behavior. However, a causal interpretation based solely on these results would be inappropriate, because either variable might precede the other (or some uncontrolled third variable might be related to both). Nonetheless, the fact that the general learning model passed this opportunity for falsification is important, as is the fact that alternative (i.e., non-causal) explanations involving time and exposure to violent content were contradicted.

STUDY 2

In Study 2 we more directly tested the hypothesis that habitual playing of prosocial video games would increase prosocial behavior assessed months later. In each of two separate samples, Japanese children's video game habits and prosocial behaviors were assessed twice with a three to four month time span between the two assessments. Structural equation analyses were conducted simultaneously on the two correlation matrices from these samples. We hypothesized that exposure to prosocial video games would predict subsequent prosocial behavior.

Methods

Participants—Sample 1 consisted of 780 5th graders (384 boys, 396 girls, mean age 10.9, *SD* = .31). Sample 2 consisted of 1050 8th and 11th graders (540 boys, 510 girls; *Ms* = 13.6 & 16.6, *SDs* = .48 & .50 years). All participants were treated in accordance with the ethical guidelines appropriate to the culture and the participating schools.

Procedures—Participants completed surveys in their school classrooms. Prosocial video game exposure was assessed by asking participants to rate how frequently in the previous month they had played video games with two types of prosocial scenes [scenes in which characters help troubled persons, and scenes where friendships or affections between parent(s) and child(ren) are shown] on scales ranging from 1 (*not at all*) to 5 (*very often*). Prosocial behavior was assessed by asking participants to rate how often in the previous month they had done each of four helpful or prosocial behaviors (e.g., "I helped a person who was in trouble"; $\alpha = .75$) using the same 5-point rating scales.

Results and Discussion

LISREL 8.5 was used to test competing models using maximum likelihood procedures. We began with a structural equation model in which prosocial gaming and prosocial behavior at Time 1 were correlated with each other and predicted prosocial gaming and prosocial behavior at Time 2, which also were allowed to correlate with each other. In addition, sex was included as a predictor of prosocial gaming and prosocial behavior at both time periods.

When we allowed the predictive links between sex and the other four factors to differ between the two samples, the model fit very well, χ^2 (11) = 6.68, $p > .80$, RMSEA = .00, *NFI* = .995 (see Figure 3). As predicted, the causal path from amount of prosocial game playing at time 1 to amount of prosocial behavior at time 2 (3-4 months later) was significant. In addition, the causal path from prosocial behavior at time 1 to prosocial gaming at time 2 was significant. Thus, there was a bi-directional relationship between prosocial gaming and prosocial behavior. This pattern of findings supports an "upward spiral" of prosocial gaming and behavior, in contrast to the "downward spiral" involving violent video gaming and aggression (Slater, Henry, Swaim, & Anderson, 2003). Study 2 provides additional (and stronger) evidence for a causal long-term relation between prosocial game play and prosocial behavior.

STUDY 3

Study 3 used an experiment designed to test the short-term causal hypothesis that playing prosocial video games would increase prosocial behavior in the immediate situation, whereas playing matched violent games would increase aggressive behavior. Neutral video games were also included in the design as a control. To increase generalizability, two games of each type were used; all were rated E (appropriate for everyone) by the Entertainment Software Ratings Board. After playing one type of video game for 20 minutes, participants completed a task where they could either help or harm another participant. Prosocial games were expected to increase helpful, prosocial behavior, whereas violent games were expected to increase unhelpful, aggressive behavior.

Methods

Participants—Participants were 161 college students (64 men, 95 women, 1 unidentified; mean age = 19.2 years, *SD* = 1.8) who received course credit in exchange for their voluntary participation. All participants were treated in accordance with the American Psychological Association's guidelines on the ethical treatment of participants.

Procedure—Participants were tested individually in a study investigating "how different types of video games affected puzzle performance." Participants were randomly assigned to play specific parts of a prosocial game (*Super Mario Sunshine* or *Chibi Robo*), a violent game (*Ty2* or *Crash Twin Sanity*), or a neutral game (*Pure Pinball* or *Super Monkey Ball Deluxe*) for 20 minutes (see Appendix A). In a pilot test, the games were rated by 27 college students on several dimensions, including how much your character helped other characters (4 items, Cronbach $\alpha = .98$) and how much your character harmed other characters (4 items, $\alpha = .98$). The two prosocial games scored 5.6 (on a 7-point scale) for how often one does nice things to or for other characters and scored 1.8 for how often one shoots at or kills other characters. The two violent games averaged 2.5 and 6.2 for doing nice things and shooting/killing, respectively. The two neutral games averaged scores of 1.1 and of 1.1, respectively. These scores demonstrate that the prosocial games are seen as including helping content and little violent content, whereas violent games show the opposite pattern, and neutral games contain neither because there are not other characters to either help or harm. All comparisons between game types are statistically significantly different. These ratings can be used to provide objective measures of the dosage of helpful and harmful behavior encountered in each of the six games.

Next, participants assigned their partner 11 tangram puzzles to complete. Tangram puzzles are based on seven differently shaped pieces (e.g., small square, large triangle) used to form a specified outlined shape. Outlines that require more shapes (6 or 7 pieces) are harder and more time consuming than those requiring fewer shapes. Participants could choose from 30 puzzles: 10 easy, 10 medium, and 10 hard. Participants were told that if their partner completed at least 10 of the 11 puzzles within 10 minutes, the partner would win a $10 gift certificate. Participants could help their partner by assigning easy puzzles, or hurt their partner by assigning difficult puzzles. Participants were encouraged to select from multiple difficulty levels. Because they had to choose 11 puzzles, and there were only 10 of each difficulty level, participants necessarily had to use at least 2 of the difficulty levels.

Participants then completed a video game evaluation questionnaire (Anderson et al., 2007), which asked players to rate the game they played on the following dimensions: absorbing, action-packed, addicting, arousing, boring, enjoyable, entertaining, exciting, fun, involving, stimulating, difficult, and frustrating. They also rated their perceived ability at the game. Ratings were made using 10-point scales (1= *"Strongly disagree"*, 10= *"Strongly agree"*). These individual ratings were combined into two scales based on a principal components factor analysis. Analysis of the scree plot of eigenvalues suggested an orthogonal two factor solution was most appropriate (i.e., additional factors accounted for little variance in the ratings). After reverse scoring the appropriate items, the first 11 listed items were averaged to form a "fun" scale (alpha = .95). The remaining three items (difficulty, frustrating, and ability (reverse scored)) were averaged to form a "difficulty" scale (alpha = .75). These two scales were not significantly correlated with each other ($r = 0.075$), accounted for 65% of the variance in game ratings, and were used to control for attributes of the games other than their prosocial and violent content (because enjoyment and frustration are theoretically relevant to consequent prosocial and aggressive behavior).

Participants also completed the 29-item Buss-Perry Aggression Questionnaire (Buss & Perry, 1992) as a measure of trait aggressiveness. Participants indicated agreement with statements (e.g., "If somebody hits me, I hit back") using a five-point scale (1= *"Extremely uncharacteristic of me"*, 5= *"Extremely characteristic of me"*), alpha = 0.92. Finally, participants were probed for suspicion (with multiple open-ended questions to see if participants realized that the video game and the tangram task were related), thanked, and dismissed. Nine participants expressed some suspicion about the study, but the results were

the same regardless of whether we kept or deleted these nine participants, so we kept their data.

Results and Discussion

Helping and Hurting Scores—Participants chose the tangrams mostly from the medium category (M_{medium} = 4.30), followed by the easy category (M_{easy} = 3.85), followed by the hard category (M_{hard} = 2.85). "Helping" was defined as the number of "easy" puzzles chosen by participants for their partners. "Hurting" was defined as the number of "hard" puzzles chosen. Of course, once one knows the helping and hurting scores of any participant, one also knows the number of medium difficulty choices. Thus, the number of medium difficulty choices is wholly redundant, and therefore was not analyzed.[1]

Preliminary Analyses—Preliminary analyses revealed no significant effects of participant sex or of the "fun" covariate on helping and hurting behavior, so they were dropped from final analyses. The game "difficulty" covariate yielded one marginally significant effect, so it was kept in the main analyses of puzzle choice behavior.[2]

Main Analyses—A 3 (game type: prosocial, neutral, or violent) x 2 (behavior type: helping or hurting) analysis of covariance was conducted with game difficulty and trait aggression as covariates.[3] There was a main effect of behavior type, $F(1, 155) = 9.47$, $p < .005$, $d = .49$. As we've already seen, participants chose more easy than difficult puzzles (*M*s = 3.92 & 2.79). More importantly, the game type by behavior type interaction was significant, $F(2, 155) = 5.26$, $p < .01$ (see Figure 4). A planned contrast revealed that those who had just played a prosocial game were significantly more helpful than those who had not played a prosocial game, $F(1, 155) = 8.94$, $p < .005$, $d = 0.48$. More specific comparisons found that participants who played a prosocial game helped their partners significantly more than either those who had played a violent game, $F(1, 155) = 9.91$, $p < .005$, $d = 0.63$, or those who had played a neutral game, $F(1, 155) = 3.97$, $p < .05$, $d = 0.39$. The latter two groups did not differ, $F(1, 155) = 1.45$, $p < .25$, $d = 0.24$.

Also as expected, participants who had played a violent game were significantly more hurtful than those who had played any of the other games, $F(1, 155) = 8.35$, $p < .005$, $d = 0.46$. More specific comparisons found that the violent gamers hurt their partners significantly more than either those who had played a prosocial game, $F(1, 155) = 8.93$, $p < .005$, $d = 0.59$, or those who had played a neutral game, $F(1, 155) = 4.23$, $p < .05$, $d = 0.41$. The latter two groups did not differ, $F(1, 155) = 0.91$, $p < .40$, $d = 0.19$.[4]

An Alternative Analysis—The objective ratings of helpful (prosocial) and hurtful (violent) game content provided by the 27 raters can also be used as indicators of the prosocial and violent game content dosages to which participants were randomly assigned. In other words, we can enter these two dosage scores for each participant, based on which of the six games they were assigned to play, and use these scores as the independent variables

[1]Because participants had to choose from at least two difficulty levels, and because they were explicitly instructed to use multiple categories, one might argue that choosing 1 or 2 easy puzzles does not necessarily indicate helpful intent. Similarly, 1 or 2 hard puzzle choices might not clearly indicate harmful intent. We therefore tested several different scoring procedures, such as counting the number of easy puzzles greater than 1 as the measure of helping, and counting the number of hard puzzles greater than 1 as the measure of hurting. The results were essentially the same regardless of whether we started the count at greater than 1 or 2.

[2]Nonetheless, the pattern of results was identical regardless of whether the fun and difficulty were included or excluded from the analyses.

[3]Preliminary analyses demonstrated that trait aggression was marginally significant when predicting helping behavior, whereas trait prosocial behavior was not significantly related to helping or hurting behavior (lowest $p = .48$). The results did not change regardless of whether both or neither were included in the analyses.

[4]The trait aggression x behavior type interaction approached statistical significance, $F(1, 155) = 3.23$, $p < .10$. Trait aggression was negatively related to helping, $b = -0.46$, $p < .08$, $r = .14$, and slightly positively related to hurting, $b = 0.38$, $p < .25$, $r = .13$.

predicting helping and hurting behavior towards their partner. It is interesting to note that across the six games, these two types of content were essentially uncorrelated with each other (r = -.07). In other words, across these six games the amount of prosocial and violent content were largely orthogonal.

A 2 (game content: prosocial or violent) x 2 (behavior type: helping or hurting) analysis of covariance was conducted with game difficulty and trait aggression as covariates. By including both types of game content simultaneously in the regression model, we tested for the unique effect of each content dimension while controlling for the other. Preliminary analyses yielded no hint of a 2-way game content interaction, so that term was dropped.

There was a significant behavior type by violent content interaction, and a marginally significant behavior type by prosocial content interaction, Fs(1, 155) = 5.57 & 3.51, ps < . 02 .06, rs = .19 & .15, respectively. These interactions are best understood by examining the game content effects on each behavior type.

Both types of content yielded significant unique effects on helping behavior. As expected, amount of prosocial content in the assigned game was positively related to helping one's partner by choosing easy puzzles, F(1, 155) = 4.52, p < .05, b = .40, r = .17. Conversely, amount of violent content in the assigned game was negatively related to helping one's partner, F(1, 155) = 3.97, p < .05, b = -.36, r = .16. Figure 5 displays these results.

The amount of violent content in the assigned game was positively related to hurting behavior towards the partner, F(1, 155) = 6.25, p < .02, b = .41, r = .20. Amount of prosocial content in the assigned game was negatively (but nonsignificantly) related to hurting behavior, F(1, 155) = 1.93, p < .20, b = -.24, r = -.11. Figure 6 displays these results.

In sum, the results from Study 3 show that playing video games with prosocial content causes people to be more helpful after playing. In contrast, playing games with violent content causes people to be less helpful and more hurtful after the game is turned off. The experimental effects of violent content replicate prior work as shown in early (Anderson & Bushman, 2001) and recent (Anderson et al, under review) meta-analyses. However, the positive effect of prosocial content on helping behavior in an experimental setting is unique in the video game research domain.

GENERAL DISCUSSION

As we have discussed elsewhere (Anderson & Bushman, 2002; Anderson et al., 2007), the strongest case possible for establishing that the effects of video games (or any scientific variable) are causal is when well-designed experimental, correlational, and longitudinal studies yield converging evidence (called triangulation). Furthermore, when a set of such studies includes diverse populations (different ages, sexes, cultures) and different measurement approaches, the degree of reasonable generalization broadens tremendously.

The present studies satisfy all of these criteria. The experimental study using U.S. university undergraduates demonstrated a short-term causal impact of playing prosocial games on helpful behavior (and of playing violent games on hurtful behavior). Short-term experiments like this are especially important for at least two reasons: (a) they provide a strong case for causality; (b) they reveal underlying processes likely to influence long-term effects. The correlational study using Singaporean junior high schoolers demonstrated the predicted associations among video game habits and “real world” prosocial and antisocial behaviors and traits. Such correlational studies are important because: (a) they provide an opportunity for a theoretical model to fail; (b) they allow tests of the predicted association with long-term consequential behavioral patterns and traits; and (c) they allow tests of some plausible

alternative explanations. The longitudinal study using Japanese children and adolescents demonstrated effects of earlier prosocial game play habits on later prosocial behavior. Such studies allow strong causal inferences, primarily by ruling out many alternative explanations that rely on individual differences in trait aggressiveness and in interests that exist at the first assessment time period; they also allow testing of the theoretical model with consequential real-world outcome measures. The bi-directionality of the present longitudinal results also demonstrates that the often-asked chicken and egg question is overly simplistic. These data suggest that playing prosocial games tends to increase prosocial behavior tendencies, and that prosocial tendencies tend to lead to selection of prosocial games. This clearly has implications for the parallel argument about violent media and aggression (Slater et al., 2003).

Overall, these results provide support for both the short-term and long-term predictions of the General Learning Model. Specifically, in the short-term players' behaviors were predicted by the prosocial and violent content of the games they played. In the long-term, players with high prosocial game exposure had higher prosocial traits and behaviors.

Study 1 also provides additional information about the relations between prosocial and aggressive effects of prosocial and violent games. As noted earlier, prosocial and aggressive behavior are not simply opposite behaviors. The cross-sectional correlations between violent game play and prosocial behaviors and traits were not always significant. Prosocial game play was significantly positively related to all four measured prosocial behaviors and traits (and negatively related to aggressive cognition), whereas violent game play was significantly negatively related to helping behavior and empathy (and was positively related to aggressive cognition). We do not know from the results of this one study why violent game play was not significantly related to sharing and cooperation or emotional awareness, but it does suggest that game content is most likely to have specific rather than broad effects. One possible reason is that some violent games require cooperation and others do not. We further speculate that violent game play can be related to empathy but not to emotional awareness because many violent games require the player to see others' emotions (e.g., begging for mercy), but to then ignore them. Thus, players can be aware of others' (and their own) emotions without showing empathy. Future research is needed to test these speculations.

Although this set of studies provides conceptual replications and converging evidence from different populations and methods, there are some potentially important limitations. Studies 1 and 2 rely upon self-report evidence. It is possible that self-presentation biases influenced the data. But, we expect that all children and adolescents wish to present themselves in a positive light (not just those who play prosocial games). It is also possible that children's reports of their gaming habits are not accurate. Again, it is unclear why this would only affect children who play prosocial games. Indeed, the correlation between the self-report ratings of game content and expert ratings of game content was high (r= .75). Inaccuracy would also tend to lower the probability of finding significant effects. It is also worth noting that in Study 2 the primary regression coefficients of interest are small, although statistically significant. This is to be expected with a short-term longitudinal study, given that most behaviors are relatively stable across three or four months (as is also seen in Figure 3).

These results provide further evidence for the multiple dimensions along which video games can have effects (Khoo & Gentile, 2007). Specifically, they make it clear how critical it is to separate amount of play from the content of play, and also provide evidence of how important it is to separate different types of content because suppressor effects may exist in the data. As John Wright, the eminent media effects researcher was fond of saying, “The medium isn't the message. The message is the message.” For many types of outcome

variables (but not all) the amount of a specific type of content in video game play has a bigger impact than overall amount of play. In the present case, the results demonstrate that content matters. Violent game content increases aggressive thoughts and behaviors, whereas prosocial game content increases prosocial thoughts and behaviors. This is not to say, however, that total amount of game play does not matter. Displacement effects appear to reduce school performance and may well reduce social skills development (Anderson et al., 2007; Gentile, Lynch, Linder, & Walsh, 2004).

These studies were not designed to suggest new psychological mechanisms for prosocial effects, but instead to test the applicability of existing theory to a related, but novel type of media - prosocial video games. By providing conceptual replications across diverse cultures, ages, and research methods, they also provide support for the generalizeability of the effect, as predicted by the General Learning Model. The results of this study do not allow us, however, to know specifically which learning mechanisms were involved, but they do demonstrate that such future research would be valuable.

Video games are not inherently good or bad, just as any tool is not inherently good or bad. For example, an axe can be used to split logs for a fire to keep people warm on a cold day, or it can be used as a weapon. Likewise, video games can have both positive and negative effects. Content matters, and games are excellent teachers (Gentile & Gentile, 2007). Violent content in video games can lead people to behave more aggressively. Prosocial content, in contrast, can lead people to behave in a more cooperative and helpful manner.

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Appendix A: Video Game Descriptions

Violent games:

- *Ty2*: The objective of this game is to get through the different stages and levels and get to Boss Cass before he takes over a country. On the way, the player has to fight with Cass' armed henchmen and robots who try to stop Ty.
- *Crash Twinsanity*: In this game the player has to make their way across different stages, enemies, puzzles, and obstacles with Dr. Cortex (a computer-controlled character). The player has to fight and defeat numerous enemies along the way.

Prosocial games:

- *Chibi Robo*: The goal of this game is to make your family happy by cleaning up, helping them out in their chores, and everyday tasks. As the player cleans up throughout the house, they earn Happy Points that improve their robot's ranking. The player can do several things to get happy points including: picking up trash and throwing it in a trashcan, scrubbing stain marks with a toothbrush, etc.
- *Super Mario Sunshine*: The objective of the game levels used in this study is to clean up the island you are on. Someone has polluted the island by leaving dirt marks and sludge everywhere. The people of the island can't enjoy themselves with all this pollution. Mario has been asked to clean the island using his cleaning device, Fludd. The player has to completely clean the area within each stage to

progress to the next level. Though there are some aggressive behaviors in this game, we used portions of the game that minimized aggression and maximized prosocial behavior.

Neutral games:

- *Pure Pinball*: The goal of the game is to keep the ball on the pinball table by using the right and left triggers. Players can earn points if their ball reaches certain hard to reach areas.
- *Super Monkey Ball Deluxe*: The goal of the game is to advance through the different mazes by reaching the goal in the allocated time. The player must roll the monkey ball towards the goal without allowing it to fall and within the time limit in order to advance to the next level.

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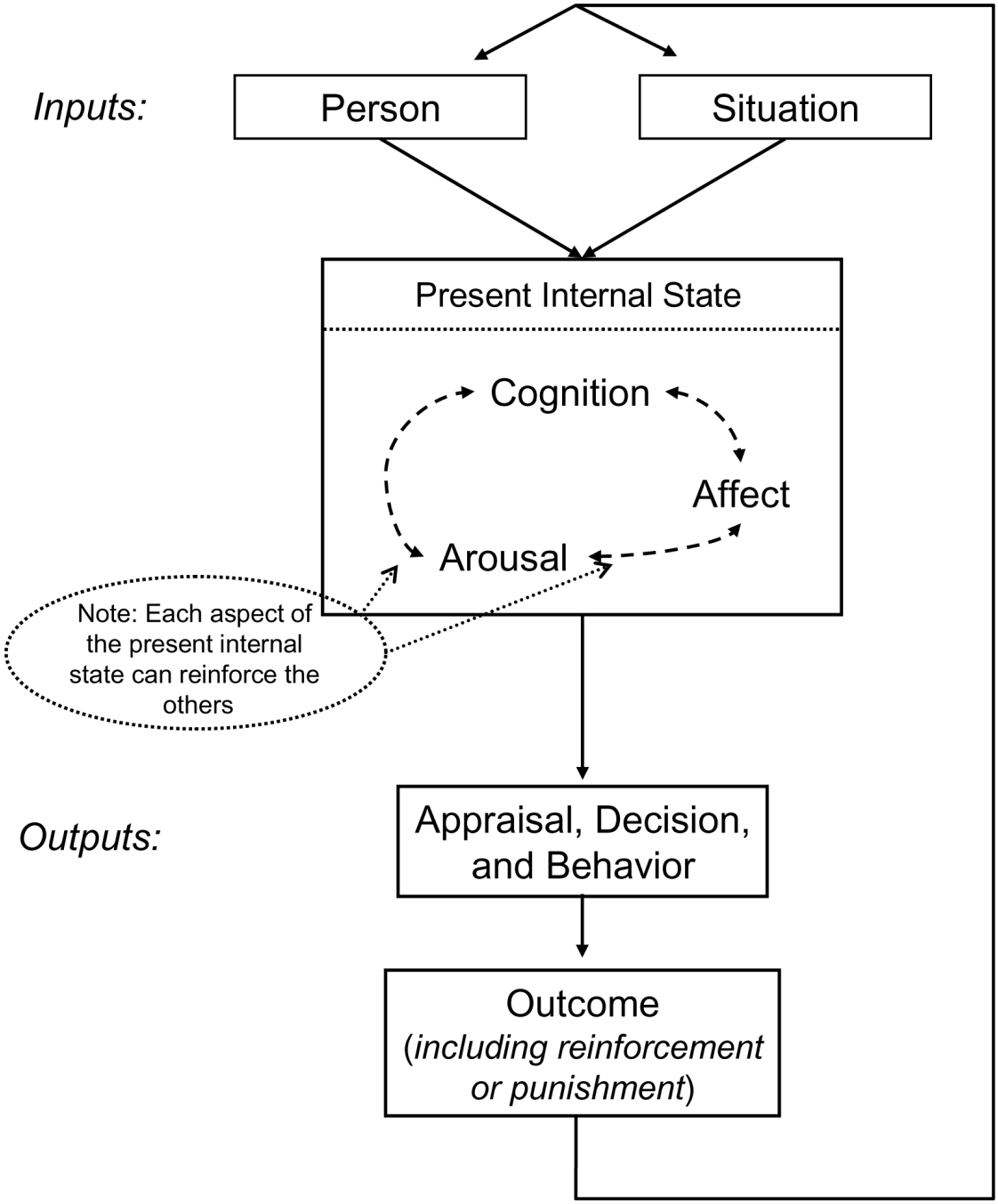

Figure 1.
Short-term processes in the General Learning Model (simplified view)

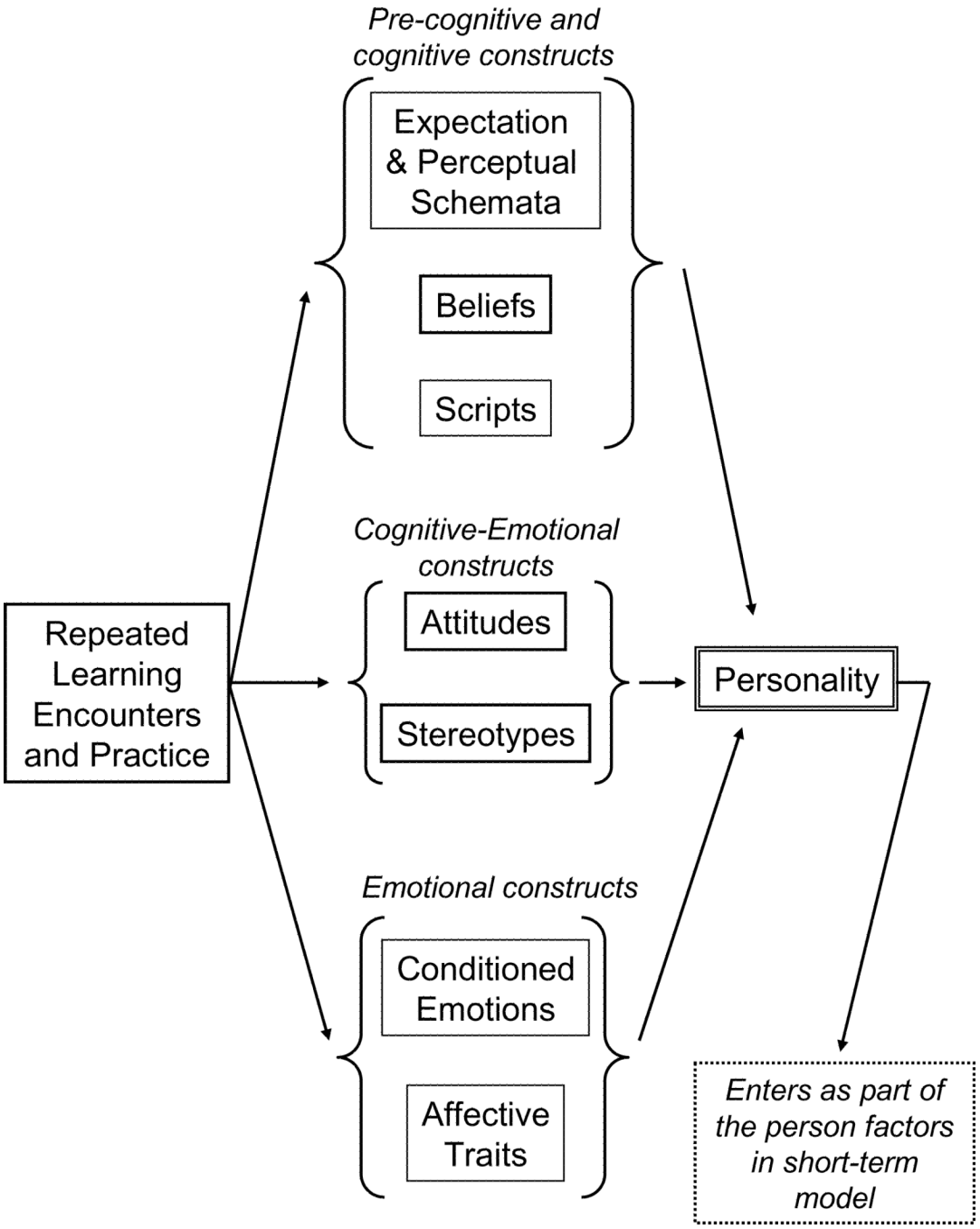

Figure 2.
Long-term processes in the General Learning Model

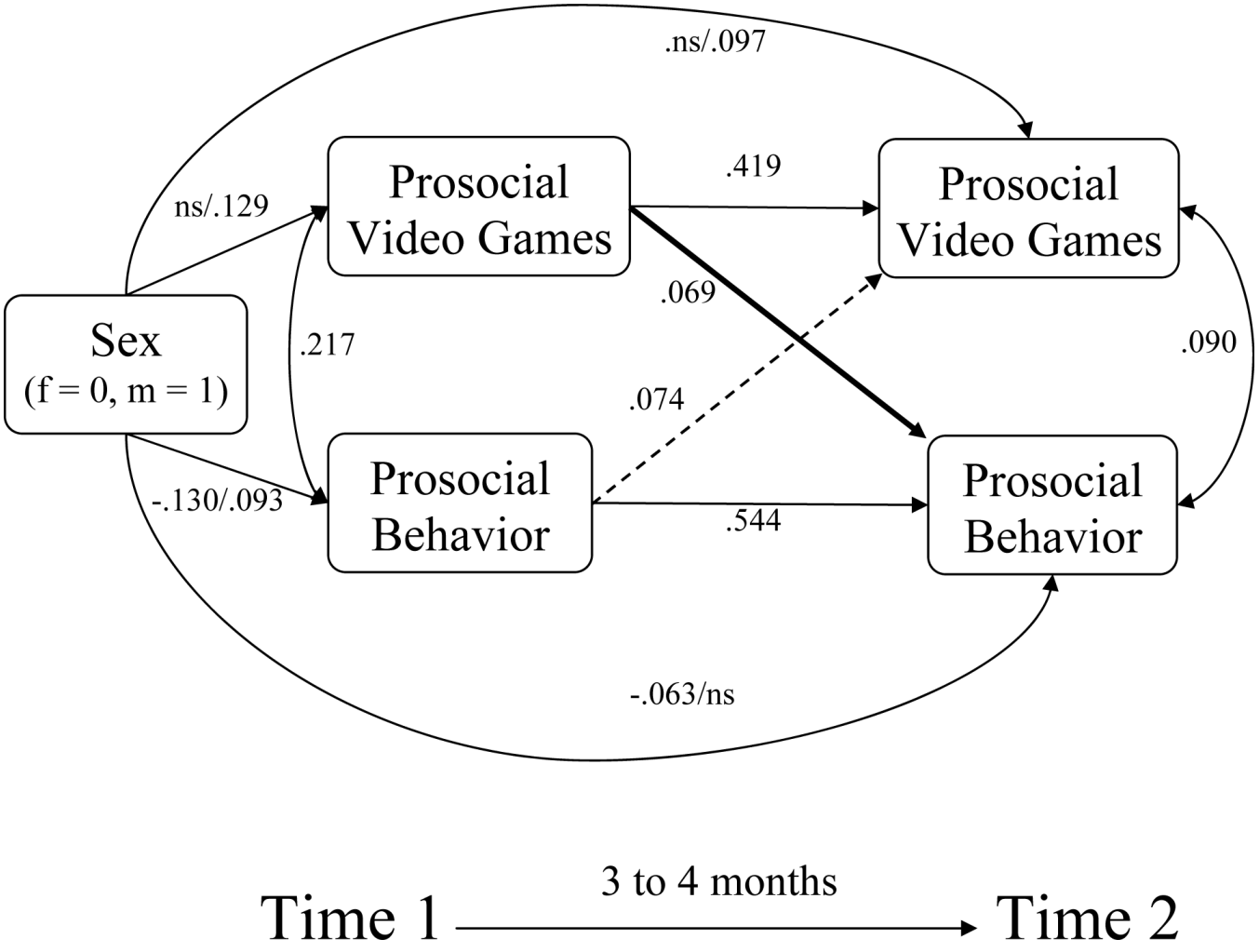

Figure 3.

Maximum likelihood structural equation model of longitudinal prosocial video game effects on prosocial behavior. Path coefficients are standardized. Unless otherwise indicated, all path coefficients are statistically significant at $p < 001$. Paths with two coefficients indicate different weights for the two samples. Ns = 780 5th graders & 1050 8th & 11th graders.

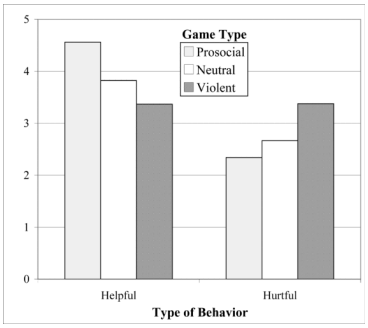

Figure 4.
Helpful and Hurtful Behavior as a Function of Type of Video Game.

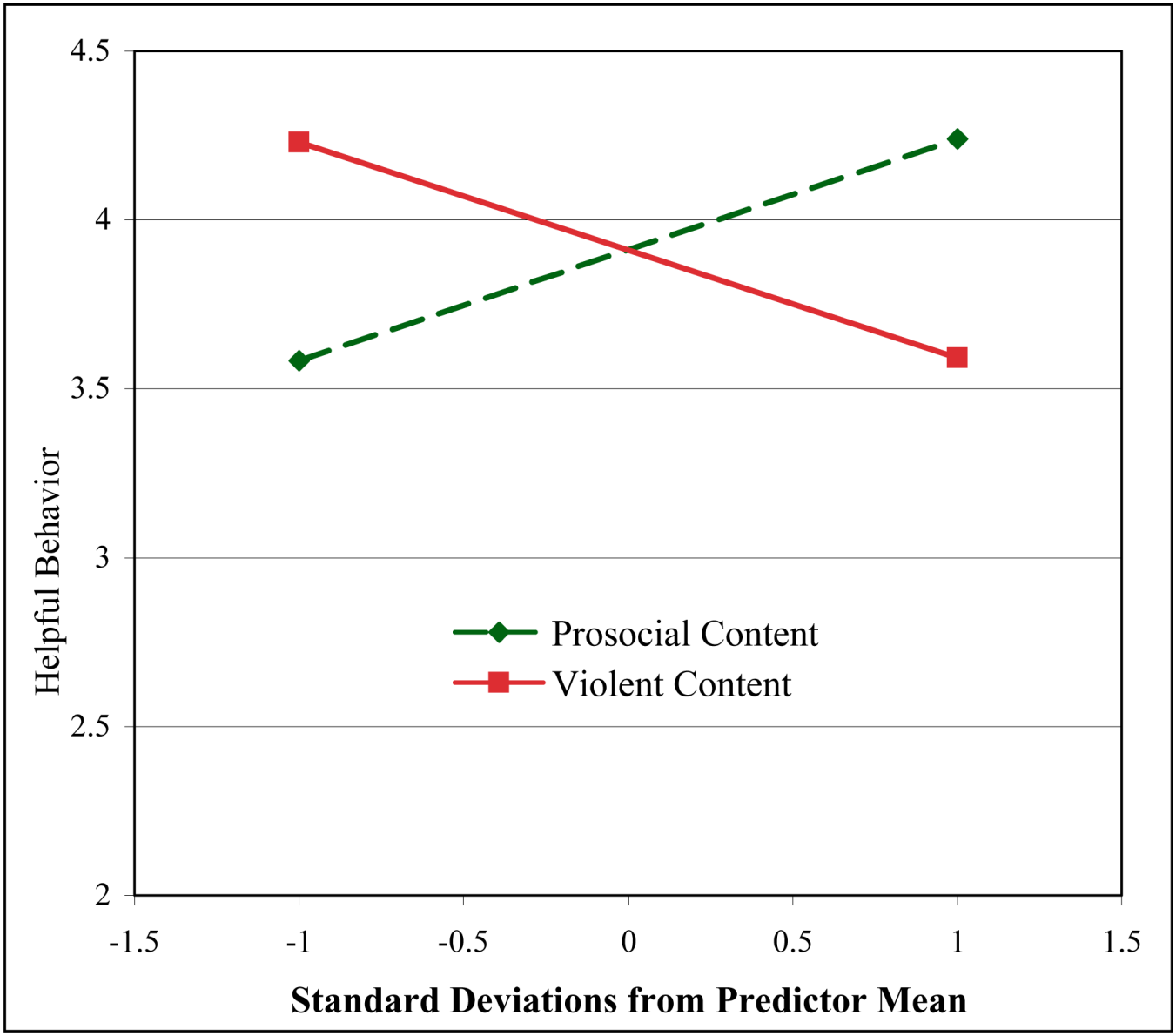

Figure 5.
Helpful behavior as a function of prosocial and antisocial content of assigned video game. Both effects are significant at $p < .05$.

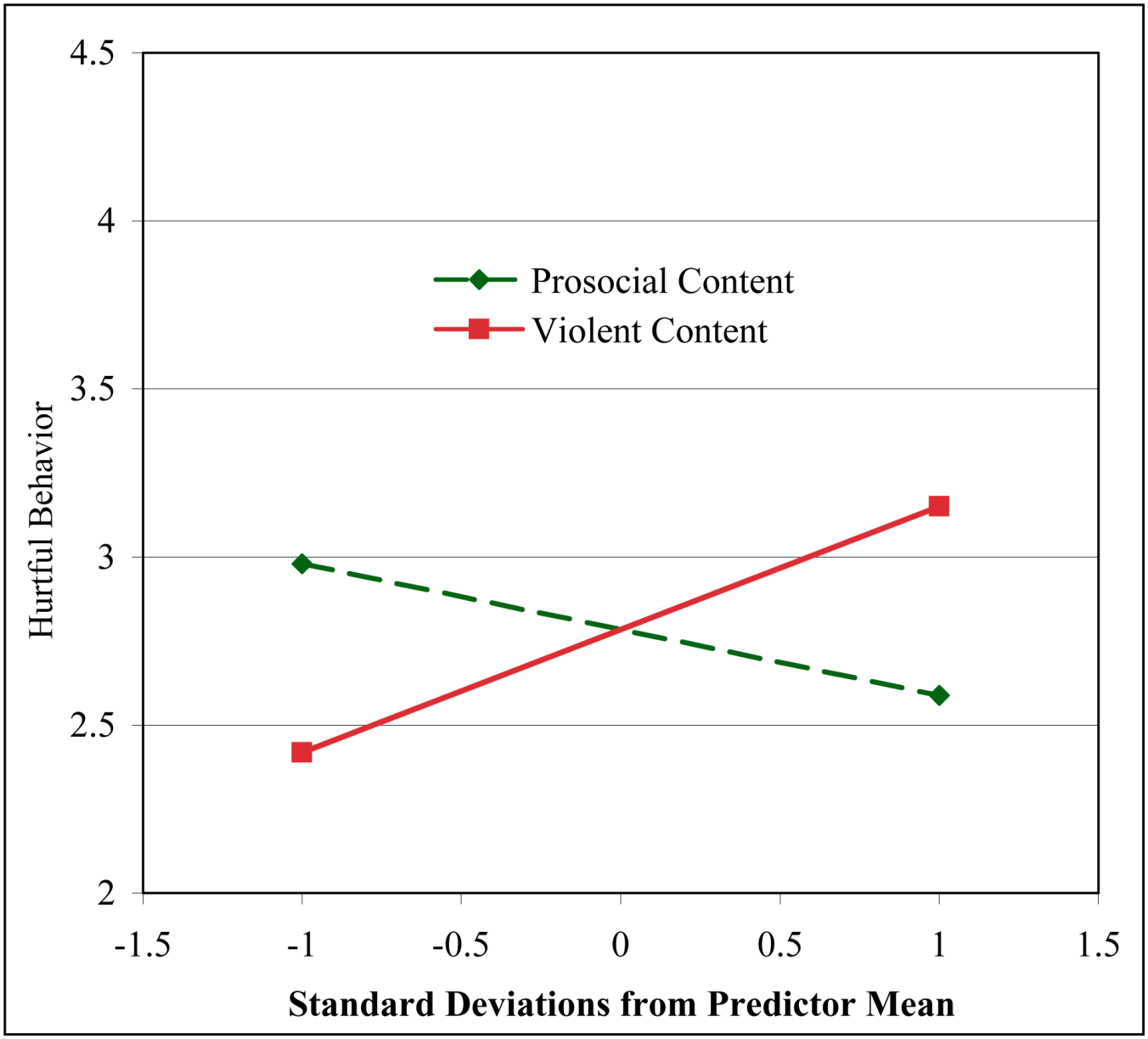

Figure 6.
Hurtful behavior as a function of prosocial and antisocial content of assigned video game. The Violent Content effect is significant at $p < .05$. The Prosocial Content effect is not significant, $.10 < p < .20$.

Table 1

Regression Coefficients Predicting Prosocial Behaviors and Traits

	β	*t*	*p*
DV: Helping Behavior			
Sex (1=male, 2=female)	.164	4.50	.000
Age	-.089	-2.49	.013
Weekly Game Play	-.156	-3.54	.000
Violent Game Exposure	-.430	-4.58	.000
Prosocial Game Exposure	.492	5.38	.000
DV: Cooperation and Sharing			
Sex (1=male, 2=female)	.175	4.50	.000
Age	-.096	-2.59	.010
Weekly Game Play	-.183	-4.01	.000
Violent Game Exposure	.022	0.47	.639
Prosocial Game Exposure	.175	4.52	.000
DV: Empathy			
Sex (1=male, 2=female)	.167	4.54	.000
Age	-.064	-1.78	.076
Weekly Game Play	-.134	-3.03	.003
Violent Game Exposure	-.413	-4.36	.000
Prosocial Game Exposure	.481	5.22	.000
DV: Emotional Awareness			
Sex (1=male, 2=female)	.061	1.60	.109
Age	-.136	-3.66	.000
Weekly Game Play	-.184	-4.00	.000
Violent Game Exposure	-.036	-0.37	.713
Prosocial Game Exposure	.186	1.95	.051

Table 2

Regression Coefficients Predicting Aggressive Cognition

	β	*t*	*P*
DV: Approval of Aggression			
Sex (1=male, 2=female)	-.083	-2.16	.031
Age	.085	2.24	.025
Weekly Game Play	.100	2.16	.031
Violent Game Exposure	.260	2.67	.008
Prosocial Game Exposure	-.281	-2.96	.003
DV: Hostile Attribution Bias			
Sex (1=male, 2=female)	.038	0.96	.335
Age	-.066	-1.73	.084
Weekly Game Play	.064	1.38	.169
Violent Game Exposure	.337	3.41	.001
Prosocial Game Exposure	-.321	-3.33	.001