

Video Game Violence Use Among “Vulnerable” Populations: The Impact of Violent Games on Delinquency and Bullying Among Children with Clinically Elevated Depression or Attention Deficit Symptoms

Christopher J. Ferguson · Cheryl K. Olson

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Abstract The issue of children’s exposure to violent video games has been a source of considerable debate for several decades. Questions persist whether children with pre-existing mental health problems may be influenced adversely by exposure to violent games, even if other children are not. We explored this issue with 377 children (62 % female, mixed ethnicity, mean age = 12.93) displaying clinically elevated attention deficit or depressive symptoms on the Pediatric Symptom Checklist. Results from our study found no evidence for increased bullying or delinquent behaviors among youth with clinically elevated mental health symptoms who also played violent video games. Our results did not support the hypothesis that children with elevated mental health symptoms constitute a “vulnerable” population for video game violence effects. Implications and suggestions for further research are provided.

Keywords Video games · Aggression · Violence · Mental health

Introduction

Whether violent video games do or do not contribute to behavioral aggression and societal violence among youth has been debated, at the time of this writing, for three

decades. By societal violence, we refer to a range of behaviors, from bullying and physical fighting to criminal assault and even homicide, which are of concern to law-makers and parents. We contrast societal violence with the measures of relatively mild aggression (or perhaps competition) often used in laboratory studies of college students, which arguably do not tap well into the issue of societal violence (Kutner and Olson 2008). Caution is required in generalization of laboratory aggression measures to societal violence as the potential for misinformation is considerable (Ferguson et al. 2011). To date, no consensus has been reached on the matter: some scholars argue that violent games contribute to behavioral aggression (Fraser et al. 2012) or even societal violence (Strasburger 2007), while others suggest that video games have a negligible influence on aggression (Puri and Pugliese 2012) or may even reduce aggression (Colwell and Kato 2003).

Existing societal concerns about video games have intensified after the 1999 Columbine High School massacre (Ferguson 2013) and other well-publicized school shootings. The tragic 2012 Sandy Hook Elementary School murders in Newtown, Connecticut resurrected these debates amid reports that the 20-year-old shooter was an avid gamer (e.g., Henderson 2012). The Newtown shooting also brought renewed attention to wide discrepancies in opinion regarding whether violent video games influence criminal behavior. The Brown v EMA (2011) Supreme Court decision, in which the Court ruled that a California law restricting the sale or rental of violent games to minors was an unconstitutional violation of the First Amendment, highlighted the limitations of existing studies of violent video games and the difficulty of applying this pool of research to policy-relevant questions. A series of appellate court rulings made similar points (see Brown v EMA 2011, p. 12). Given these court rulings, and the recurring media

A1 C. J. Ferguson (✉)
A2 Department of Psychology, Stetson University,
A3 DeLand, FL 32729, USA
A4 e-mail: CJFerguson1111@Aol.com

A5 C. K. Olson
A6 Reston, VA, USA

68 focus on video games, researchers need to do more to
69 answer the questions of greatest public concern regarding
70 video games and any potential harm to youth. The recur-
71 rence of these concerns with each school shooting or court
72 ruling points to the need for studies that can meaningfully
73 inform policy and legal debates.

74 **Video Game Violence Research: What is the Evidence?**

75 Much speculation focuses on the issue of whether violence
76 in video games or other entertainment media, such as
77 television, can contribute to real-life violence. Evidence to
78 date is scant. For instance, in a recent meta-analysis that
79 focused on criminal aggression, Savage (2008) found that
80 exposure to media violence shared only trivial amounts of
81 variance with criminal aggression. Similarly, in a large
82 sample of youth aged 10–15, Ybarra et al. (2008) found
83 that violent media exposure did not predict violence once
84 other confounding variables were controlled. It is also
85 noteworthy that the explosion in popularity and availability
86 of video games has coincided with a precipitous decline in
87 youth violence, not a rise (see Ferguson 2013 for
88 discussion).

89 There exists a large pool of studies examining video
90 game violence effects in college students using laboratory
91 methods and measures of relatively mild aggression. The
92 validity of these measures has been debated within the
93 research community (e.g. Giancola and Zeichner 1995;
94 Ritter and Eslea 2005). One point of contention is the lack
95 of clear correspondence between these measures and the
96 types of aggressive behaviors of interest to policy makers
97 and parents. For instance, such studies have examined
98 outcomes such as filling in the missing letters of words,
99 where “kill” rather than “kiss” is considered more
100 aggressive (Farrar et al. 2013); self-ratings of hostile
101 feelings (Williams 2011); or administering non-painful
102 bursts of annoying noise to consenting opponents in a
103 reaction-time test (Anderson and Dill 2000). Taken at face
104 value, such studies may be generalizable to competitiveness
105 rather than aggression, or perhaps to mild aggressive
106 acts (the equivalent of children sticking tongues out at each
107 other), but cannot be generalized to societal violence. Even
108 these studies produce mixed results, however, and have
109 been criticized for methodological issues such as failing to
110 match violent and non-violent video game play conditions
111 carefully (Adachi and Willoughby 2011), using unstan-
112 dardized outcome measures that may allow researchers to
113 pick and choose outcomes fitting their hypotheses (Fergu-
114 son 2013), and high potential for demand characteristics.

115 By contrast, studies of video game effects on violent
116 behaviors among children, conducted outside laboratory
117 settings, remain relatively few in number. Such studies

differ in quality and standardized approach to measure- 118
ment. One study (Anderson et al. 2008) found weak links 119
between video game violence and aggression in US and 120
Japanese children, although interpretation of results is 121
complicated by the use of non-standard measures of 122
aggression and inadequate control for other variables. A 123
later German study tying media violence, including video 124
game play, to aggression in children (Krahé et al. 2012) 125
also did not use standardized assessments. That study may 126
have been compromised by the introduction of a media 127
education program into the schools mid-way through the 128
longitudinal period (e.g., Möller et al. 2012) introducing 129
demand characteristics (i.e., advertising the study hypoth- 130
eses to prime respondents to answer surveys in a particular 131
way, not representative of how they actually behave). 132
Another recent study that links violent games with 133
aggression, by Willoughby et al. (2012), carefully con- 134
trolled for important “third” variables. With other vari- 135
ables controlled, exposure to violent video games cor- 136
related with later aggression with an effect size equivalent 137
to $r = .07$, indicating that violent game use was associated 138
with approximately half a percent increase in aggressive 139
behavior. The authors noted, however, that it may be 140
competitive qualities of the games, not violent content, 141
which led to this increase (see Adachi and Willoughby 142
2011). In a follow-up longitudinal study (Adachi and 143
Willoughby 2013), the authors confirmed that competition 144
predicts later aggression, irrespective of violent game 145
exposure history. 146

147 Few other studies of children and video games have
148 made a solid case for a connection to aggression or violent
149 outcomes. Several have suggested that use of violent video
150 games might reduce aggression (Colwell and Kato 2003;
151 Shibuya et al. 2008¹). Others indicate that, with other
152 factors controlled, effects are null (Ferguson 2011; von
153 Salisch et al. 2011; Wallenius and Punamäki 2008; Ybarra
154 et al. 2008) or that effects may be idiosyncratic among
155 children (Unsworth et al. 2007). Meta-analyses (e.g.,
156 Sherry 2007) have found weaker effects in studies of
157 children than for college students, the opposite of what
158 might be expected developmentally. Thus, overall, it is

¹ We note the issue that some research reports insinuate links 1FL01
between violent games and aggression, where their data fail to support 1FL02
such insinuations. We note that in Shibuya et al. 2008, in their 1FL03
Table 2, the video game exposure by violence presence variable is 1FL04
associated with a reduction in aggression in boys, but not girls. For 1FL05
Ybarra et al. (2008) the null effect for violent video games is noted in 1FL06
their Figure 2, although they largely ignore their own results to imply 1FL07
links between violent games and youth aggression. These papers 1FL08
highlight the need to closely examine research results when under- 1FL09
standing the true implications of a research study. The rhetoric 1FL10
employed by scholars in their abstracts and discussion sections does 1FL11
not always match their data. 1FL12

159	difficult to make clear conclusions about links between	209
160	video game violence and childhood aggression or violence.	210
161	Post-Sandy Hook, a view emerged, typified by the report	211
162	of the US House of Representatives Gun Violence Pre-	212
163	vention Task Force (2013), that current research probably	
164	did not support concerns that the average child was harmed	
165	by video game violence. Rather, attention should be	
166	focused on prevention and early intervention with “at-risk	
167	youth,” with particular emphasis on mental health. This is	
168	a reasonable hypothesis, but one that has not been studied	
169	extensively. Several studies of college students by Patrick	
170	Markey found that violent video games may interact with	
171	preexisting anger symptoms in some young adults to	
172	increase hostility, although he has been cautious about	
173	extending these findings to violence in children (Giumetti	
174	and Markey 2007; Markey and Markey 2010; Markey and	
175	Scherer 2009). These warnings are consistent with those of	
176	criminologists who warn against generalizing laboratory	
177	aggression measures to criminal violence (Savage 2008).	
178	One recent analysis with children (Ferguson 2011) was	
179	unable to confirm the hypothesis that children with pre-	
180	existing antisocial traits were adversely influenced by	
181	violent video games. However, more research would cer-	
182	tainly be welcome.	
183	The Current Study	
184	The current study is intended to address gaps in the existing	
185	literature by considering the impact of exposure to violence	
186	in video games on criminal delinquency and bullying	
187	behaviors in a sample of children with clinically elevated	
188	mental health symptoms. It is important to note at the	
189	outset that the vast majority of children with mental health	
190	symptoms do not engage in violent behavior. Although	
191	some symptoms of mental health problems such as	
192	depression (Ferguson 2011) and attention deficit disorder	
193	(Wymbs et al. 2012) have been identified as risk factors for	
194	aggressive or violent behavior, this occurs only in combi-	
195	nation with other significant risk factors, not as a direct	
196	result of the mental health symptoms. Thus, scholars must	
197	exercise caution not to further stigmatize mental illness by	
198	insinuating links with violence.	
199	Rather, our analyses are intended to address the	
200	hypothesis that children with clinically elevated mental	
201	health symptoms constitute a “vulnerable” population of	
202	individuals who may be susceptible to video game violence	
203	effects even if clinically “normal” children are not. We	
204	thus test two main hypotheses. First, it was hypothesized	
205	that children with clinically elevated symptoms of depres-	
206	sion will demonstrate a correlation between violent video	
207	game exposure and criminal delinquency and bullying	
208	behavior-related outcomes. Second, it was hypothesized	
	that children with clinically elevated attention deficit	209
	symptoms will demonstrate a correlation between violent	210
	video game exposure and criminal delinquency and bul-	211
	lying behavior related outcomes.	212
	Methods	213
	Participants	214
	The current study includes a subset of participants from a	215
	large federally funded project examining video game vio-	216
	lence effects on youth. Details related to the initial devel-	217
	opment and recruitment for this project can be found at	218
	Kutner and Olson (2008). Only children who scored in the	219
	clinically significant range on clinically validated scales	220
	related to depressive or attention deficit symptoms (scales	221
	discussed below) were included in the current analyses.	222
	These included 377 children: 182 with clinically elevated	223
	attention deficit symptoms, and 284 with clinically ele-	224
	vated depressive symptoms. Clinically elevated symptoms	225
	were comorbid for 89 (23.6 %) children. There were 234	226
	females in the sample and 140 males (3 chose not to report	227
	their gender). The mean age of the children was 12.93	228
	(SD = .76). Children were recruited from both an urban	229
	and suburban school. The ethnic makeup of students in the	230
	urban school was 50 % white, 43 % black, 2 % Asian, 5 %	231
	Hispanic and <1 % other. The ethnic makeup of students in	232
	the suburban school was 90 % white, 4 % black, 4 %	233
	Asian, 1 % Hispanic and 1 % other (individual students	234
	were not asked to report their ethnic background).	235
	Measures	236
	<i>Depression/Attention Symptoms</i>	237
	Symptoms of depression and attention-deficit/hyperactivity	238
	problems were assessed using the relevant subscales of the	239
	youth self-report version of the Pediatric Symptom Check-	240
	list—17 (PSC; Gardner et al. 1999). This instrument is a	241
	validated, brief screening device for mental health problems	242
	in children, and provides clinical cut-offs to identify children	243
	whose symptoms merit further evaluation. Participants were	244
	asked to rate whether they experienced particular mental	245
	health symptoms “never,” “sometimes” or “often.” With	246
	the current sample, coefficient alpha for the ADHD subscale	247
	was .75 and for the depression subscale .80. The sample	248
	reported mean was 5.41 and standard deviation was 2.28.	249
	<i>Trait Aggression</i>	250
	The Attitudes Toward Conflict scale (ATC; Dahlberg et al.	251
	1998) consists of eight Likert items related to potential	252

253 aggressive responses to various hypothetical situations.
 254 Sample items include, "It's OK for me to hit someone to
 255 get them to do what I want" and "I try to talk out a
 256 problem instead of fighting." Due to the stability in trait
 257 aggression it is commonly regarded as an important control
 258 variable and we include it here for this reason. Trait
 259 aggression correlated with video game exposure at $r = .24$
 260 for youth with elevated attention deficit symptoms and $.23$
 261 for youth with elevated depressive symptoms. However,
 262 predictive relationships between exposure to video game
 263 violence and trait aggression became non-significant in
 264 regression equations with gender, parental involvement,
 265 stress and family/peer support controlled. Thus, we are
 266 confident that our use of trait aggression as a control vari-
 267 able does not miss relationships between video game
 268 violence and trait aggression with other factors controlled.
 269 Coefficient alpha for the current sample for the ATC was
 270 $.76$. The sample reported mean was 16.48 and standard
 271 deviation was 4.60 .

272 Parental Involvement

273 To measure parents' involvement with their children's
 274 media use, sharing media consumption with children and
 275 making media consumption decisions for them, a nine-item
 276 Likert-scale was created for this study. Examples of
 277 questions included in this scale are "My parents play
 278 electronic games with me," and "My parents tell me I can't
 279 play a particular electronic game." Coefficient alpha for
 280 the current sample was $.68$. The sample reported mean was
 281 18.48 and standard deviation was 4.12 .

282 Support from Others

283 We compiled a sixteen item Likert-scale measure of per-
 284 ceived support from peers and family. This measure was
 285 based on two existing measures (Lerner et al. 2005; Phillips
 286 and Springer 1992) of peer support and family support.
 287 Overall coefficient alpha for the resultant scale was $.87$.
 288 The sample reported mean was 44.35 and standard devia-
 289 tion was 10.22 .

290 Stress

291 The Stressful Urban Life Events scale (SULE; Attar et al.
 292 1994), a 19 item yes/no scale, was used to measure total
 293 stress that children in the current sample had experienced
 294 during the past year. The SULE addressed stressors such as
 295 getting suspended from school, getting poor grades on
 296 one's report card, or experiencing the death of a family
 297 member. Coefficient alpha for the total stress scale was $.67$
 298 for the current sample. The sample reported mean was 4.82
 299 and standard deviation was 2.96 .

Exposure to Video Game Violence

301 In the current study, we used Entertainment Software
 302 Ratings Board (ESRB) video game ratings as an estimate
 303 of exposure to violence in video games. Respondents were
 304 asked to write the names of five video games that they had
 305 "played a lot" in the past 6 months. ESRB ratings were
 306 then obtained for each game, and ordinally coded (a
 307 maximal score of 5 for "Mature," 4 for "Teen," etc.). The
 308 sample reported mean was 29.97 and standard deviation
 309 was 30.09 .

310 Many factors go into an ESRB rating, including lan-
 311 guage, sexual content, and use of (or reference to) drugs or
 312 gambling. However, among those factors that determine
 313 the age-based rating, violence appears to take priority.
 314 Descriptors of listed games were reviewed to ensure that
 315 high ratings had not been obtained primarily for sexual
 316 content; this was not the case for any of the games.
 317 Common violence-containing games named by participants
 318 included those in the *Halo*, *Grand Theft Auto*, and *Mortal*
 319 *Kombat* series. The ratings were summed across the 5
 320 games listed, then multiplied by the number of hours per
 321 week that the child reported playing video games. As with
 322 all attempts to assess game content exposure, this is only an
 323 estimate; however, it removes some of the subjectivity
 324 inherent in previous methods. This approach has been
 325 found to be reliable and valid in previous research (Fer-
 326 guson 2011; Lenhart et al. 2008).

Delinquency

327 A six-item Likert scale of general delinquency was com-
 328 piled from several existing delinquency scales (Brenner
 329 et al. 2002; Elliot et al. 1985; Leffert et al. 1998). Ques-
 330 tions addressed physical aggression (been in a physical
 331 fight; hit or beat up someone) as well as more general
 332 delinquency (stole something from a store; got into trouble
 333 with the police; damaged property just for fun, such as
 334 breaking windows, scratching a car, or putting paint on
 335 walls; skipped classes or school without an excuse). Par-
 336 ticipants were asked to report how often these behaviors
 337 occurred within the previous twelve months. Coefficient
 338 alpha for the resultant scale was $.75$ for the current sample.
 339 The sample reported mean was 3.00 and standard deviation
 340 was 3.95 .

Bullying

341 The Revised Olweus Bully/Victim Questionnaire (Olweus
 342 1996) was used to assess bullying behaviors. The bullying
 343 perpetration scale consisted of 9 items in which partici-
 344 pants were asked to rate how often they had engaged in
 345 bullying behaviors over the past couple of months. Items
 346
 347

348 inquire about physical aggression, verbal aggression, 393
 349 threats and social exclusion. A coefficient alpha of .86 was 394
 350 obtained for the current sample. The sample reported mean 395
 351 was 2.68 and standard deviation was 4.27. 396

352 Procedure 397

353 All procedures described within this study were approved 400
 354 by local IRB and designed to comport with APA standards 401
 355 for ethical human research. An “opt out” procedure was 402
 356 used for student involvement, with parents notified of the 403
 357 study through school newsletters and notices sent home to 404
 358 students. Youth assent for participation was obtained for all 405
 359 participants. Teachers were not present during data col- 406
 360 lection, which occurred during the school day. 407

361 Primary data analysis used for the testing of the study 408
 362 hypotheses were OLS multiple regressions. Gender, 409
 363 parental involvement, trait aggression, stress, family/peer 410
 364 support and exposure to video game violence, as well as 411
 365 the interaction between exposure to violent video game and
 366 trait aggression, were entered simultaneously in the
 367 regression equation. In keeping with the recommendations
 368 of Simmons et al. (2011), we certify that this analysis
 369 approach was selected in advance and was not altered to
 370 produce particular results. An interaction between trait
 371 aggression and exposure to video game violence was tested
 372 by first centering the variables to avoid multicollinearity.
 373 Collinearity diagnostics for all regressions revealed
 374 absence of any concerns with all VIFs below 2.0. Youth
 375 with depressive or attention deficit symptoms will be
 376 considered separately.

377 Results

378 Video Game Exposure

379 Children in our sample were generally very familiar with
 380 electronic games. Of our sample, 84.4 % reported playing
 381 video games on a computer, 81.2 % on a console and
 382 50.4 % on a handheld device in the previous 6 months.
 383 Only 6.1 % reported playing no games at all during that
 384 time. Similarly, only 11.4 % of our sample had no expo-
 385 sure to violent video games. Boys had considerably
 386 more exposure to violent video games than did girls
 387 [$t(189.24) = 9.07, p < .001, r = .46, 95\% \text{ CI} = .38, .54$].
 388 Kurtosis and skew were acceptable, suggesting a normal
 389 distribution of scores.

390 Video Game Influences

391 With the sample of children with clinically elevated
 392 depressive symptoms and regarding delinquent criminality

as an outcome only stress ($\beta = .30$) and trait aggression 393
 ($\beta = .42$) were predictive of delinquent criminality. Nei- 394
 395 ther exposure to video game violence nor the interaction 396
 between trait aggression and exposure to video game vio- 397
 398 lence were predictive of delinquent outcomes. The adjusted 399
 R^2 for this regression equation was .36. These results are

400 With the same sample of children with clinically ele- 401
 402 vated depressive symptoms but considering bullying 403
 404 behaviors as an outcome, once again only stress ($\beta = .23$) 405
 406 and trait aggression ($\beta = .28$) were predictive of bullying 407
 408 behaviors. Neither exposure to video game violence nor the 409
 410 interaction between exposure to video game violence and 411
 411 trait aggression were predictive of bullying related out-
 comes. The adjusted R^2 for this regression equation was
 .22. These results are presented in Table 2.

With the sample of children with clinically elevated
 attention deficit symptoms and regarding delinquent crim-
 inality, as with the sample of children with clinically

Table 1 Delinquency regression: beta weights and significance of entered variables for adolescents with clinical elevated depressive symptoms

Variable	β	95 % confidence interval	<i>t</i> test	Significance
Gender	.06		0.92	.36
Parental involvement	-.01		-0.05	.96
Stress	.30	(.19, .40)	4.73	.001*
Family/peer support	-.07		-0.96	.34
Trait aggression	.42	(.32, .51)	6.08	.001*
VGV	.04		0.55	.59
VGV × trait aggression	.04		0.64	.53

VGV exposure to video game violence

Table 2 Bullying regression: beta weights and significance of entered variables for adolescents with clinical elevated depressive symptoms

Variable	β	95 % confidence interval	<i>t</i> test	Significance
Gender	-.11		-1.74	.14
Parental involvement	-.01		-0.09	.92
Stress	.23	(.12, .34)	3.24	.001*
Family/peer support	-.05		-0.67	.50
Trait aggression	.28	(.17, .38)	3.74	.001*
VGV	-.07		-0.95	.34
VGV × trait aggression	-.02		-0.23	.82

VGV exposure to video game violence

Author Proof

Table 3 Delinquency regression: beta weights and significance of entered variables for adolescents with clinical elevated attention deficit symptoms

Variable	β	95 % Confidence interval	<i>t</i> test	Significance
Gender	.06		0.71	.48
Parental involvement	.06		0.70	.49
Stress	.32	(.18, .44)	4.21	.001*
Family/peer support	-.15		-1.69	.10
Trait aggression	.38	(.25, .50)	4.23	.001*
VGW	.04		0.45	.65
VGW \times trait aggression	.03		0.39	.70

VGW = exposure to video game violence

412 elevated depressive symptoms only stress ($\beta = .32$) and
 413 trait aggression ($\beta = .38$) were predictive of delinquent
 414 criminality. Neither exposure to video game violence nor
 415 the interaction between trait aggression and exposure to
 416 video game violence were predictive of delinquent out-
 417 comes. The adjusted R^2 for this regression equation was
 418 .37. These results are presented in Table 3.

419 Finally, with the sample once again of children with
 420 clinically elevated attention deficit symptoms and with
 421 regards to bullying behavior only trait aggression ($\beta = .41$)
 422 was predictive of bullying behaviors along with the inter-
 423 action between trait aggression and exposure to violent
 424 games did approach significance ($\beta = -.22$) suggesting
 425 that highly trait aggressive children who also played vio-
 426 lent video games were less likely to engage in bullying
 427 behaviors. Exposure to Video game violence was not a
 428 significant predictor of bullying behaviors. The adjusted R^2
 429 for this regression equation was .19. These results are
 430 presented in Table 4.

Table 4 Bullying regression: beta weights and significance of entered variables for adolescents with clinical elevated attention deficit symptoms

Variable	β	95 % confidence interval	<i>t</i> test	Significance
Gender	-.06		-0.61	.54
Parental involvement	.06		0.65	.52
Stress	.12		1.38	.17
Family/peer support	.01		0.02	.99
Trait aggression	.41	(.28, .52)	4.17	.001*
VGW	.06		0.60	.55
VGW \times trait aggression	-.22	(-.08, -.35)	-2.27	.03*

VGW exposure to video game violence

Discussion

432 The 2011 Supreme Court (Brown v EMA 2011) case
 433 seemed to have briefly cooled speculation about video
 434 game violence effects on children. The tragic 2012 shoot-
 435 ing of young children in Newtown, Connecticut by a
 436 20-year-old male reportedly fond of playing violent video
 437 games put the issue back on the front burner (Gun Violence
 438 Prevention Task Force 2013). The consensus from the
 439 government (e.g., Gun Violence Prevention Task Force
 440 2013) seems to have been that current research does not
 441 consistently link exposure to video game violence with
 442 aggression or societal violence, but more research is nec-
 443 essary to assess effects on potentially vulnerable subgroups
 444 of children. The current study is an attempt to fill that gap
 445 by considering correlational violent video game effects in
 446 a sample of youth with clinically elevated mental health
 447 symptoms. Our results did not provide support for the
 448 hypotheses that exposure to violent video games would be
 449 associated with increased delinquency or bullying behav-
 450 iors in children with elevated mental health symptoms.

451 Our results indicated that violent video games were
 452 associated with neither delinquent criminality nor bullying
 453 behaviors in children with either clinically elevated
 454 depressive or attention deficit symptoms. Nor did we find
 455 support for the belief that trait aggression would interact
 456 with video game violence within this sample of youth. That
 457 is a particularly interesting finding given that a combina-
 458 tion of mental health symptoms and long-term aggressive
 459 traits are common elements to attackers who carried out
 460 school shootings (US Secret Service and US Department of
 461 Education 2002). Our results cannot, of course, be gen-
 462 eralized to mass homicides. We do note that our findings
 463 with more general forms of youth violence are similar to
 464 those of the Secret Service report, in that trait aggressive-
 465 ness and stress were risk factors for negative outcomes
 466 where exposure to video game violence was not. The only
 467 exception was our finding that, for children with elevated
 468 attention deficit symptoms, trait aggression and video game
 469 violence interacted in such a way as to predict reduced
 470 bullying. This could be considered some small correla-
 471 tional evidence for a cathartic type effect, although we note
 472 it was for only one of four outcomes and small in effect
 473 size. Thus we caution against overinterpretation of this
 474 result.

475 None of the hypotheses related to video game violence
 476 effects on vulnerable youth were supported. Although this
 477 is only one piece of evidence, this early result does not
 478 support the belief that certain at-risk populations of youth,
 479 at least related to clinically elevated depression and
 480 attention deficit symptoms and trait aggression, demon-
 481 strate negative associations between violent video games
 482 and aggression related outcomes. It may be that the

483 influence of media is simply too distal to impact children,
484 even those with mental health symptoms. We do note that
485 our results do not rule out motivational models of media
486 use, wherein effects are driven by user motivations rather
487 than automatic modeling of content. However, we found
488 little evidence to support beliefs in reliable probabilistic
489 models of automatic media modeling of violence in chil-
490 dren with elevated depressive or attention deficit
491 symptoms.

492 We note that our results differ from those of Patrick
493 Markey (Giumetti and Markey 2007; Markey and Markey
494 2010; Markey and Scherer 2009). There are several pos-
495 sible explanations for the differing results. For example,
496 Markey's work considered hostile feelings in the short term
497 as outcome. It may be that such feelings do not persist or
498 do not extend to actual violent behavior. Markey's work
499 also examined college students, whereas ours look at
500 youth. Differences between laboratory-based work and
501 correlational work also may help explain the differences in
502 findings.

503 **Developmental and Theoretical Perspectives**

504 Across youth and across outcomes, the current level of
505 stress and trait aggression were the most consistent pre-
506 dictors of negative outcomes in youth. These results are
507 consistent with a model of aggression known as the Cata-
508 lyst Model, which is basically a diathesis stress model of
509 violence (Ferguson et al. 2008). Although we did not
510 specifically set out to test the Catalyst Model, our results
511 are a good fit for this theory's predictions that violence is
512 the product of crystallized personality traits coupled with
513 stressful triggers from the environment.

514 From a developmental perspective, the Catalyst Model
515 suggests that such personality traits results from a combi-
516 nation of genetic propensity coupled with harsh upbringing,
517 although these were variables beyond our current
518 dataset. However, the Catalyst Model generally assumes
519 that exposure to media violence is a normative rather than
520 deviant experience (see also Olson 2010). This may differ
521 from the perspective of many commentators concerned
522 about harmful media influences. For instance, much
523 attention has focused on whether Adam Lanza (the New-
524 town, Connecticut shooter) had significant exposure to
525 violent video games (e.g. Henderson 2012). It is worth
526 noting that, statistically speaking, it would be more unusual
527 if he did *not* play violent video games, given that the
528 majority of youth and young men play such games at least
529 occasionally (Lenhart et al. 2008; Olson et al. 2007). Thus,
530 it may be a mistake to take the perspective that exposure to
531 violent video games or other media is a developmentally
532 abnormal experience. Our results support that generally

533 accepted thinking, even for children with elevated mental
534 health systems, may need to be changed.

535 The Catalyst Model has the advantage of acknowledging
536 that not all learning opportunities are equal. That is to say,
537 proximal influences, such as family environment, are
538 considered to have a greater impact than distal influences,
539 such as electronic media. We believe that this is superior to
540 traditional social cognitive models of aggression that
541 equate all learning opportunities and thus lack nuance and
542 an acknowledgement of developmental trends in which
543 children are known to process different sources of infor-
544 mation differently (Woolley and Van Reet 2006). The
545 Catalyst Model also relies less on the assumption that
546 aggressive cognitions and behaviors are based primarily on
547 cognitive aggressive scripts, which does not appear to be an
548 effective approach to understanding serious aggression.
549 The Catalyst Model fits best with our observations of stress
550 and trait aggression as the primary predictors of delin-
551 quency and bullying in youth, although as a correlational
552 study our findings can not address the causal assumptions
553 of the Catalyst Model.

554 In addition to looking at violence from more of a
555 diathesis-stress approach, there may be value in viewing
556 media use from more of a motivational perspective, such as
557 the uses and gratifications approach (Sherry et al. 2006) or
558 Self-Determination Theory (Przybylski et al. 2010; Ryan
559 et al. 2006). These theoretical approaches have in common
560 the value of taking the user experience as a primary driving
561 factor of the relationship between the user and media,
562 rather than presuming that content drives the relationship.
563 In the typical "hypodermic needle model" of media
564 effects, effects are traditionally conceptualized as Stimu-
565 lus/Response, or perhaps Stimulus/Organism/Response if
566 the individual is considered as a moderating variable (see
567 Ferguson and Dyck 2012 for discussion). There may be
568 greater value in considering the relationship from more of
569 an Organism/Stimulus/Response arrangement, with the
570 organism rather than the stimulus as the primary driving
571 force of the relationship between media and behavior. That
572 is to say, individuals may select certain kinds of media in
573 order meet needs they have or reach desired emotional
574 states. Even specific forms of media may have idiosyn-
575 cratic effects on users dependent upon how they consume
576 and process media.

577 **Limitations and Conclusions**

578 As with all studies, ours has limitations that are important
579 to consider. First, our sample includes children with mental
580 health symptoms above clinical cut-off points on a vali-
581 dated screening tool, but screening results do not constitute
582 official diagnoses of mental health disorders. Further,

583 although we considered mental health and trait aggression,
 584 it is possible that other issues may place some children in
 585 vulnerable populations that we did not identify. Our study
 586 involves concurrent correlational data; thus, it is not pos-
 587 sible to make causal inferences or to test the directionality
 588 of observed relationships. Reliabilities of the stress and
 589 parental involvement scales were also lower than ideal.
 590 These two scales appear to tap into a broad array of issues,
 591 which may explain this result; future researchers may wish
 592 to consider more narrowly constructed scales. Lastly,
 593 although our delinquency scale was compiled from existing
 594 well-validated scales, it would be valuable to see our
 595 results replicated using clinical outcomes such as the Child
 596 Behavior Checklist or criminological outcomes such as the
 597 Negative Life Events scale (Paternoster and Mazerolle
 598 1994).

599 Our results suggest that the association between violent
 600 video games and aggression related outcomes in children,
 601 even those with clinically elevated mental health symp-
 602 toms, may be minimal. Our research contributes to the field
 603 of youth and media by providing evidence that a timely,
 604 policy-relevant, and seemingly reasonable hypothesis—
 605 that mentally vulnerable children may be particularly
 606 influenced by violent video games—does not appear to be
 607 well supported. However, more research on this popula-
 608 tion, and on others likely to be at increased risk (such as
 609 children exposed to violence in their homes or neighbor-
 610 hoods), is needed to guide parents, health professionals and
 611 policymakers. It may be valuable for future researchers to
 612 consider alternate models of youth's media use, particu-
 613 larly those that focus on motivational models in which
 614 users, rather than content, drive experiences. Content-based
 615 theoretical models do not appear to be sufficient for a
 616 sophisticated understanding of media use and effects.

617 A Word of Caution

618 Scholarship produced in the emotional and politicized
 619 environment that follows a national tragedy (see Ferguson
 620 2013) can give the appearance of a “wag the dog” effect,
 621 with research commissioned based upon, and then used to
 622 support, an a priori political agenda. As Hall et al. (2011)
 623 noted in their article on the Supreme Court and video
 624 games, a rush to judgment grounded in legislators' inter-
 625 pretations of “unsettled science” may damage the credi-
 626 bility of the scientific process. Scholars would be wise to
 627 proceed carefully, with close attention to sound method-
 628 ology and discussion of limitations, as they design and
 629 conduct the next wave of studies. Studies which move
 630 beyond traditional social cognitive automatic processes to
 631 consider how youth select, interpret and involve media in
 632 their identity development as active consumers of media
 633 would be of particularly high value.

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 paper and wrote the initial draft. CO collected the data and contributed
 to revising drafts of this paper. Both authors participated equally in
 conceiving and designing the analyses. Both authors read and
 approved of the final manuscript.

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Author Biographies

Dr. Christopher J. Ferguson is associate professor and department
880 chair at Stetson University. His research interests focus on media
881 effects on children and adolescents, particularly violent media, and
882 thin images on body dissatisfaction. 883
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Dr. Cheryl K. Olson is currently working as a consultant. Her
885 research interests have focused on public health and policy related to
886 media issues. 887
888