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With a rebel yell: Video gamers' responses to mass shooting moral panics

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Abstract
When a moral panic happens, society believes that a group of people and/or their behaviour is responsible for a threat to society – without any evidentiary basis. How does the target group respond? In the video game context, gamers may fear that their pastime will be blamed for mass shootings leading to social stigma. Group members so threatened are hypothesized to react to protect their group identity. This leads to increased engagement in the activity under threat. In contrast, disasters that do not threaten the group would not affect the amount of video game play. We test these hypotheses by relating the amount of game play to incidents of mass shootings and non-shooting disasters for a large sample of individuals ($N = 170,000$). Incidents of mass shootings that threaten the gamer community lead to increases in game playing while incidents of other disasters unrelated to gaming divert time away from gaming.

Keywords
Aggression, defensive reactions, moral panic, playing time, video games

The names of Columbine, Sandy Hook and Parkland, all evoke memories of horrendous events. These may be the most prominent of the mass shootings in the United States, but mass shootings have also occurred with seeming regularity and outside the United States.

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These events occur often enough that the news media almost have a formula for their coverage (Harris, 2018). Scheduled coverage will be interrupted with 'breaking news' about the facts of the event for a day or two, as they become known. After the initial news, stories eulogize the victims, survivors retell the events they witnessed, and, when possible, the praise is offered for individual acts of heroism. Finally, some discussion of policy changes to reduce these occurrences, especially gun policy, will garner some attention (Kain, 2018). For a week or so, social media will be filled with posts of these stories with posters sending 'thoughts and prayers'.

Mass shootings have the potential to traumatize society (Lowe and Galea, 2017). Questions of whom or what can be held responsible for such terrible incidents arise. Next to gun proliferation, video games – especially violent video games – are mentioned as a leading cause of mass shootings. For example, the two boys who murdered 12 students and a teacher at Columbine High School on 20 April 1999 enjoyed playing the then popular games, especially *Doom* and *Quake* (Campbel, 2018). The 14-year-old perpetrator of the Heath High School shooting on 1 December 1997 also enjoyed video games. President Trump recently singled out video games as a responsible causal factor for mass shootings (Kain, 2018). This claim is made despite only 4 of the 33 school shooters between 1980 and 2014 being fans of video games (Campbel, 2018).

Not surprisingly, video game communities strictly distance themselves from mass shootings or any real-life aggression. They claim that finger-pointing is by the older generation, who have experience different (media-) socialization, and who simply 'do not know what they are talking about'. Interestingly, both hard-core players and their non-video game playing peers deny any relation between games and real-life aggression (Przybylski, 2014). Being part of the digital native generation means that video games are just seen as a normal free time activity (Tapscott, 2008).

Studies on this generation gap seem to mirror similar defensive reactions of the player communities and same-aged peers: Perceptions of video games and their effects have been found to be strongly influenced by own game experience and age among students (Ivory and Kalyanaraman, 2009), the general public (Przybylski, 2014) and among scholars (Ferguson and Colwell, 2015, 2017). Even the perception of game play motivations was found to depend on playing expertise and age (Kneer et al., 2019). These studies point to how games, their players and playing motivations are perceived by players and non-players and how they differ between generations and own playing experience. However, these studies are based on quasi-experimental designs and that are far from real-life experiences (Eastin and Griffiths, 2009; Ferguson et al., 2008b).

What happens to players in case of a mass shooting? Does the relationship presented between game playing and mass shooting by the media lead to a change in playing behaviour after a mass shooting took place? The studies and results mentioned above cannot answer the question if non-players are biased or if players turn defensive and reactive if primed with games and thus, with related negative images that are portrayed in society. In case that players react due to defensive mechanisms, as proposed by some studies (Kneer et al., 2012a, 2012b), this should also be visible in their real-life playing behaviours when games are accused of causing appalling events like mass shootings.

RQ: To what extent does game playing behaviour change due to a mass shooting?

Moral panic concerning video games and its effects on digital natives

Video game play can still be described as an activity predominately enjoyed by a *young* group, typically those in their teens and twenties (Olson, 2010). One's own experience as a digital native might guide the perceptions of games, players, playing motivations and possible effects (Elson et al., 2014a; Ivory and Kalyanaraman, 2009; Kneer et al., 2012a; Przybylski, 2014). Video games are still often claimed to be the cause of many unwanted behaviours such as aggressive tendencies and even to be responsible for mass shootings (Ferguson, 2008).

Research in the field of games and real-life aggression is still more than ambivalent and results are not clear (Ferguson and Konijn, 2015). While some scholars have called for imposing restrictions, or even a ban, on many video games (Arriaga et al., 2015; Ellithorpe et al., 2015), others claim the science does not support these interventions (Cunningham et al., 2016). Most early results regarding influences on aggression found that aggression increased with violent video game play (e.g. Anderson and Dill, 2000). However, the interpretation of these results is difficult, starting with the questionable measurement of aggression in such video game studies (Elson et al., 2014c; Ivory et al., 2015). Around 2008, the majority of studies failed to find a games to aggression link (e.g. Elson et al., 2014b; Ferguson et al., 2008a; Ivory and Kalyanaraman, 2009).

Blame for mass shootings resulted in moral panic regarding games. Moral panic can be defined as the process of an arising societal issue mostly caused by moral driven entrepreneurs and/or mass media (Scott, 2014). Goode and Ben-Yehuda (1994) describe five criteria that characterize moral panic: (1) *Concern*, there must be a certain concern against a group or behaviour of a group that is perceived to have negative outcomes for society. In case of violent video games, there is a concern that playing them will cause aggression within the player. (2) *Hostility*, there must be an increased level of hostility against the group of persons who show this behaviour; meaning in case of video games against the players. (3) *Consensus*, meaning that at least parts of society agree that the target behaviour is a threat, thus, playing video games is believed to cause aggression by at least sections society. (4) *Disproportionality*, the concern about the threat to society is not in line with reality. As argued above, research has indicated that the link from video games to aggression, if it exists, is so weak, that it is negligible. (5) *Volatility*, moral panics suddenly appear and quickly disappear, however, they can remain latent for long periods of times. The idea that video games are responsible for mass shootings often emerges quickly after a shooting, and then also subsides quickly. Moral panic regarding video games enhances the negative stereotypes and attitudes towards this pastime, primarily among those who have no direct contact with video games, that is, older generations without playing expertise (Ferguson, 2008; Markey and Ferguson, 2017).

Past research supports the idea that age and playing experience impact views about the effects of video games and, thus, about who is *part* and who is *threatened* by a moral panic concerning video games. Ivory and Kalyanaraman (2009) showed that beliefs about video game effects decreased when a person considered concrete examples of games they themselves have played. This speaks for the impact of expertise on the perception of game effects. Playing experience together with age have an impact on perception of video game effects with less experienced, older people holding significantly more negative attitudes towards games (Przybylski, 2014). Other studies found similar results for therapists working with minors (Ferguson, 2015) and with scholars (Ferguson and Colwell, 2017). Study participants who were confronted with common beliefs about the danger of games showed defensive reactions (Kneer et al., 2012b). Both players and young non-players tended to defend video games by suppressing negative associations such as ‘aggression’ and activating positive links such as ‘fun’ (Kneer et al., 2012a). All of these findings support the idea that digital natives, with and without playing knowledge, experience a threat when video games are blamed for anti-social behaviours. This may be a result of moral panic created by mass media (Markey and Ferguson, 2017). However, all of the studies mentioned above have the same issue: conclusions concerning protective and reactive behaviour are drawn from experimental settings and are not derived from real-life events. If moral panic concerning video games is already affecting studies that had mostly (quasi-) experimental design structures, what is happening to actual gamer communities? Or to put it more concretely, how is playing behaviour affected in the case of a mass shooting event?

Video games as media choice after mass shootings and other disasters

A reaction towards moral panic concerning video games might be increased video game play due to defensive reaction processes. Media coverage concerning mass shootings mostly include links to violent video games (Ferguson and Kilburn, 2009; Markey and Ferguson, 2017) which leads to a *social identity threat*. Being a gamer is part of one’s social identity (De Grove et al., 2015; Lynch et al., 2016), thus, a threat to this group by linking video games to aggression and mass shootings results in a social identity threat (Steele et al., 2002). Threats to social identity are known to cause defensive mechanism and reactance behaviour (Steindl et al., 2015). This was also found to happen for the gaming community (Ivory and Kalyanaraman, 2009; Kneer et al., 2012a; Przybylski, 2014). Increased playing time for players might be protective and defensive reactions, but *only* when the link between the disaster and video games is portrayed in mass media. Thus, disasters other than mass shootings do not cause a social identity threat and, thus, should not cause players to increase their video game play while mass shootings should due to defensive reactions of the player community.

Mood management theory (MMT) postulates that persons turn to media to improve or stabilize their mood (Knobloch-Westerwick, 2006; Zillmann and Bryant, 1985). Media content can help to recover from bad mood and stress by either *distracting* from the negative emotional state or by *addressing* the negative mood itself via mood repair (Rieger et al., 2014). Mood repair is described as physiological homeostasis restoration (e.g. in case of boredom, exciting media content will be chosen to increase psychophysiological arousal and vice versa for stress feelings) and distraction from the negative cause is seen as intervention process. Video games have been found to have higher potential for mood management compared with non-interactive media such as movies (Rieger et al., 2014). Again, these studies were mainly conducted in laboratories and did not investigate real-life media choices. It is clear that media is chosen based on one’s experience, needs and gratifications (Oliver and Bartsch, 2010; Quandt, 2018; Tamborini et al., 2012). When someone is already a video game player, he or she tends to turn to games in order to recover from negative states, while a non-player would chose different media for mood management (Klimmt and Hartmann, 2006; Scharkow et al., 2015). If game playing time is increasing due to noxious mood caused by negative events, MMT argues that only players would turn to video games due to their intuitive idea that game play will help to recover from the negative state (Bowman and Tamborini, 2012; Elson et al., 2014a). This should be the case for *any* negative events, not only media coverage on mass shootings. Thus, any terrible news should lead to a negative state such as sadness and frustration and thus, to an increase of video game play for players as well in order to repair their – in this case media induced – negative mood.

In sum, two distinct hypotheses can be stated. The defensive reaction argument: (H1) Video playing time increases for players only and only if disasters are linked to video games. The MMT argument: (H2) Video playing time increases after disasters but only for players. To investigate if, when and for whom video playing time increases, real-life data need to be analysed.

Method

Data collection

The analysis exploits three main data sources. We obtain daily duration of video game playing time from a representative sample of over 160,000 US residents spanning 2003 to 2016. These are matched with information on incidents of specific mass shootings and to multiple fatality non-shooting accidents and disasters. From a methodological point-of-view, the analysis takes advantage of mass shootings, accidents and disasters occurring randomly making them natural experiments. That is, the individuals selected to be interviewed about their video game playing are independent from the events. This aids in identifying that the relationship is not caused by confounding factors that differ across individuals.

The data on time spent playing games come from the American Time Use Survey (ATUS) in which US residents are asked to complete a time use diary for a 24-hour period. Activities in the diary can be related to work, shopping, child rearing, eldercare, recreational activities and so on. A growing literature that is based on time use data tackles many disparate subjects. For example, these include: how inclement weather affects leisure time (Connolly, 2008), how time spent shopping affects retail expenditures (Aguiar & Hurst, 2007) and how family structure affects the time mothers and fathers spend on child care (Kalenkoski et al., 2007).

For the period from 2003 to 2016, the ATUS includes complete diaries of a total of nearly 170,000 respondents' time use over a given 24-hour period. Data are collected for every day within this period with an average of 33 complete diaries on each day. The ATUS includes over 400 separate possible categories of activities on which respondents' classify their time use over a single day, one of which is time spent playing games. While the ATUS category of 'Playing games' is broader than playing video games, there is evidence that it predominately represents video game playing (Ward, 2018). This category is primarily selected by teens and young adults and is distinct from sports and computer use. Of the 169,246 observations, a total of 14,706 report to have played a game on their diary day and averaged 2.1 hours of game playing time.

Video game playing differs by individual demographic characteristics and across time periods (Ward, 2010). Certain sub-populations play video games more, for example, males and the young. Also, video game play increases on weekends, during holiday periods and has grown over time. These effects could be confounding factors. We develop tests for video game playing being affected by shootings and disasters above and beyond differences resulting from demographic characteristics. The ATUS draws a representative sample from the Current Population Survey (CPS). This enables us to merge demographic characteristics of the individuals found in the CPS with time use information in ATUS. In particular, we obtain information about the sex, race, age, household income, education level, marital status and household size of each individual. From the diary date, we can construct variables reflecting the day-of-week, the week-of-year and the year. Summary statistics for these variables are reported in Table 1.

Incidents of mass shootings in the United States are found in the Stanford Mass Shooting in America (MSA) database. The MSA began in 2012 as a single repository of information on mass shooting information gleaned from online news sources. Entries are back filled and include incidents as far back as 1966 but the MSA was discontinued in 2016. To be included, an event had to have three or more victims not including the shooter and it had to have been reported on by at least three corroborating online news sources. Over the 2003 to 2016 period spanning the ATUS data, the MSA database includes 250 mass shooting events, with 1739 victims. A total of 927 of these victims lost their lives due to the injuries they sustained. However, the data do not purport to be comprehensive. They need not be comprehensive for the purposes of this study; the events merely need to represent a natural experiment in that potential gamers surveyed by the ATUS are chosen independently from the events. Besides the date of the event, the MSA contains information on the number of fatalities and the number of victims. More fatalities and victims represent stronger stimuli that are expected to generate a larger behavioural response.

Non-shooting accident and disaster information were compiled from Wikipedia. The webpage ‘List of disasters in the United States by death toll’ reports the date of the events and the number of fatalities by type of event including bus crashes, fires and floods (Wikipedia, 2019). Additional Wikipedia pages list fatalities for tornadoes and hurricanes. A total of 156 fatal accidents and disasters in the United States are reported during the 2004 to 2016 time period that took a total of about 8000 lives.[1] The most deadly was the hurricane Jeanne making landfall in Florida on 25 September 2004 and claiming 3037 lives. Table 2 provides some summary statistics for these events.

Empirical model

The empirical model relates time spent playing video games to information regarding deaths from either mass shooting events or disaster events. The video game playing regression is specified as

Table 1. Demographic characteristics from ATUS 2004–2016 sample.

Variable	Average (%)
Female	56.3
Male	43.7
Age 15–18	5.7
Age 19–22	3.3
Age 23–26	4.5
Age 27–30	6.3
Age 31 +	80.2
Income missing	7.6
Income < US$15 K	12.8
Income US$15 K–US$30 K	15.7
Income US$30–US$50 K	19.2
Income US$50–US$75 K	17.4
Income >US$75 K	27.2
White	69.0
Black	14.0
Asian	3.5
Hispanic	13.5
Household size 1	25.0
Household sizes 2–4	44.1
Household size > 4	30.8
Sunday	25.6
Monday	10.1
Tuesday	10.0
Wednesday	10.1
Thursday	9.8
Friday	9.8
Saturday	24.6

ATUS: American Time Use Survey.
From sample of 169,246 ATUS diarists.

$$VG\ time_{it} = \sum_{\tau=-3}^{3} \rho_\tau event_{\tau,t} + \beta X_i + \lambda X_t + \varepsilon_{it}$$

where *event* is alternatively the number of fatalities for a mass shooting event or disaster or the total number of victims. More horrific events elicit more media attention and engender a stronger reaction among individuals. Accordingly, it is hypothesized that the reaction will be larger for events with more fatalities and more overall victims. These enter the regression specification each of the 3 weeks prior to each event as leads and each of the 3 weeks after the event as lags. The lags allow for a flexible specification of the speed at which gamers incorporate news into their decisions and then how fast its effect dissipates. The leads represent a falsification test as events yet to occur should

Table 2. Summary information about major US fatality events from 2002 to 2016.

Type	Events	Fatalities
Mass shootings	250	927
Major non-shooting disasters		
Aircraft crash	2	99
Hot air balloon	1	16
Blizzard	3	112
Bus crash	2	32
Explosion	3	59
Fire	3	70
Flood	4	117
Hurricane	28	6481
Railroad	1	26
Shipwreck	1	20
Tornado	108	1207
Total non-shooting disasters	156	8239

Mass shooting from: https://library.stanford.edu/projects/mass-shootings-america.
Hurricanes from: https://en.wikipedia.org/wiki/List_of_United_States_hurricanes.
Tornadoes from: https://en.wikipedia.org/wiki/List_of_North_American_tornadoes_and_tornado_outbreaks.
Others from: https://en.wikipedia.org/wiki/List_of_disasters_in_the_United_States_by_death_toll.

have no effect on video game playing. The *VG time* variable is the number of minutes of game play from ATUS.

The control variables, X_i and X_t, refer to demographic characteristics of the individual observation and information about the time period. Prior research has noted large differences in the amount of video game playing by demographic characteristics as well as regular seasonality patterns and a general trend upwards (Ward, 2018). Since mass shooting and disaster events appear to occur randomly, they should not be correlated with the demographic characteristics of the week's ATUS sample and so should not generate omitted variable bias. Nevertheless, we include demographic information on the off chance that they would. Video game playing tends to increase during holidays and weekends. To capture common seasonality effects, time period information is included in the form of fixed effects for each week-of-year and each day-of-week. These could be related to mass shootings because shooters may also be affected by seasonal cycles.

Sample

The ATUS sample includes 169,246 observations spanning each day from 2003 to 2016. Each observation records the individual's time allocation over a day including the time spent playing games. The time spent playing games excludes participating in sports but includes games other than just video games. A total of 14,706 individuals in the ATUS, about 9%, report having played a game that day with gaming activity concentrated mostly among those aged under 30 and also among those aged over 65. Few of the latter group are playing video games as their game playing is not correlated with video game sales (Ward, 2018). The remaining 154,540 individuals recorded no game playing time on their diary day leading the data to be severely censored at zero. The Tobit estimator was developed for the case of censored data. Rather than trying to predict negative duration values as with the standard multivariate regression, the Tobit estimator instead allows for a probability mass at zero (Tobin, 1958).

Results

Table 3 reports the regression results for both mass shooting fatalities and victims as the stimulus for a change in the amount of video game playing. While not reported, all specifications also include dummy variables for day-of-week and week-of-year and a yearly trend. Unreported estimates confirm that there are significant seasonality effects both throughout the year and over the week. There is also a significant positive annual trend in game playing as video games gained popularity over this period. Columns (3) and (4) also include, but do not report, the demographic variables found in Table 1. The estimates indicate game playing time is significantly higher for males, for the young, for lower to middle incomes, for Whites and for larger households. However, the similarity between the coefficients for the mass shooting variables between Columns (1) and (2) and (3) and (4) indicate that these are largely uncorrelated with mass shootings.[2]

A common pattern emerges across all these specifications. As expected, there is no apparent increase in video game playing in the weeks leading up to a mass shooting. However, video game playing increases significantly in the week following a mass shooting. Moreover, these effects are not small. Each mass shooting fatality increases average video game playing by almost 1 minute. Since the average ATUS respondent played for 11.25 minutes per day, this represents about an 8% increase in time spent playing video games for each mass shooting fatality. Since only 9% of the ATUS sample plays video games on their diary day, among those who played video games, playing time increased by about 11 minutes from an average of 125 minutes.

Table 4 reports the results for the deaths from non-shooting-related US accidents and disasters as opposed to deaths from mass shootings. The empirical specification is identical to that for mass shootings. These yield the same pattern for demographic characteristics and seasonality. Again, time spent playing video games is unrelated to events yet to occur, but is related to events that occurred in the same week. These events result in a small but significant increase in time spent playing video games during the week of the disaster. Each non-shooting fatality increases time spent playing video games by slightly more than 1 second per day on average or by 0.15%. Among those who played video games, playing time increased by 0.19 minutes from the average of 125 minutes.

The response to shooting fatalities is considerably larger than the response to non-shooting fatalities. On a per-fatality basis, the video game playing response is 60 times as large for shootings than non-shooting-related disasters. However, non-shooting events average 63.8 fatalities each, while shooting-related events average 4.5 fatalities. On a per-incident basis, mass shootings result in 4.2 additional minutes versus 1.1 additional minutes for non-shooting incidents, $F(1, 17{,}6196) = 4.33$, $p = .037$. Even on a per-incident basis, the response to shooting fatalities is about four times that of non-shootings.

Table 3. Tobit estimates of the effect of mass shootings on video games playing.

	Fatalities	Victims	Fatalities	Victims
			With demographic controls	
Three weeks lead	0.141	–0.158	0.087	–0.162
	(0.318)	(0.178)	(0.310)	(0.174)
Two weeks lead	–0.577*	0.040	–0.472	0.072
	(0.328)	(0.177)	(0.320)	(0.172)
One week lead	0.235	0.132	0.167	0.073
	(0.306)	(0.164)	(0.299)	(0.161)
Week of event	–0.168	–0.263	–0.238	–0.276
	(0.320)	(0.177)	(0.311)	(0.173)
One week lag	0.952***	0.384**	0.943***	0.425**
	(0.318)	(0.175)	(0.310)	(0.170)
Two weeks lag	0.504	0.101	0.483	0.087
	(0.318)	(0.180)	(0.310)	(0.175)
Three weeks lag	–0.103	0.220	–0.013	0.231
	(0.360)	(0.200)	(0.351)	(0.194)
Day-of-week fixed effect	Sign.	Sign.	Sign.	Sign.
Week-of-year fixed effect	Sign.	Sign.	Sign.	Sign.
Year trend	Sign.	Sign.	Sign.	Sign.
Demographic controls			Sign.	Sign.
Observations	169,246	169,246	169,246	169,246
Log likelihood	–135,637.08	–135,639.60	–133,677.00	–133,678.38

Standard errors in parentheses. While individual coefficients are not reported, all specifications include a yearly time trend, day-of-week dummy variables and week-of-year dummy variables. Columns (3) and (4) also include controls for sex, race, age, household income, education level, marital status and household size. These controls generally have significant effects on video game playing time.
*$p < .1$, **$p < .05$.

Finally, Table 5 reports estimates separately for those who are digital natives and those who are not. In this case, digital natives are defined as those born after 1980. Both digital natives and non-natives respond to mass shooting fatalities by playing more video games. Digital natives also respond more to incidents with more victims as well as more fatalities. This is not reported in Table 5 as victim data as not available for non-shooting events. However, the response to a fatality by digital natives is twice as large, 1.7 versus 0.78 minutes. For non-shooting fatalities, the video game playing response is concentrated solely within digital natives.

Discussion

The debate about video games as cause for mass shootings is not new but is ongoing. The recent meta-analysis from Mathur and vanderWeele (2019) showed tiny effects, however, even their analysis seems to dramatize their findings (Drummond and Sauer, 2019). From this debate and findings from studies on the perception of video game play (Kneer

Table 4. Tobit estimates of the effect of non-shooting disasters on video games playing.

	Fatalities	Fatalities With demographic controls
Three weeks lead	0.016*	0.016*
	(0.009)	(0.009)
Two weeks lead	–0.007	–0.006
	(0.009)	(0.009)
One week lead	0.016	0.012
	(0.011)	(0.010)
Week of event	0.017**	0.017**
	(0.009)	(0.009)
One week lag	–0.000	–0.001
	(0.009)	(0.009)
Two weeks lag	0.006	0.005
	(0.009)	(0.008)
Three weeks lag	–0.008	–0.009
Day-of-week fixed effect	Sign.	Sign.
Week-of-year fixed effect	Sign.	Sign.
Year trend	Sign.	Sign.
Demographic controls		Sign.
Observations	176,268	176,268
Log likelihood	–141,465.44	–139,443.22

Standard errors in parentheses. While individual coefficients are not reported, all specifications include a yearly time trend, day-of-week dummy variables and week-of-year dummy variables. Column (2) also includes controls for sex, race, age, household income, education level, marital status and household size. These controls generally have significant effects on video game playing time.
$^{*}p < .1$, $^{**}p < .05$.

et al., 2019) we know, that the target group – video game players – show defensive reactions when it comes to their free time activity in laboratory studies. Still, there are no studies of what happens to players after they become target of such moral panics in real life. We argued that players increase their playtime due to protective reactions as a result of a threat to their social identity. These defensive mechanisms only occur if players became target by a moral panic, thus, increased playing time should *only* occur after a mass shooting but *not* after a non-mass shooting. According to MMT, after horrible incidents, the coverage in mass media is strong enough that the audience needs to recover from negative feelings induced by this media coverage. In that case, players would turn to video games as their intuitive media choice. While in contrast, non-players would not start playing video games as they do not have any positive expectations with that free time activity. Based on MMT, this increased playing time for players should happen after *any* incident: mass shootings or non-mass shootings.

To test these two distinct hypotheses, we analysed data from the ATUS sample. We found that players indeed increase their playing time *after* both mass shootings and non-shooting-related accidents. However, the reactions to mass shooting events were much

Table 5. Tobit estimates of the effect of fatalities on video games playing by year of birth.

	Shooting fatalities		Non-shooting fatalities	
	Born 1980+	Born < 1980	Born 1980+	Born < 1980
Three weeks lead	0.095	0.100	0.011	0.016*
	(0.685)	(0.368)	(0.025)	(0.009)
Two weeks lead	–1.191	–0.441	–0.007	–0.007
	(0.752)	(0.372)	(0.024)	(0.010)
One week lead	0.051	0.270	0.015	0.015
	(0.661)	(0.353)	(0.025)	(0.011)
Week of event	0.226	–0.323	0.054**	0.008
	(0.694)	(0.369)	(0.022)	(0.010)
One week lag	1.701**	0.779**	0.002	0.000
	(0.707)	(0.365)	(0.023)	(0.010)
Two weeks lag	0.644	0.483	–0.003	0.008
	(0.694)	(0.368)	(0.023)	(0.009)
Three weeks lag	0.410	–0.240	–0.003	–0.009
	(0.732)	(0.384)	(0.024)	(0.011)
Day-of-week fixed effect	Sign.	Sign.	Sign.	Sign.
Week-of-year fixed effect	Sign.	Sign.	Sign.	Sign.
Year trend	Sign.	Sign.	Sign.	Sign.
Observations	30,264	146,004	30,264	146,004
Log likelihood	–39,434.9	–238,298.1	–39,436.3	–238,297.9

Standard errors in parentheses. While individual coefficients are not reported, all specifications include a yearly time trend, day-of-week dummy variables and week-of-year dummy variables.
*$p < .1$, **$p < .05$.

larger than after non-mass shootings events. The non-shooting response is consistent with MMT while the larger response to mass shootings is consistent with a defensive reaction in addition to MMT. This finding supports results from (quasi-) experimental studies concerning defensive reactions to gamers' social identity threat: (1) When social identity is threatened, reactance of that group is rising (Ivory and Kalyanaraman, 2009; Kneer et al., 2012b; Przybylski, 2014) and (2) playing experience has impact on this defensive mechanism (Kneer et al., 2019). In sum, players show protective reactions when being accused of threatening society by playing 'even more' (Ivory and Kalyanaraman, 2009).

However, non-shooting-related accidents such as hurricanes and tornados increased playing time as well. This is in line with the argument that players turn to video games in case of a noxious mood caused by any negative event (Bowman and Tamborini, 2012; Reinecke et al., 2012; Villani et al., 2018). This would speak for MMT and against defensive reactions. Still, playing time increases 60 times more in case of a mass shooting compared with non-shooting-related accidents. That fatalities are 14 times higher in case of non-shooting-related accidents supports the hypothesis that defensive reactions are also happening after a mass shooting. These differences concerning the impact on increased playing time between mass shooting and non-shooting-related events still speak for protective reactions in the player community. In sum, negative events cause mood states that increases the playing time and additionally, in case of mass shootings, social identity of a player is threatened.

Our analyses have several limitations. While studies about defensive reactions of the gamer community were all based on laboratory or survey approaches, our study took real-life data into account. Still, we have to be careful claiming cause–effect relationships. The playing time data were still assessed via self-assessment and not via recording actual times. Thus, mass shootings and non-shooting-related accidents might have changed the *perception* instead of the actual playing time. This approach would need a close collaboration with the gaming industry to track the actual gaming times.

From the ATUS data, it is not clear which genre of games were played. Our defensive reaction hypothesis would suggest an increase in violent games, however, we cannot answer this question with this data set. In addition, the increase in playtime was large but the affected population was small. The idea that moral panic leads to an increase of the target behaviour for the in-group needs to be tested for other topics as well (e.g. soccer and hooligans for special soccer clubs, social media and self-perception).

This last limitation is especially important considering that it seems that video games become more and more accepted in society – and even protected from more than just the player's community. The idea that video games are responsible for any aggressive behaviour is subsiding and, as it does, the protective reaction of players may diminish. This can be addressed by applying an analysis of the moral panic criteria. *The concern that video game play has negative outcomes for society will decrease due to a growing gamer community.* While video games are increasingly becoming an everyday part of the lives of children and adolescents (Olson, 2010), the video game community in general is still growing in numbers and also ageing (Williams et al., 2009). Gamers themselves do not need to turn to other sources such as media coverage to assess the effects of video gaming. With a growing number of players and a growing diversity in the playing community, society will become more familiar with this free time activity. *The level of hostility against players will decrease due to an increase in familiarity.* An increase in players and experience with games in society will also lead to an increased understanding about the real (non-) effects of video games. Media coverage already displays less agreement with negative effects of games and thus, the threat towards the player community is decreasing. *The consensus that video games cause real-life aggression is unravelling.* Recent game research is more often finding minimal or even no negative effects of video games concerning aggression (Ferguson and Colwell, 2017; Mathur and VanderWeele, 2019). Mass media follows this development as described in the example. When President Trump indicated that violent video games may have contributed to the mass shootings in El Paso and Dayton in 2019, most media outlets' story lines refuted the claim (Voytko, 2019). *As the consensus grows that video games are no threat, disproportionality between society's belief and reality is decreasing.* In line with the growing acceptance of video games as normal free time activity and the consensus that this past time is not leading to negative outcomes, society's opinion about video game effects falls more and more in line with results from real scientific results. *Volatility will decrease.* While some voices still quickly blame video games for mass shootings other voices immediately and strongly decline any relationship. This development is visible in game research and in public debates about games. In sum, it can be argued that moral panics about video games will diminish as they did for other media such as comic books or rock music (Kneer, 2016; Kneer et al., 2011; Snell and Hodgetts, 2007). Instead of focusing on the negative sides, the views of both researchers and the general society towards video games have turned more *positive* (Reinecke et al., 2012).

Still, moral panics concerning media use will take place for other new(er) media. One of the reasons is that current policy statements that are guided from professional organizations about media effects (e.g. American Psychology Association, American Academy of Pediatrics) tend to dramatize effects which are *not* warranted by underlying science as found by Elson et al. (2019). Such policy statements bare the risk of misinforming the public and causing moral panics when claiming consensus instead of providing information where studies differ or agree on findings. This will bear a threat to other media communities. Whether the reaction of those communities could also result in higher media consumption or has negative implications for the specific group needs to be investigated in future studies.

Conclusion

This study has two main findings: First, players show defensive reactions when video games are blamed. This is not only happening in laboratory studies but after real-life events as well. Second, moral panics cause a social identity threat that leads to reactance for the target group and thus, to an increase in the aimed behaviour. It may no longer be the case that mass media frame video games as a cause for mass shootings, still, the *mere* discussion about it leads to an increase of playing time for players.

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Notes

1. Precise death tolls are not available for all incidents.
2. Let $\rho^{W}_{Fatality}$ be the coefficient with the demographic information included and $\rho^{W/O}_{Fatality}$ be the coefficient without the demographic information. Then $\rho^{W/O}_{Fatality} = \rho^{W}_{Fatality} + \beta_{Demo} \times cov(Fatalities, Demo)$ (Angrist and Pischke, 2009: 59–64). Where demographic information affects gaming, $\beta_{Demo} \neq 0$, the observation that $\rho^{W/O}_{Fatality} \approx \rho^{W}_{Fatality}$ requires that $cov(Fatalities, Demo) \approx 0$.

References

Aguiar M and Hurst E (2007) Life-cycle prices and production. *American Economic Review* 97(5): 1533–1559.

Anderson CA and Dill KE (2000) Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology* 78(4): 772–790.

Angrist JD and Pischke JS (2009) *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Arriaga P, Adrião J, Madeira F, et al. (2015) A 'dry eye' for victims of violence: effects of playing a violent video game on pupillary dilation to victims and on aggressive behavior. *Psychology of Violence* 5(2): 199–208.

Bowman ND and Tamborini R (2012) Task demand and mood repair: the intervention potential of computer games. *New Media & Society* 14(8): 1339–1357.

Campbel C (2018) A brief history of blaming video games for mass murder. *Polygon*, 10 March. Available at: https://www.polygon.com/2018/3/10/17101232/a-brief-history-of-video-game-violence-blame

Connolly M (2008) Here comes the rain again: weather and the intertemporal substitution of leisure. *Journal of Labor Economics* 26(1): 73–100.

Cunningham S, Engelstätter B and Ward MR (2016) Violent video games and violent crime. *Southern Economic Journal* 82(4): 1247–1265.

De Grove F, Courtois C and Van Looy J (2015) How to be a gamer! Exploring personal and social indicators of gamer identity. *Journal of Computer-Mediated Communication* 20(3): 346–361.

Drummond A and Sauer JD (2019) Divergent meta-analyses do not present uniform evidence that violent video game content increases aggressive behaviour. Available at: https://psyarxiv.com/xms5u/

Eastin MS and Griffiths RP (2009) Unreal: hostile expectations from social gameplay. *New Media & Society* 11(4): 509–531.

Ellithorpe ME, Cruz C, Velez JA, et al. (2015) Moral license in video games: when being right can mean doing wrong. *Cyberpsychology, Behavior, and Social Networking* 18(4): 203–207.

Elson M, Breuer J, Ivory JD, et al. (2014a) More than stories with buttons: narrative, mechanics, and context as determinants of player experience in digital games. *Journal of Communication* 64(3): 521–542.

Elson M, Breuer J, Van Looy J, et al. (2014b) Comparing apples and oranges? Evidence for pace of action as a confound in research on violence in digital games. *Psychology in Popular Media and Culture* 4: 112–125.

Elson M, Ferguson CJ, Gregerson M, et al. (2019) Do policy statements on media effects faithfully represent the science? *Advances in Methods and Practices in Psychological Science* 2: 12–25.

Elson M, Mohseni MR, Breuer J, et al. (2014c) Press CRTT to measure aggressive behavior: the unstandardized use of the competitive reaction time task in aggression research. *Psychological Assessment* 26(2): 419–432.

Ferguson CJ (2008) The school shooting/violent video game link: causal link or moral panic? *Journal of Investigative Psychology and Offender Profiling* 5: 25–37.

Ferguson CJ (2015) Clinicians' attitudes toward video games vary as a function of age, gender and negative beliefs about youth: a sociology of media research approach. *Computers in Human Behavior* 52: 379–386.

Ferguson CJ and Colwell J (2015) Scholarly consensus on video game violence effects continues to elude: examining factors related to differing opinions among scholars on whether violent video games cause societal violence. In: *European congress of psychology*, Milan, Italy, 7–10 July.

Ferguson CJ and Colwell J (2017) Understanding why scholars hold different views on the influences of video games on public health. *Journal of Communication* 67: 305–327.

Ferguson CJ and Kilburn J (2009) The public health risks of media violence: a meta-analytic review. *Journal of Pediatrics* 154(5): 759–763.

Ferguson CJ and Konijn EA (2015) She said/he said: a peaceful debate on video game violence. *Psychology of Popular Media Culture* 4: 397–411.

Ferguson CJ, Rueda SM, Cruz AM, et al. (2008a) Violent video games and aggression: causal relationship or byproduct of family violence and intrinsic violence motivation? *Criminal Justice and Behavior* 35(3): 311–332.

Ferguson CJ, Smith S, Miller-Stratton H, et al. (2008b) Aggression in the laboratory: problems with the validity of the modified Taylor Competitive Reaction Time Test as a measure of aggression in media violence studies. *Journal of Aggression, Maltreatment & Trauma* 17(1): 118–132.

Goode E and Ben-Yehuda N (1994) Moral panics: culture, politics, and social construction. *Annual Review of Sociology* 20: 149–171.

Harris A (2018) The media's week-long attention span for a mass shooting. *The Atlantic*, 22 November. Available at: https://www.theatlantic.com/education/archive/2018/11/how-long-does-media-cover-mass-shootings/575926/

Ivory JD and Kalyanaraman S (2009) Video games make people violent – well, maybe not that game: effects of content and person abstraction on perceptions of violent video games' effects and support of censorship. *Communication Reports* 22(1): 1–12.

Ivory JD, Markey PM, Elson M, et al. (2015) Manufacturing consensus in a diverse field of scholarly opinions: a comment on Bushman, Gollwitzer, and Cruz (2015). *Psychology of Popular Media Culture* 4: 222–229.

Kain E (2018) Trump blames violent video games for school shootings – here's why he's wrong. *Forbes*, 22 February. Available at: https://www.forbes.com/sites/erikkain/2018/02/22/trump-blames-violent-video-games-for-school-shootings-heres-why-hes-wrong/#36a3aabf67f3

Kalenkoski CM, Ribar DC and Stratton LS (2007) The effect of family structure on parents' child care time in the United States and the United Kingdom. *Review of Economics of the Household* 5(4): 353–384.

Klimmt C and Hartmann T (2006) Effectance, self-efficacy, and the motivation to play video games. In: Vorderer P and Bryant J (eds) *Playing Video Games: Motives, Responses, and Consequences*. Mahwah, NJ: Lawrence Erlbaum, pp. 133–145.

Kneer J (2016) Are we evil? Yes we are – but at least not crazy! How to test implicit associations of fans and non-fans with metal music. *Metal Music Studies* 2(1): 69–86.

Kneer J, Glock S, Beskes S, et al. (2012a) Are digital games perceived as fun or danger? Supporting and suppressing different game-related concepts. *Cyberpsychology, Behavior, and Social Networking* 15(11): 604–609.

Kneer J, Jacobs R and Ferguson CJ (2019) You could have just asked: the perception of motivations to play violent video games. *Studies in Media and Communication* 6(2).

Kneer J, Munko D, Glock S, et al. (2012b) Defending the doomed: implicit strategies concerning protection of first-person shooter games. *Cyberpsychology, Behavior and Social Networking* 15(5): 251–256.

Kneer J, Rieger D, Frischlich L, et al. (2011) Goethe versus Rammstein: who is allowed to play with madness? The influence of musical taste on prejudice against heavy metal lyrics. In: McKinnon CA, Scott N and Sollee K (eds) *Can I Play With Madness? Metal, Dissonance, Madness & Alienation*. Oxford: Inter-Disciplinary Press, pp. 3–14.

Knobloch-Westerwick S (2006) Mood management: theory, evidence, and advancements. In: Bryant J and Vorderer P (eds) *Psychology of Entertainment*. Mahwah, NJ: Lawrence Erlbaum, pp. 239–254.

Lowe SR and Galea S (2017) The mental health consequences of mass shootings. *Trauma, Violence, & Abuse* 18(1): 62–82.

Lynch T, Tompkins JE, van Driel II, et al. (2016) Sexy, strong, and secondary: a content analysis of female characters in video games across 31 years. *Journal of Communication* 66(4): 564–584.

Markey PM and Ferguson CJ (2017) Teaching us to fear: the violent video game moral panic and the politics of game research. *American Journal of Play* 10(1): 99–115.

Mathur MB and VanderWeele TJ (2019) Finding common ground in meta-analysis 'wars' on violent video games. *Perspectives on Psychological Science* 14(4): 705–708.

Oliver MB and Bartsch A (2010) Appreciation as audience response: exploring entertainment gratifications beyond hedonism. *Human Communication Research* 36(1): 53–81.

Olson C (2010) Children's motivations for video game play in the context of normal development. *Review of General Psychology* 14(2): 180–187.

Przybylski A (2014) Who believes electronic games cause real world aggression? *Cyberpsychology, Behavior, and Social Networking* 17(4): 228–234.

Quandt T (2018) Dark participation. *Media and Communication* 6(4): 36–48.

Reinecke L, Tamborini R, Grizzard M, et al. (2012) Characterizing mood management as need satisfaction: the effects of intrinsic needs on selective exposure and mood repair. *Journal of Communication* 62(3): 437–453.

Rieger D, Frischlich L, Wulf T, et al. (2014) Eating ghosts: the underlying mechanisms of mood repair via interactive and noninteractive media. *Psychology of Popular Media Culture* 4: 138–154.

Scharkow M, Festl R, Vogelgesang J, et al. (2015) Beyond the 'core-gamer': genre preferences and gratifications in computer games. *Computers in Human Behavior* 44: 293–298.

Scott J (ed.) (2014) Moral panic. In: Marshall G and Scott J (eds.) *A Dictionary of Sociology*. New York: Oxford University Press, p. 492.

Snell D and Hodgetts D (2007) Heavy metal, identity and the social negotiation of a community of practice. *Journal of Community & Applied Social Psychology* 17(6): 430–445.

Steele CM, Spencer SJ and Aronson J (2002) Contending with group image: the psychology of stereotype and social identity threat. *Advances in Experimental Social Psychology* 34: 379–440.

Steindl C, Jonas E, Sittenthaler S, et al. (2015) Understanding psychological reactance. *Zeitschrift für Psychologie* 223: 205–214.

Tamborini R, Eden A, Bowman ND, et al. (2012) The influence of morality subcultures on the acceptance and appeal of violence. *Journal of Communication* 62(1): 136–157.

Tapscott D (2008) *Grown Up Digital: How the Net Generation Is Changing Your World*. New York: McGraw-Hill.

Tobin J (1958) Estimation of relationships for limited dependent variables. *Econometrica* 26(1): 24–36.

Villani D, Carissoli C, Triberti S, et al. (2018) Videogames for emotion regulation: a systematic review. *Games for Health Journal* 7(2): 85–99.

Voytko L (2019) Trump suggests video games connected to violence. research doesn't support that. *Forbes*, 5 August. Available at: https://www.forbes.com/sites/lisettevoytko/2019/08/05/trump-blames-video-games-for-shootings-but-research-doesnt-support-that/#7cceafc111dc

Ward M (2018) Cutting class to play video games. *Information Economics and Policy* 42: 11–19.

Ward MR (2010) Video games and adolescent fighting. *Journal of Law and Economics* 53(3): 611–628.

Wikipedia (2019). Available at: https://en.wikipedia.org/wiki/List_of_accidents_and_disasters_by_death_toll

Williams D, Martins N, Consalvo M, et al. (2009) The virtual census: representations of gender, race and age in video games. *New Media & Society* 11(5): 815–834.

Zillmann D and Bryant J (1985) Affect, mood, and emotion as determinants of selective exposure. In: Zillmann D and Bryant J (eds) *Selective Exposure to Communication*. Hillsdale, NJ: Lawrence Erlbaum, pp. 157–189.

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