Computers in Human Behavior Reports 3 (2021) 100063

Contents lists available at ScienceDirect

Computers in Human Behavior Reports

journal homepage: www.journals.elsevier.com/computers-in-human-behavior-reports

Beyond hours of video gameplay: Connections between verbal aggressiveness, genre preference, and technology used

William T. Howe [a,*,1], Ioana A. Cionea [b,2]

[a] University of Kentucky, Department of Communication, USA
[b] University of Oklahoma, Department of Communication, USA

ARTICLE INFO

Keywords:
Verbal aggressiveness
Video games
Technology
Genre of gameplay

ABSTRACT

This research examined how multiple factors (i.e., hours of gameplay, types of gameplay, preferred genre of video games, technology used to play games, and biological sex) were associated with both trait and situational verbal aggressiveness. Cross-sectional data were collected from 435 undergraduate students via an online questionnaire. Results indicated similar patterns to previous literature in that video gameplay hours were positively related to verbal aggressiveness. However, we extended research by also showing that a preference for certain genres and technology used to play video games were also related with both situational and trait verbal aggressiveness. Based on these results, we argue that player choice of genre and technology should be considered when examining the relationship between video games and verbal aggressiveness.

The pervasive belief that playing video games is associated with anti-social behaviors has recently led lawmakers in Pennsylvania to propose a ten percent sales tax on violent video games. State Representative Chris Quinn said: "One factor that may be contributing to the rise in, and intensity of, school violence is the material kids see, and act out, in video games" (Higgins, 2019, n. p.). Recent studies have found beliefs about the anti-social effects of violent video games are held by many adults (Kort-Butler, 2020; Kowert, Domahidi, Festl, & Quandt, 2014; Kowert, Festl, & Quandt, 2014). Although some video games have graphic content hinged in violence (e.g., *Call of Duty*), others focus on thought provoking narratives that challenge players to think through problems both in and out of the game (e.g., *Detroit*), while others become popular for being simple and accessible (e.g., *Flappy Bird*). Positive effects of video games have been found by researchers even in the context of violent video games (e.g., Howe & Lee, 2018). Perhaps it is for these reasons that scholarship about video games continues to find mixed results (Byrne & Christie, 2011). This study focuses on video games as well, but further delineates various genres of video games for a more nuanced understanding of their relationship with verbal aggressiveness, beyond the classic dichotomy of violent or non-violent games.

One reason why research on video games and aggression has produced mixed results is that there exist a wide variety of video games, which problematizes generalized claims about video games. Greitemeyer and Mügge (2014) found, in their meta-analysis of video game behavior, that violent video games increased aggression and decreased pro-social behaviors, but that pro-social video games had the opposite effects. Howe and Lee (2018) reported players of the video game *Battlefield 4* were rewarded for the pro-social behavior of reviving fallen teammates. This latter finding complicates the designation of a game as either violent or non-violent, further suggesting that the type of games participants play is an important consideration in the study of aggressiveness, as genres capture violence at differing levels. For example, games in the first-person-shooter (FPS) genre are much more likely to contain violent elements than games in the social genre. However, games in both these genres could be rated similarly, as explained in more detail later. Saleme, Pang, Dietrich, and Parkinson (2020) state, "future research should focus on analysing game attributes" (p. 6), and this paper begins to answer this call.

Chory and Cicchirillo (2007) examined the relationship of trait verbal aggressiveness and video gameplay. They found a significant positive correlation between hours of gameplay and verbal aggressiveness; however, the only other variable examined was biological sex (i.e., sex differences in verbal aggressiveness). There may be important differences among other variables their study did not examine. As we will explain,

* Corresponding author.
E-mail address: william.howe@uky.edu (W.T. Howe).
[1] https://www.researchgate.net/profile/William_Howe8
[2] https://www.researchgate.net/profile/Ioana_Cionea

https://doi.org/10.1016/j.chbr.2021.100063
Received 30 September 2020; Received in revised form 31 January 2021; Accepted 1 February 2021
Available online xxxx

behaviors and verbal aggressiveness may depend on the duration individuals play as well as on the type(s) of gameplay, genre preference, and technology used. Furthermore, we examine not only trait verbal aggressiveness but also situational or state verbal aggressiveness. The goals of this paper are to investigate how the amount of time spent playing video games is associated with verbal aggressiveness, compare these findings to prior research, and extend these analyses to other possible connections between and among verbal aggressiveness (trait and state), types of gameplay, genre preferences, technology used, biological sex, and hours played in an attempt to better understand this complex issue.

1. Video games

Video games are a highly consumed medium. Brown (2017) reported that 24% of adults 65 and older play video games and Howe, Livingston, and Lee (2019) reported that 98.6% of their undergraduate student participants played video games. Research interest in this area has mirrored this rise of gameplay and continues to be a trending topic. The rise of eSports may be both an indicator of and a catalyst for the rising popularity of video games (Hamari & Sjöblom, 2017). However, there are mixed results about whether and how video gameplay relates to communication patterns, thought processes, and social behaviors (Dill & Dill, 1998). Reported findings are often about the potential negative effects of games. Such reporting may be what has led many adults to view video games as addictive, violent, and bad for health (Kort-Butler, 2020; Madrigal-Pana, Gómez-Figueroa, & Moncada-Jiménez, 2018), despite the fact that research has demonstrated that approximately only 3% of players suffer from these issues (Ferguson, Coulson, & Barnett, 2011). Thus, negative gaming outcomes, which may be affecting only a small percentage of video gameplayers, have been generalized to stigmatize all video games.

Recent research has shown some of the positive effects of video games (e.g., Adachi & Willoughby, 2017; Wulf, Bowman, Rieger, Velez, & Breuer, 2018). In fact, Alkalay, Dolev, Rozenshtein, and Sarne (2020) used *Co-Op World*, a casual coin-collection game, to demonstrate how video games can be used as a therapeutic tool. Yet, individuals tend to have negative mental models of video games (Kowert, Domahidi et al., 2014; Kowert, Festl, et al., 2014; Madrigal-Pana et al., 2018). Kort-Butler (2020) found that "Non-players, compared to players and gamers, tended to hold more negative attitudes about video games and their effects" (p. 1). Such stereotypes may not consider the diverse types of games played and the differing reasons individuals choose to play these games, which may lead to differing outcomes. Some individuals may wish to decompress after a day at work and play a single player game that requires little interaction (e.g., *Skyrim*, *Command & Conquer*). Others may see video games as a way to spend time with family and friends in a co-present offline setting (e.g., *Mario Kart*, *Madden*). Video games also offer a means for players to interact with others from around the globe (e.g., *Contest of Champions*, *Words with Friends*). Nostalgia may also be a key contributor to playing certain games (Wulf et al., 2018). These diverse reasons for play are hard to reconcile with research conducted in a laboratory setting where type of gameplay is usually selected by researchers. In such a setting, participants may or may not be playing something they enjoy or would normally choose for themselves, which limits the applicability of such experimental studies to video gameplay as a whole. This study offers some initial evidence about the importance of types of gameplay that can provide researchers with a foundation to untangle these issues further.

Video games have been connected to increased aggressiveness, but only for violent games. Hollingdale and Greitemeyer (2014) had students play either a violent video game (*Call of Duty*) or a neutral video game (*LittleBigPlanet*) in an offline or online environment. They found that more aggression was present among players who played the violent game online, but that less aggression was present among players who played the neutral game online versus offline. Notably, the researchers chose to silence the communication channels of other players to "prevent participants being exposed to other players' attitudes or opinions in the online condition and to promote consistency" (p. 3). The results of this study show how important genre (FPS and casual) as well as gameplay type (online and offline) are in the study of aggression.

Furthermore, researchers have found prosocial elements can be present in the context of violent video games. Adachi and Willoughby (2017) found that, in violent video games when participants "… were working together to shoot and kill attacking zombie-like enemies […] intergroup cooperation boosted favorable attitudes toward the target outgroup from before the game to after the game" (p. 204). Similarly, Howe and Lee (2018) found that members of an FPS clan, playing *Battlefield 4*, valued members who revived other players in-game.

Thus, falsely dichotomizing video games as either violent or nonviolent can prove problematic (e.g., Hartmann, Krakowiak, & Tsay-Vogel, 2014), as not all games are violent and some violent video games contain pro-social elements. Pro-social video games have been found to have differing effects from violent video games (Greitemeyer & Mügge, 2014). Lachlan and Maloney (2008) argued that personality traits (including aggression) may be more important for some games but not others and also may have different outcomes, depending on the type of gamed played. As they conclude, there is "cause for concern regarding conventional notions of the relationship between gameplay and aggression" (Lachlan & Maloney, 2008, p. 297). Furthermore, individuals may choose a different type of gameplay, genre, or technology based on their personal needs, preferences, and motivations for playing video games (Bowman et al., 2016). Therefore, type of gameplay (alone, co-present offline, co-present online), genre of gameplay, and technology used to play should be studied to further elucidate how video gameplay may relate to verbal aggressiveness.

2. Verbal aggressiveness

Verbal aggressiveness represents the tendency of an individual to attack another person's self-concept as opposed, or in addition, to attacking that person's ideas (Infante & Wigley, 1986). It constitutes a hostile, destructive form of communication. According to Rancer and Avtgis (2014), one theoretical explanation for aggressive communication, including verbal aggressiveness, lies in the trait perspective, which suggests that people's communication behavior is driven by their personality traits (McCroskey, Daly, Martin, & Beatty, 1998). The trait view posits that verbal aggressiveness is a somewhat consistent patterned behavior of individual-attacking communication across time and space. In other words, verbal aggressiveness is a relatively stable personality characteristic. Another theoretical explanation for aggressive communication posits that behavior is influenced by factors in a given situation. The situational (or state) view focuses on the importance of context in determining aggressive communication. According to Rancer and Avtgis (2014), individuals adapt their behavior to match the unique characteristics of a situation. Situational scholars state that the social context influences whether or not individuals perform verbal attacks. Thus, verbal aggressiveness would be triggered by situational factors that overpower any trait characteristics. Finally, a third theoretical perspective on aggressive communication, the interactionist approach, attempts to unify the previous two lines of theoretical reasoning. It proposes that verbal aggressiveness is somewhat stable across time, but social context dictates the enactment of verbal aggressiveness. So, when someone verbally attacks another, their communication behavior is "best understood as a joint product of situational factors and the trait characteristics of a person" (Rancer & Avtgis, 2014, p. 70).

These theoretical differentiations of the various views on verbal aggressiveness are germane to this study, in which we test both the trait and the situational (state) theoretical conceptualizations of verbal aggressiveness. According to the trait perspective, each individual's underlying amount of verbal aggressiveness is relatively stable (Rancer & Avtgis, 2014), so video games should not have much of an influence on it.

In other words, individuals would exhibit the same level of verbal aggressiveness regardless of the situation in which they are or, in this case, the type of video games they were playing. Bluemke, Friedrich, and Zumbach (2010) found some support for this view. When studying whether different types of gameplay changed trait aggressiveness, they found no significant differences in trait aggressiveness between a violent and a peaceful video game.

However, traits can be influenced via repeated exposure, which means that repeated exposure to various stimuli in the context of video games could enhance or diminish verbal aggressiveness over time (Mischel, 1968). Thus, how often a game is played may be more important than a single instance of playing a game to detect a change in verbal aggressiveness. Therefore, video gameplay should be qualified by the number of hours as well as the different types of play to examine the nuanced associations verbal aggressiveness may have with video games.

Although verbal aggressiveness has been studied mostly as a trait, it does have a situational or state nuance as well (Hample, 2008). The situationist theoretical conceptualization of verbal aggressiveness suggests that individuals can adapt their behavior depending on the demands of the situation. In a study measuring aggression (albeit via a different questionnaire), Farrar and Krcmar (2006) found that an aggressive prime yielded higher aggression scores, which were also higher when the measures contained state items than trait items. Similarly, Infante, Trebing, Shepherd, and Seeds (1984) found that people who were low or moderate in argumentativeness were more likely to use verbal aggressiveness if their opponent was perceived as obstinate. Thus, video games could amplify and bring out a person's aggressive tendencies when playing. For instance, Infante, Riddle, Horvath, and Tumlin (1992) explained that aggressive language reciprocity, the presence of various aggressive cues, or frustration with the situation can facilitate aggressive behavior in a specific situation. This means that, while playing a video game, other players' verbal aggressiveness or frustration with losing the game could facilitate a player's own verbal aggressiveness to spike.

Verbal aggressiveness has been operationalized as two sub-dimensions: pro-social, or constructive (VApro), and anti-social, or destructive (VAanti) verbal aggressiveness. When using this scale, Infante and Rancer (1996) suggested that the pro-social and anti-social components be calculated separately, and then the pro-social score be subtracted from the anti-social score for an overall verbal aggressiveness score (VAovr). Infante, Rancer, and Wigley (2011) maintained that measuring verbal aggressiveness as one dimension was most effective and eliminated social desirability. Other researchers, however, have argued that the two sub-dimensions are different constructs (e.g., Kotowski, Levine, Baker, & Bolt, 2009; Levine et al., 2004), as the direction of their relationship vary across studies. Further, Levine et al. (2004) posited that the pro-social, benevolently worded items may capture not the lack of aggressiveness but "other-esteem confirmation and supportiveness" (p. 245). Thus, pro-social verbal aggressiveness may reveal unique patterns of association in the case of video gameplay, more reflective of pro-social, supportive behavior rather than destructive aggression.

In sum, there are two different theoretical frameworks that guide the examination of verbal aggressiveness as connected to video games play in the current study: the trait perspective and the situational perspective. In addition, we measure verbal aggressiveness as a two-dimensional construct and report the study's results for both pro-social and anti-social verbal aggressiveness. The exception is in the assessment of the relationship between overall hours played and overall trait verbal aggressiveness (as posited in H1) for which we also calculate an overall verbal aggressiveness score so that these findings can be compared to prior work (e.g., Chory & Cicchirillo, 2007).

3. Hypotheses and research questions

To date, research on verbal aggressiveness has found that hours of gameplay were positively correlated to verbal aggressiveness (Chory & Cicchirillo, 2007). Chory and Cicchirillo used college students as they were more likely to exhibit media effects (Haridakis, 2002) and these results could be compared to earlier work (e.g., Anderson & Dill, 2000). In this study, we also used a sample of college students and compare some of our results with previous work.

Chory and Cicchirillo (2007) asked participants how often they played video games and how long they played when doing so. In their study, participants were not asked to differentiate between types of play, such as alone, co-present offline, or co-present online. However, we believe that these various types of gameplay may stem from differing motivations for play and should be investigated separately. As previously stated, players may choose to play alone, co-present offline, or co-present online because of the differing affordances of each type of video game (e.g., relaxing, social, connecting across time and space).

Playing alone, co-present offline, and co-present online have differing levels of communication. Playing alone leaves no room for communication with other individuals. Verbal aggressiveness in such play would be directed toward the game or the self, so likely little situational verbal aggressiveness. Co-present offline gaming could involve interpersonal or group interactions with others in a player's immediate proximity, likely among players who know each other. Although verbal aggressiveness could be directed at the game, self, and other players, relational factors may limit the verbal aggressiveness expressed. Co-present online gaming has the most opportunity for verbal aggressiveness to occur. When playing online, individuals can play with people they do and/or do not know. Furthermore, their online player identity can be somewhat anonymous as players can choose to not share identifying information. Therefore, when playing online, individuals have the greatest ability to and, perhaps, willingness to enact verbally aggressive behaviors. Nowak, Krcmar, and Farrar (2008) found that participants who perceived more violence in a game and who played more hours felt more presence in the game; "those who felt more presence felt more hostility and were more verbally aggressive than those who felt lower levels of presence" (p. 256). For these reasons, a closer examination of the subcategories of gameplay warrants examination to determine whether these patterns do, in fact, hold, given various contexts of gameplay. Therefore, the following hypotheses are advanced:

H1. a) Hours of total gameplay, b) alone gameplay, c) co-present offline gameplay, and d) co-present online game will be positively correlated with trait VAovr.

H2. a) Hours of total gameplay, b) alone gameplay, c) co-present offline gameplay, and d) co-present online gameplay will be positively correlated with VAanti (trait and state).

H3. a) Hours of total gameplay, b) alone gameplay, c) co-present offline gameplay, and d) co-present online gameplay will be negatively correlated with VApro (trait and state).

In the same study mentioned previously, Chory and Cicchirillo (2007) found sex differences regarding verbal aggressiveness. Sex differences and verbal aggressiveness have been studied over many years and extend far beyond gaming. Rancer and Avtgis (2014) detail reports of such sex differences in verbal aggressiveness across a variety of contexts. Therefore, the findings of Chory and Cicchirillo (2007), that male players scored higher on verbal aggressiveness than female players, are unsurprising but must be considered when comparing our results to their previous findings. We posit the following, consistent with previous research:

H4. Men will score a) higher in VAanti (trait and state) and b) lower in VApro (trait and state) than women.

Furthermore, Howe et al. (2019) found that the way gamers are

playing games has changed compared to some of the patterns reported by previous research. For example, they found that gamers preferred consoles over computers and FPS over massive-multiplayer online (MMO) games. The study of games of different genres could be one reason that research on video games has produced mixed results. As previously mentioned, combining all video games together and applying findings from violent video games to other games is an oversimplification of the proposed relationship between video games and verbal aggressiveness.

Video games range on a spectrum of violent actions. Current rating systems, however, fail to capture how violent a game is in isolation from other rating factors. For example, *Call of Duty Mobile* is rated 17+ mainly for violence and *BitLife – Life Simulator* is rated 17+ mainly for suggestive themes, language, and nudity. Currently, one of the most popular games in the Apple App Store is *Among Us*. In this game, one player attempts to murder the other players without those players becoming aware of the murderer's intentions. The IARC rates this game as 9+, meaning the game is considered appropriate for anyone over 9 years old to play. Furthermore, the Entertainment Software Rating Board (ESRB) assigned 1948 ratings in 2017, but only 13% were rated Mature; no video games received the rating of Adults Only. This means that only 13% of games "may contain intense violence, blood and gore, sexual content and/or strong language" (Entertainment Software Rating Board, 2018, n. p.)

If violence in a video game is the mechanism that triggers aggressiveness, then genres that are more likely to contain violent video games, such as FPSs, MMOs, role-playing games (RPGs), and sports games, might be better representations of violent games than game ratings. These genres might also be more likely to increase verbal aggressiveness as they are more likely to create scenarios in which individuals could be verbally aggressive. Therefore, we propose that:

H5. Preference for a) FPS, b) RPG, c) MMO, and d) sports games will be positively correlated with VAanti (trait and state).

H6. Preference for a) FPS, b) RPG, c) MMO, and d) sports games will be negatively correlated with VApro (trait and state).

However, games that do not provide as much opportunity for aggressive behaviors, such as strategy, social, and retro games, may not be associated with verbal aggressiveness, as these games may be played due to nostalgia (Wulf et al., 2018) or desire to solve a problem (Adachi & Willoughby, 2017). Therefore, we ask:

RQ1). What relationship does preference for a) strategy, b) social, and c) retro games have with a) VApro (trait and state) and b) VAanti (trait and state)?

Another factor that should be considered in respect to the relationships between verbal aggressiveness and video gameplay is the type of technology that is used to play video games. This area is vastly understudied compared to general video game effects. A technology's immersion potential may be crucial to understanding reported verbal aggressiveness. Individuals who are playing a video game on a cell phone may be less immersed in the game and, therefore, less vested in the outcome than those who play on a computer or a console. This idea, however, has not yet been tested. Therefore, we ask:

RQ2). Is technology used to play video games related to a) VAanti (trait or state), or b) VApro (trait or state)?

4. Method

4.1. Participants

Six hundred and twelve participants began this study but 30 did not finish, 12 finished in less than 4 minutes, 109 failed attention checks, and 46 had significant missing data. These responses were removed from analyses, which left 435 responses as the final sample. The age of participants ranged from 18 to 35 years old ($M = 19.53$, $SD = 1.73$); 56.8% were women. Most participants identified as European-American ($n = 334$); other ethnic/racial groups present in the sample were Asian-American ($n = 30$), African-American ($n = 14$), Latina/o/x ($n = 22$), a combination or ethnicities ($n = 18$), or another ethnicity ($n = 17$). Participants reported playing mainly on consoles ($n = 189$), cell phones ($n = 211$), and personal computers ($n = 32$).

4.2. Procedures

Participants were recruited from an undergraduate research pool at a large West South Central university. After participants signed up for the study online, they were directed to an online questionnaire, hosted on Qualtrics, whose first page contained consent information. Those who agreed to participate in the study and verified that they were 18 or older proceeded to answer demographic questions, genre preference, indicated hours of gameplay, technology of gameplay, and completed the verbal aggressiveness scale (trait VA). Participants then were asked to remember the last time they played a video game, provide the genre of play, the length of time since they played, and then complete the verbal aggressiveness scale indicating how they felt while playing the video game (state VA). Attention verification checks were interspersed with scale items. All scale items were presented in random order. Participants were awarded a small amount of research credit that they could apply to their Communication courses for completing this study. The research was approved by Institutional Review Board at the university where data collection occurred.

4.3. Measures

Hours of video games played. Participants provided several estimates of the time they spent playing video games by supplying the amount of hours they played, per week, in an open-ended format question, for: *hours played alone*, *hours played in the presence of others offline*, and *hours played with others online*. Overall hours played was calculated by adding the three items together. Means and standard deviations for each are included in Table 1.

Video game preference. Participants indicated their preference for seven game genres (i.e., FPS, MMO, RPG, strategy, social, sports, and retro) by using a 100-point sliding scale ranging from 0 = *not at all* to 100 = *a great deal*. Preference ratings' mean and standard deviation scores are included in Table 1.

Technology used. Participants completed a multiple-choice question indicating on what device they played video games most frequently. Response answers included the following categories: 1) console, 2) computer, 3) cell-phone, 4) other hand-held device, and 5) other.

Verbal aggressiveness. Both trait and state verbal aggressiveness were measured using Infante and Wigley's (1986) scale on 100-point response choices. Participants were instructed to use a slider and place the cursor at a number that reflected their answer choice. As previously mentioned, this scale contains two sub-dimensions, pro-social behavior (T/SVApro, measured with ten items) and anti-social behavior (T/SVAanti, also measured with ten items). The overall trait verbal aggressiveness score (TVAovr) was computed by subtracting VApro from VAanti. Means, standard deviations, and Cronbach's alpha reliability scores are included in Table 1 for both trait VA and state VA.

Given the controversies regarding the verbal aggressiveness scale validity and factor structure, a confirmatory factor analysis was conducted in LISREL 10.2 (Jöreskog & Sörbom, 2019) for trait verbal aggressiveness and, separately, for state verbal aggressiveness. A raw data file was used as input and maximum likelihood as the estimation method. The first item in each scale was fixed at 1 to make the metric assumption. The two latent sub-dimensions (pro and anti) were allowed to covary by default (Brown, 2015). Hu and Bentler's (1999) recommendations were used to determine model fit: RMSEA $\leq$ 0.06, CFI $\geq$ 0.95, and SRMR $\leq$ 0.08. For trait verbal aggressiveness the CFA model fit was, χ^2 (169) = 348.36, $p < .001$, RMSEA = 0.049 [CI: 0.042-0.057], CFI = 0.95, and SRMR = 0.046. For state verbal aggressiveness, the CFA

model fit was, χ^2 (169) = 389.74, $p < .001$, RMSEA = 0.055 [CI: 0.048-0.062], CFI = 0.95, and SRMR = 0.054. Although the chi-square statistic was significant, this index has often been criticized for its shortcomings, including inflated values with larger sample sizes (Brown, 2015). Thus, researchers often use other fit indices to determine model fit, such as the guidelines proposed by Hu and Bentler, which the models satisfied.

5. Results

5.1. Data preparation

A missing value analysis (MVA) was conducted in SPSS 25 to examine whether the data were missing systematically or at random. Little's MCAR test was not significant, χ^2 (502) = 427.51, $p > .05$; therefore, data were considered not to be missing systematically. The remaining responses contained 1.40% missing data in the verbal aggressiveness scales, which were imputed in IBM's SPSS v. 26 using the EM function in MVA (IBM Knowledge Center, n. d.).

5.2. Data analysis

The first three hypotheses proposed that the various hours of gameplay reported (i.e., total hours, alone hours, co-present offline, and co-present online) would be positively related to overall verbal aggressiveness (H1) and the anti-social sub-dimension of verbal aggressiveness (H2), and negatively related with the pro-social sub-dimension of verbal aggressiveness (H3) for both the trait and state VA. Regarding trait VA, H1 and H2 were fully supported, with correlation coefficients ranging in magnitude from 0.170 to 0.242, but only H3c (hours played co-present offline; [r (435) = −0.126, $p < .01$]) was supported. Regarding state VA, H2 was fully supported, with correlation coefficients ranging in magnitude from 0.208 to 0.255, but H3 received no support (see Table 2 for correlation coefficients and significance levels).

H4 posited that there would be a difference in verbal aggressiveness based on sex, in that men would score higher in anti-social verbal aggressiveness (H4a) but lower in pro-social verbal aggressiveness (H4b) than women for both trait and state VA. Multivariate analysis of variance (MANOVA) results offered support for three of the four predictions. For trait VA, men scored significantly higher in VAanti and lower in VApro than women. For state VA, men scored significantly higher than women only on VAanti (see Table 3 for full results). Partial correlations were calculated among trait and state VA and both hours of play (see Table 2) and genre of play. The significance and directions of most relationships remained the same, although some differences were noted in playing alone and online with trait VA (see Table 4).

Table 1
Means and Standard Deviations for Continuous Study Variables.

	M	*SD*	Chronbach's alpha
Trait Verbal Aggressiveness (TVAovr)	−31.32	31.06	
Trait Verbal Aggressiveness Anti-Social (TVAanti)	29.89	18.95	.898
Trait Verbal Aggressiveness Pro-Social (TVApro)	61.21	18.36	.871
State Verbal Aggressiveness Anti-Social (SVAanti)	28.34	20.32	.917
State Verbal Aggressiveness Pro-Social (SVApro)	54.18	21.30	.897
Hours Played Weekly Overall (HoursTotal)	9.42	12.68	
Hours Played Weekly Alone (HoursAlone)	4.12	5.10	
Hours Played Weekly Co-Present Offline (HoursOffline)	2.50	4.70	
Hours Played Weekly Co-Present Online (HoursOnline)	2.80	5.07	
First-Person Shooter Game Preference (FPS)	47.57	37.93	
Massive-Multiplayer Online Game Preference (MMO)	25.90	30.13	
Role-Playing Game Preference (RPG)	34.45	33.49	
Strategy Game Preference	38.35	32.16	
Social Game Preference	55.97	35.84	
Sports Game Preference	46.29	37.56	
Retro Game Preference	51.30	35.65	

The final two hypotheses proposed a positive relationship between preference for FPS, RPG, MMO, and sports games and VAanti (H5), and a negative relationship between preference for these games and pro-social verbal aggressiveness (H6) for both trait and state VA. H5 was fully supported for both trait and state VA, with correlation coefficients ranging in magnitude from 0.184 to 0.342. However, H6 received no support for either trait or state VA (see Table 4 for correlation coefficients and significance levels).

RQ1 asked what kind of relationship existed between preference for strategy games social games, and retro games and the two sub-dimensions of verbal aggressiveness for both trait and state VA. Preference for strategy games was significantly and positively related to trait VApro as well as state VApro and VAanti, but trait VAanti had no significant relationship with strategy games. Preference for social games was significantly and negatively related to trait and state VAanti, and significantly and positively related to trait and state VApro. Preference for retro games was significantly related only to state VApro and this relationship was positive (see Table 4).

RQ2 asked whether the technology used to play a video game was related to verbal aggressiveness. MANOVA results revealed significant findings only for VAanti, for both trait and state. Post hoc analyses using Tukey's HSD revealed that those who reported playing on consoles scored higher than those who reported playing on computers or cell-phones for both trait and state VAanti (see Table 5).

6. Discussion

The goal of this paper was to examine whether the amount of time spent playing video games was associated with both trait and state verbal aggressiveness, and to analyze possible connections between other variables associated with gameplay and verbal aggressiveness. First, we will discuss our general findings about the relationship between hours of video gameplay and verbal aggression. We will then discuss findings of the relationships between biological sex, video game genre preference, technology preference and the anti-social and pro-social sub-dimensions of both trait and state verbal aggressiveness.

Our first three hypotheses explored the relationship between hours of video games played and verbal aggressiveness. Consistent with previous literature (Chory & Cicchirillo, 2007) we found positive associations between overall trait verbal aggressiveness scores and hours of video gameplay. We also examined the two sub-dimensions of verbal aggressiveness and this analysis helped elucidate correlations between aggressiveness and hours of gameplay even further. As results from the second and third hypothesis indicate, it is actually the anti-social sub--dimension that drives these correlations. Specifically, VAanti was positively correlated with hours of gameplay (whether total, alone, or co-present) when examining both trait and state VA, whereas VApro revealed only one significant correlation (out of the eight tested), with hours co-present offline. This finding is an important clarification about verbal aggressiveness and its relationship with time spent playing video games. It further suggests that pro-social verbal aggressiveness may, indeed, function differently than anti-social aggressiveness—the latter may be more prominent in gameplay. Further attention should be paid to what triggers pro-social aggressiveness and whether it has potential beneficial effects in the context of video games, similar to other pro-social behaviors.

Hours played alone had the lowest correlations with trait VAovr and trait VAanti as compared to the correlations of VAovr and VAanti for hours spent playing with others, whether online or offline. When playing alone, individuals have little chance to express verbal aggressiveness (in

Table 2
Correlation Matrix of Control Variables, Hours Played, and Verbal Aggressiveness.

#	Variable	1	2	3	4	5	6	7	8	9
1	TVAOverall		-.834***	.824***	-.562***	.653***	.106**	.029	.151**	.089
2	TVAProSoc	-.827***		-.373***	.666***	-.307***	-.054	.006	-.099**	-.044
3	TVAAntiSoc	.838***	-.387***		-.260***	.781***	.123**	.055	.152**	.105
4	SVAProSoc	-.551***	.666***	-.259***		-.103**	.057	.102**	-.007	.046
5	SVAAntiSoc	.685***	-.325***	.809***	-.112*		.128**	.102**	.118**	.101**
6	HoursTotal	.202***	-.093	.242***	.036	.255***		.817***	.796***	.885***
7	HoursAlone	.124**	-.034	.170***	.080	.220***	.841***		.413***	.613***
8	HoursOffline	.216***	-.126**	.232***	-.019	.208***	.812***	.468***		.593***
9	HoursOnline	.181***	-.081	.219***	.027	.224***	.901***	.663***	.631***	

Notes: *$p < .05$, **$p < .01$, ***$p < .001$.
Partial correlations, controlling for biological sex, are presented in the upper right.

Table 3
MANOVA Results for Biological Sex and Verbal Aggressiveness.

Biological Sex	Trait Pro-Social Verbal Aggressiveness	Trait Anti-Social Verbal Aggressiveness	State Pro-Social Verbal Aggressiveness	State Anti-Social Verbal Aggressiveness
Male	58.87 (18.18)	37.42 (17.60)	53.11 (18.84)	37.05 (18.99)
Female	63.00 (18.33)	24.17 (17.93)	55.00 (23.00)	21.71 (18.78)
F (1, 433)	5.44*	59.27***	0.84	70.54***
η^2	.012	.120	.000	.140

Notes: *$p < .05$, **$p < .01$, ***$p < .001$.
Mean listed, standard deviation listed in parentheses.

the way measured by this variable) compared to situations in which they play with others. Although players may still become verbally aggressive toward the game, self, or technology, there are no other players present on whom to enact verbal aggression, and this may account for the weaker relationship found.

Future studies could examine the differences that type of gameplay causes in levels of verbal aggressiveness. Perhaps the act of playing a video game may be less important in influencing verbal aggressiveness (whether trait or state) than the communication that occurs with other players online or offline. Co-play may not only involve verbal aggressiveness from the player, but also by other players, which may further influence how a player responds, creating a cascading effect in which players react to their gaming partners and escalate their own verbal aggressiveness. Additionally, hearing others perform communicative acts that are verbally aggressive may enhance the normalization of these acts or even create expectations that playing certain types of games with others should involve verbal aggressiveness.

One factor that may help explain differences in verbal aggressive

Table 4
Correlation Matrix for Verbal Aggressiveness and Genre Preference.

#	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	TVAOverall		-.834***	.824***	-.562**	.653***	.089	.086	.029	-.083	-.030	.048	-.023
2	TVAProSoc	-.827***		-.373***	.666***	-.307***	.033	-.043	.074	.141**	.086	.024	.067
3	TVAAntiSoc	.838***	-.387***		-.260***	.781***	.184***	.101*	.124**	.006	.037	.105*	.031
4	SVAProSoc	-.551***	.666***	-.259***		-.103*	.089	.066	.094*	.197***	.145**	.066	.127**
5	SVAAntiSoc	.685***	-.325***	.809***	-.112*		.280***	.170***	.135**	.095**	.050	.171***	.096**
6	FPS	.231***	-.038	.342***	.047	.429***		.321***	.355***	.179***	-.036	.220***	.131***
7	MMO	.154***	-.071	.184***	.051	.252***	.408***		.334***	.379***	-.022	.079	.208***
8	RPG	.109*	.037	.214***	.077	.230***	.448***	.387***		.380***	-.048	.079	.281***
9	Strategy	-.067	.135**	.021	.194***	.105*	.172***	.377***	.376***		.106*	.063	.275***
10	Social	-.191***	.135**	-.182***	.142**	-.189***	-.374**	-.179**	-.216**	.056		.122*	.186***
11	Sports	.169***	-.030	.247***	.039	.313***	.426	.191***	.204***	.077	-.191**		.193***
12	Retro	-.050	.078	-.007	.131**	.050	.046	.172***	.236***	.268***	.210***	.123*	

Notes: *$p < .05$, **$p < .01$, ***$p < .001$.
Partial correlations, controlling for biological sex, are presented in the upper right.

Table 5
MANOVA Results for Technology Used and Verbal Aggressiveness.

Technology Used		Trait Pro-Social Verbal Aggressiveness	Trait Anti-Social Verbal Aggressiveness	State Pro-Social Verbal Aggressiveness	State Anti-Social Verbal Aggressiveness
Console	Computer	−1.83 (3.51)	12.59*** (3.39)	−1.87 (4.08)	13.16** (3.58)
	Cell	−3.34 (1.84)	13.72*** (1.78)	1.45 (2.14)	16.58*** (1.88)
Computer	Cell	−1.51 (3.48)	1.14 (3.37)	3.32 (4.05)	3.42 (3.55)
	F (3, 431)	1.24	21.23***	0.51	26.67***
	η^2	.009	.129	.004	.157

Notes.
Mean differences listed, standard error in parentheses.
**$p < .01$, ***$p < .001$.

behavior is biological sex, which we found, as did Chory and Cicchirillo (2007), yielded significant differences in verbal aggressiveness. For trait verbal aggressiveness, men scored significantly lower on pro-social verbal aggressiveness and higher on anti-social verbal aggressiveness than women did, a finding that echoes previous literature on verbal aggressiveness, in general (Rancer & Avtgis, 2014). For state verbal aggressiveness, men scored significantly higher on anti-social verbal aggressiveness; no significant differences were found between men and women for state pro-social verbal aggressiveness. While playing a video game, there are some differences between men and women's level of aggressiveness that should be explored further; what makes men and women enact similar pro-social verbally aggressive behaviors, but triggers more anti-social aggressiveness from men than from women? It should be noted, though, that sex differences had small to medium effect sizes, suggesting the need for further exploration, beyond biological sex, of factors that may explain verbally aggressive behavior.

The results discussed so far largely support findings from previous studies. In what follows, we discuss specific new findings about the type of gameplay and the technological devices used to play these games. An important contribution we make in this study pertains to genre preference, an understudied area in the verbal aggressiveness and video game literature. Our fifth hypothesis sought to answer what genres of gameplay were related to verbal aggressiveness. We found that preference for FPS, MMO, RPG, and sports games was each positively correlated with both trait and state anti-social verbal aggressiveness and the magnitude of the correlations between each genre preference and trait or state verbal aggressiveness was roughly the same. This suggests certain genres may be more attractive or more conducive to the expression of verbal aggressiveness. If a player prefers a game that has a high amount of verbal interactions, such as most FPSs, then perhaps these players also selected the game specifically to engage in verbal aggressiveness or to release their own verbal aggressiveness. Causal data would help provide some answers to these speculative propositions. Future studies should direct their attention to the possible causal relationships between individuals' trait verbal aggressiveness and their choice of game or preference for a specific type of video games as well as investigate how specific contextual cues in particular genres of video games might trigger state verbal aggressiveness changes.

Additionally, preference for strategy games was significantly and positively correlated with both trait and state pro-social verbal aggressiveness. In other words, those who preferred to play strategy games also indicated using pro-social verbal aggressiveness, which consists of gentle attempts to influence others and respect for their self-concept. Many strategy games rely on working with others; players may realize that other players are more likely to work with them if they communicate in pro-social rather than anti-social ways. Thus, communication skill acquisition may be another benefit of strategy games, in addition to increasing the problem-solving skills of these players (see Adachi & Willoughby, 2017).

A similar pattern of positive correlations was observed for the same pro-social sub-dimension of verbal aggressiveness and preference for social games. Furthermore, preference for social games was also significantly and negatively correlated with overall verbal aggressiveness and the anti-social sub-dimension for both state and trait verbal aggressiveness. This finding supports the work of Greitemeyer and Mügge (2014), who reported that pro-social video gameplay was related with pro-social behaviors, as many social games are inherently pro-social. Furthermore, as Levine et al. (2004) have argued, pro-social verbal aggressiveness may, indeed, capture a more benevolent, other-esteem oriented type of supportive communication, which is clearly exhibited in social games. Thus, the pattern for these two types of games appears rather distinct from the picture we obtain when investigating FPS, MMO, and RPG games, which tend to follow the classical arguments regarding the link between verbal aggressiveness and video gameplay. Social games, to a certain extent strategy games, and to a lesser extent retro games (given only one correlation was significant for this genre preference) portray a different relationship between verbal aggressiveness and video gameplay, with more constructive, less damaging forms of aggressiveness at play.

Perhaps players who have lower verbal aggressiveness to begin with choose to play such genres of games that do not invite as much verbal aggressiveness. Or it may be that the nature of these games supports more collaboration and working together, which encourages positive forms of communication, instead of aggression. A third proposal of Wulf et al. (2018), particularly relevant to retro games, is that players may use these games as a way to relive moments from their childhood. Taken together, these findings illustrate a need for further research into these types of video games and also support our earlier assertion that researchers should clearly indicate the specific game that is under observation in research studies.

Another factor that builds upon this idea of player-driven verbal aggression is the technology used to play video games. Based on our results, participants who only played on consoles scored higher on both trait and state anti-social verbal aggressiveness than those who reported playing on computers or cell phones. Perhaps consoles enable an immersion in the game that can explain why players would score this way when compared to those playing on cell phones. For the most part, consoles remain in a fixed location; therefore, players may be more prone to single-mindedly focus on the game and eliminate other distractions. Cell phones, however, are mobile and can be carried with the player; therefore, games could be played in places or situations that do not allow the player to be fully focused on the game due to frequent interruptions. Furthermore, although desktop computers are fixed to a location, laptops are not, so individuals could be playing video games on a laptop in a public place as well and be unable to engage in anti-social verbal aggression while simultaneously meeting societal norms. A player on a console at home may be more inclined to verbally attack another player than a player playing on a cell phone riding on the metro, at a family dinner, or on a laptop in class. One reason for this possible inclination is the ability to use a headset while playing a video game that allows video gameplay and verbal communication to occur synchronously, whereas on a cell phone gameplay might have to cease in order to type a message. In addition, computers may not have the capabilities that consoles allow for gameplay, which limits their immersive potential.

Another reason is the limitations that many game developers have now implemented on mobile games to reduce the possibility of cyberbullying. Some of these limitations include an inability to directly message other players (e.g., *Clash of Clans*), only being allowed to message friends (e.g., *Contest of Champions*), or use emojis or pre-approved textual phrases (e.g., *Clash Royale*), and more. Perhaps the console only players specifically choose to play on a console due to the affordances of this medium, including the potential to enact verbal aggressiveness. What happens when individuals play video games on consoles should be further investigated to understand the differences between technology used to play and the effects or contributions it may have on or to verbal aggressiveness. This finding may further scholarly understanding of why many adults view video games in negative terms (Kort-Butler, 2020). Most adults likely see children or teenagers play on consoles, inside the home, with the player fully immersed in video game content, which may lead to the opinion that video games are grossly addictive. Scholarly findings of *Pokémon Go* further this belief, as researchers found adults held negative beliefs toward this video game (Madrigal-Pana et al., 2018).

The debate over the influence of video games on verbal aggression will no doubt continue to rage. Our study presents some support for the idea that video games can be related to verbal aggressiveness, both pro- and anti-social, both trait and state. However, it appears that this relationship may need to consider the genre of gameplay and technology chosen by the player as important contextual cues that nuance the manifestation of verbal aggressiveness. These relationships are complex and interwoven, and untangling them will require further research.

7. Limitations and future directions

The cross-sectional survey design of this study undoubtedly limits what types of claims we can make about the relationship between verbal aggression and video games. We have offered various speculations about how or why verbal aggressiveness may be higher or lower depending on the type of games played or the technology used. Ultimately, only actual experiments can determine whether such considerations reflect causal determinants of verbal aggressiveness. Based on the results of our study, we recommend that further research diversify the types of video games examined, even in the context of laboratory studies, and offer participants alternatives in terms of the technology they wish to use to play those games. We also acknowledge that results may differ outside of the United States (see Ćwil & Howe, 2020). Additionally, the examination of undergraduate students prevents us from generalizing our results beyond such samples. Future research could use more diverse samples to study verbal aggressiveness and video gameplay.

Our results, though, suggest several avenues for further research. As we have mentioned, players who are already high in trait verbal aggressiveness may tend to choose specific video games genres that enable the performance of their aggressive tendencies. Once a player stops the game, it is doubtful that their verbal aggression evaporates, but it is more likely that they need a period to "cool off." Supportive of this idea is our finding that strategy preference had a significant relationship with state anti-social verbal aggressiveness but no significant relationship with trait anti-social verbal aggressiveness. Future studies can further elucidate when and how verbal aggressiveness occurs in the context of video games, the effects of verbal aggressiveness outside of and beyond gameplay, and also point towards the need to conduct more sophisticated studies that may answer these questions. Another avenue for more research into verbal aggressiveness and video games play would be to examine professional players (e.g., individuals who broadcast on Twitch) and the ways in which they manage, or not, verbal aggressiveness during gameplay. Such individuals might represent the perfect sample for studying both trait and state verbal aggressiveness. Overall, this study found some patterns similar to prior research regarding hours of play and verbal aggressiveness, but we also found that other factors such as type of play, genre, and technology preference may also influence verbal aggressiveness. We believe future research could consider these factors when studying gameplay and verbal aggressiveness.

Declaration of competing interest

Neither co-author has any conflicts of interest that may influence the research we have presented.

Acknowledgement

Financial support was provided by the Department of Communication at the University of Kentucky. Financial support was also provided from the Office of the Vice President for Research and the Office of the Provost, University of Oklahoma.

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