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The Gambling Preferences and Behaviors of a Community Sample of Australian Regular Video Game Players

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Abstract Research has noted many similarities between video gaming and gambling activities. It has been suggested that video game players may also be attracted to gambling, although there is limited research on this possibility. The present study examined concurrent video gaming and gambling habits in a sample of regular video game players in Australia ($N = 485$, 84 % male, $M_{age} = 25.8$). Gambling involvement was found to be a generally unpopular activity among regular video game players. No significant association between frequency of video game play and frequency of gambling was found. Although significant correlations between gaming 'addiction' scores and gambling frequency were identified, age was the only significant predictor of gambling when controlling for all remaining variables. These findings are critically discussed in the context of past research, and future research directions concerning the link between video gaming and gambling are proposed.

Keywords Video games · Internet gaming disorder · Addiction · Gambling · Technology

Introduction

The potential 'addictiveness' of video gaming has been a subject of debate for over two decades. One line of reasoning is that video gaming may be addictive given its structural similarities with some electronic gambling activities. An analysis by Griffiths (1991), for example, compared arcade video gaming and gambling on slot (or 'fruit') machines, concluding the former may be considered a "non-financial form of gambling". This

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analysis has since been expanded, noting that both tasks involve responding to predictable stimuli governed by a software loop; require concentration and hand-eye co-ordination; the duration of a playing session can be extended by the player's skill; and, reinforcement of 'correct' behaviour is achieved through visual, aural, and incremental rewards (Fisher and Griffiths 1995; Griffiths and Wood 2000). Additionally, successful outcomes in both activities (e.g., cash or points) are governed by intermittent reinforcement schedules. Players in both activities may receive peer group recognition and status when they do well (Griffiths and Wood 2000). Given these similarities, early measures of video gaming addiction were developed using problem gambling measures. Fisher (1994), for example, among many others, reworded the DSM-IV-TR criteria for pathological gambling to accommodate video gaming.

Video gaming has been argued to influence a developmental pathway that may result in pathological gambling (Brown 1989; Fisher and Griffiths 1995; Griffiths 1991). Gupta and Derevensky (1996) have suggested that children who regularly play video games often learn to exert control over them though they seem guided mostly by chance at first. During adolescence, this prior experience with video games makes gambling more appealing due to perceived similarities between the two activities. Gambling may become pathological if the individual mistakenly believes that his or her ability to control video games will carry over into chance-based forms of gambling. This hypothesised link between video gaming and gambling is one reason why many studies continue to employ measures of video gaming addiction that are based on criteria for pathological gambling (Ferguson et al. 2011).

Historical comparisons of video gaming and gambling may have become less valid given fundamental changes to the underlying technology of these activities. Given fewer technological restrictions, video games have become more expansive and cinematic in scope, featuring interactive narrative, realistic virtual environments, and opportunities for online competition (King et al. 2010). Many types of modern games are qualitatively different to arcade video games—more popular at the time of earlier studies—which required coins to play, could only be played in special locations, and session length was generally short. Similarly, the nature of gambling has evolved in response to technological changes. Internet gambling, for example, has experienced exponential growth in popularity, and allows players to gamble from the comfort of their own homes or on mobile devices. Griffiths and Hunt (1998) have suggested that newer games could be more 'dependence-inducing' due to greater skill level requirements, improved graphical technology, and socially-relevant themes. There have also been significant changes in the demographics of the video gaming user base. While early studies found that video games were primarily played by male children and adolescents, a recent report from the Entertainment Software Association (2014) suggests that the average age of video game players is now 31 years old and that 48 % of players are female. Given these changes in the structural design and user experiences offered in video games as well as the demographic composition of the gaming population, it is unclear whether previous comparisons between video gaming and gambling may currently apply.

If video gaming and gambling addiction may be considered similar disorders, given their comparable structural design, player motivations, and diagnostic criteria, then it might be assumed that players at risk of one disorder would be also at risk of the other. Few studies, however, have examined concurrent participation of video gaming and gambling behaviours to examine such a link (King et al. 2014). Past research on arcade video gaming has reported significant relationships between gambling and video gaming behaviour, ranging from $r = .30$ among adolescents in the United Kingdom (Fisher 1993), to $r = .40$ among Canadian teenagers and young adults (Ladouceur and Dubé 1995), to $r = .72$

among American college students (Greenberg et al. 1999). More recent studies focusing on non-arcade forms of video gaming, however, have generally reported smaller effects, ranging from $r = .12$ among German students (Walther et al. 2012) to $r = .18$ among Canadian high school students (Wood et al. 2004). Similarly, in King et al. (2012) study, video game players reported low levels of enjoyment of gambling and correctly attributed outcomes on a simulated gambling task to chance (as opposed to skill) more often than an age-matched, non-gaming sample.

The Present Study

If video gaming is proposed to increase the likelihood of gambling involvement, then this association may be more commonly observed among those who report high levels of video gaming activity. This study therefore aimed to examine the relationship between video gaming and gambling preferences and behaviours in a sample of individuals who report regular video gaming. This study also aimed to provide data from an Australian sample as only one study to date (Delfabbro et al. 2009) has examined concurrent video gaming and gambling habits in this population. Finally, this study aimed to examine these relationships when controlling for gender. Historically, research has found that both video gaming and gambling, at higher levels of involvement, are male-dominated activities. It is therefore possible that the small effects reported in recent studies may have a third variable explanation, that is, that males are generally more likely to be attracted to and participate in these activities.

Previous studies have reported a positive correlation between video gaming and gambling. It was therefore hypothesised that frequency of video gaming would be positively related to involvement in both monetary and points-based ('simulated') forms of gambling. An overlap in these behaviours among regular video game players may suggest that both activities are appealing to the same individuals due to similarities in the gratifications they provide (e.g., competition, success, and arousal). In accordance with this, it was hypothesised that the combination of gender, age, video gaming frequency, and problem video gaming scores would significantly predict overall frequency of gambling. Additionally, while many previous studies have reported a significant correlation between problematic involvement with video games and time spent playing them, it is possible for some individuals to spend many hours playing video games without developing problematic habits (Griffiths 2010a). It was therefore hypothesised that video gamers who exhibit problematic behaviour would be involved in all forms of gambling to a greater extent than non-problem video gamers. Finally, the greater popularity of both video gaming and gambling among males has been consistently reported in previous studies, leading to three further hypotheses: male video gamers would engage in both activities more frequently than female video gamers, rates of problem video gaming would be higher among male video gamers, and gender would moderate any relationship between video gaming frequency, problematic video gaming, and frequency of gambling.

Methods

Participants

The study sample involved 485 Australian video gamers (84.3 % male) with an average of 16.4 years' worth of video gaming experience ($SD = 6.9$, range 0–36). Ages ranged from

16 to 68 ($M = 25.8$, $SD = 7.4$). Participants reported a diverse range of genre preferences, including role playing games (30.3 %), shooters (23.1 %), action/adventure (19.2 %), strategy (12.6 %), and sports (4.9 %). Other preferences included simulation, puzzle, racing, fighters, arcade, and quiz/trivia. Participation by state was: South Australia 37.3 %, New South Wales 20.6 %, Victoria 19.4 %, Queensland 9.9 %, Australian Capital Territory 3.9 %, Tasmania 2.1 %, Northern Territory 0.6 %. Aside from South Australia, this distribution is approximately in accordance with each state's population (Australian Bureau of Statistics 2014). A disproportionate amount of participants were from South Australia as this is the state in which all authors resided, and was the only state for which recruitment was supplemented by offline methods.

Procedure

Online advertisements were posted at several video gaming websites with predominantly Australian user bases. Flyers were also posted throughout the campuses of two South Australian universities. Prospective participants were provided with a link to a survey hosted on a web survey development site (i.e. *SurveyMonkey*). All participants who completed their surveys received a small voucher in compensation for their time. This research was approved by the university's Human Ethics Subcommittee.

Advertisements were addressed to individuals with a strong interest in video gaming. Responses were included if the individual identified as a "video gamer" (i.e., to select participants with a gamer identity—see King and Delfabbro 2014) and reported playing video games for at least 7 h per week (i.e., on average <1 h per day) in the previous 3-month period. In total, 657 responses were received, 530 of which were completed. Twenty-two participants were excluded because they did not meet the inclusion criteria. A further 23 responses were removed from analyses as they were deemed to be disingenuous.

Measures

The survey contained a range of questions pertaining to participants' video gaming habits, including prior experiences with video games and weekly frequency of play. Surveys generally took 30–45 min to complete. All questions referred to participants' experiences during the past 3 months.

Gambling Habits

Measures of gambling habits were adapted from Delfabbro and Thrupp (2003). Participants were asked how frequently they gambled for money and for credits or points online using 5-point scales where 1 = 'never', 2 = 'once or twice', 3 = 'between one and three times per month', 4 = 'weekly', and 5 = 'daily'. For the purposes of analyses, the mid-points of these ordinal categories were then multiplied to provide 3-month gambling frequencies (i.e. never = 0 occasions, once or twice = 1.5 occasions, between one and three times per month = 6 occasions, weekly = 12 occasions, daily = 90 occasions). Participants were also asked to select their main gambling activity from a list of common activities, or to provide an open-ended 'other' response if their preferred activity was not listed.

The Game Addiction Scale (*GAS*; Lemmens et al. 2009) is a 21-item measure of problematic video gaming based on Griffiths 'components' model of video game addiction (2005). Participants were asked to rate the frequency at which they experienced symptoms

of salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems caused by their video gaming. Responses are given on a 5-point Likert scale ranging from 'never' to 'very often'. Scores can range from a minimum of 21 to a maximum of 105. The scale also contains seven subscales corresponding with each component of addiction. A subscale was considered 'met' if a participant's average score on its items was 3 ('sometimes') or greater. A polythetic classification system was used such that participants' video gaming was considered problematic if they met at least four of the seven components. Cronbach's alphas were: salience subscale $\alpha = .66$, tolerance $\alpha = .67$, mood modification $\alpha = .78$, relapse $\alpha = .79$, withdrawal $\alpha = .87$, conflict $\alpha = .77$, problems $\alpha = .67$, total scale $\alpha = .92$.

Analytical Strategy

GAS scores were summed across subscales to provide a continuous 'total score' of problematic video gaming involvement. Three-month frequencies of gambling were estimated from participants' ordinal responses. Visual examination of P–P and Q–Q plots for the resulting count data indicated that they were highly non-normal ($D(485) = 0.43$), $p < .001$) due to a high number of zero responses. Pearson's correlations were used to examine the univariate relationships between gambling frequency and all variables of interest. As problem gaming scores have been found to correlate highly with time spent playing video games, partial correlations were also conducted to assess their independent effects on gambling frequency. Chi-square and two-tailed independent samples *t* tests were used to compare video gamers who gambled with those who did not gamble, as well as gamers who met GAS criteria for problematic video gaming with those who did not, on all remaining variables of interest.

A series of regressions was conducted to assess the combined ability of gender, age, video gaming frequency and problem gaming scores to predict gambling frequency. Gambling frequency was predicted from video gaming behaviour as the former is generally regarded as the higher risk behaviour. Due to the non-normal distribution of the gambling frequency data described above, a negative binomial model was found to provide the best fit. Negative binomial regression is similar to Poisson regression and uses a log link function to transform overdispersed count data. Due to the high number of zero responses, a binary logistic regression model was also constructed predicting whether or not participants gambled at all during the past 3 months from the same variables. All calculations were performed using SPSS for Windows, version 20.0. Unless otherwise stated, all tests are two-tailed.

Results

Descriptives

Participants reported playing video games for between 7 and 120 h per week ($M = 32.69$, $SD = 20.21$). Total GAS scores ranged from 21 to 105 ($M = 44.39$, $SD = 13.92$). The most frequently met symptom of addiction was mood modification (47.8 %), followed by salience (40.0 %), tolerance (26.4 %), problems (21.4 %), relapse (12.6 %), conflict (9.9 %), and withdrawal (9.3 %).

The mean frequency of gambling during the 3 months prior to survey was 1.74 occasions ($SD = 9.57$). Participants generally preferred to gamble for money ($M = 1.41$,

$SD = 6.30$) than for credits or points online ($M = 0.32$, $SD = 4.22$). While estimated frequencies of gambling ranged from 0 to 180 (i.e. bidaily), rates of gambling were generally low. Indeed, only one quarter of participants ($N = 125$) reported gambling in any form during the 3 months prior to study. Among participants who gambled during the past 3 months, poker machines were most frequently given as their preferred form of gambling (29.4 %), followed by lottery tickets and pools (28.6 %), sports betting (15.9 %), scratch tickets and cards (7.1 %), horse or dog racing (5.6 %) and internet gambling (2.4 %).

Relationship Between Video Gaming and Gambling Frequency

Correlations between video gaming behaviour, gambling behaviour and demographic variables are presented in Table 1. Frequency of video gaming was significantly associated with male gender, younger age, and higher problem video gaming scores, but not with frequency of gambling for money or for credits or points online. Furthermore, even when controlling for problem gaming scores, partial correlations (all $df = 482$) between frequency of video gaming and frequency of gambling for money ($r = -.08$) and frequency of gambling for credits or points online ($r = .00$) were non-significant ($p > .05$). However, small but significant relationships emerged when controlling for video gaming frequency between problem gaming scores and frequency of gambling for money ($r = .11$, $p < .05$), but not frequency of gambling for credits or points online ($r = .08$).

No significant differences were found between video gamers who gambled during the past 3 months and those who did not for gender ($\chi^2(df = 1, N = 485) = 1.72$, $p > .05$), frequency of video gaming ($t(483) < 1$) or GAS scores ($t(483) = 1.12$, $p > .05$), although those who did gamble were on average slightly older than those who did not (mean difference = 1.90 years, $t(483) = 2.51$, $p < .05$, $d = 0.26$).

Results from the negative binomial regression are presented in Table 2. Note that parameter estimates (B) correspond to the log-transformed dependent variable. Negative binomial regression does not have an equivalent statistic to R-squared reflecting the proportion of variance in the dependent variable explained by variance in the predictors; however, the overdispersion parameter (α in the table) is used to test the overall significance of the model. For the present data, the combined effects of gender, age, hours per week spent playing video games, and problem gaming scores were found to significantly predict total gambling frequency over a 3 month period. However, individual effect sizes were either non-significant or relatively small. The column labelled *incident rate ratios*

Table 1 Pearson's correlations (r) between video gaming behaviours, gambling behaviours, and demographic variables (N = 485)

	Gender	Age	VG	GAS	Money
Age	−.06				
VG	−.11*	−.10*			
GAS	−.02	−.14**	.42***		
Money	.03	.10*	−.04	.09	
Cred/Points	.10*	.10*	.04	.09*	.64***

For *Gender*, male coded as 0, female as 1. *VG* = number of hours per week spent playing video games. *GAS* = total scores on the Lemmens Game Addiction Scale (Lemmens et al. 2009). *Money* = estimated frequency of gambling for money during the past 3 months, *Cred/Points* = estimated frequency of gambling for credits or points online during the past 3 months. All tests two-tailed. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2 Negative binomial regression predicting frequency of gambling from gender, age, and video gaming behaviour (N = 485)

	B (*SE*)	IRR	95 % CI for IRR	
			Lower	Upper
Intercept	−2.89** (1.01)			
α	8.51 (0.99)			
Gender = male	0.28 (0.42)	1.32	0.57	3.03
Age	0.07** (0.01)	1.08	1.03	1.13
VG	0.00 (0.01)	1.00	0.99	1.01
GAS	0.03** (0.01)	1.03	1.01	1.05

Coefficients not adjusted to account for dispersion (Chi-square/$df = 1.19$). α = dispersion parameter. *VG* = number of hours per week spent playing video games. *GAS* = total scores on the Lemmens Game Addiction Scale (Lemmens et al. 2009). Model Log Likelihood = −613.70, $\chi^2(4) = 21.94$, $p < .001$. ** $p < .01$

(*IRR*) contains the exponentiated coefficient values, and may be interpreted as with odds ratios for logistic regression. Increasing age by 1 year was therefore associated with an 8 % increase in expected gambling frequency, while each additional point on the GAS was associated with a 3 % increase in expected gambling frequency. However, gender and video gaming frequency were not significant predictors of gambling frequency when controlling for the remaining variables. These findings are generally consistent with those from the binary logistic regression, which are presented in Table 3. When predicting whether participants gambled at all during the past 3 months, only age remained a significant predictor (*OR* = 1.04).

Comparisons Between Problem and Non-problem Video Gamers

A total of 75 participants (83 % male) were classified as 'problem' gamers using polythetic GAS criteria. Two-tailed independent samples *t* tests comparing problem and non-problem video gamers are presented in Table 4. Non-significant differences were found between problem and non-problem gamers for age and previous experience with video games. Problem video gamers reported playing video games for significantly more hours per week than non-problem gamers. However, contrary to expectations, there were no significant differences between problem and non-problem gamers according to any of the measures of gambling frequency.

Table 3 Binary logistic regression predicting gambling status from gender, age, and video gaming behaviour (N = 485)

	B (*SE*)	95 % CI for odds ratio		
		Lower	OR	Upper
Included				
Constant	−2.80*** (0.60)			
Gender = male	0.36 (0.32)	0.78	1.44	2.67
Age	0.04* (0.01)	1.01	1.04	1.06
VG	0.00 (0.01)	0.99	1.00	1.01
GAS	0.01 (0.01)	0.99	1.01	1.03

$R^2 = .02$ (Cox and Snell), .03 (Nagelkerke). Model correctly identifies 73.6 % of cases. Model $\chi^2(4) = 9.58$, $p < .05$. * $p < .05$, *** $p < .001$

Table 4 Comparisons between problem and non-problem video gamers (N = 485)

	Non-problem gamers	Problem gamers		Effect size	
	M (*SD*)	*M* (*SD*)	*t* (*df*)	*d*	*r*
Age	25.96 (7.41)	25.03 (7.04)	1.01 (483)	0.13	.06
Experience	16.56 (6.95)	15.68 (6.53)	1.02 (481)	0.13	.06
VG	30.34 (18.67)	45.51 (23.39)	5.32*** (92.03)	0.78	.36
Money	1.08 (2.73)	3.28 (14.62)	1.31 (74.95)	0.35	.17
Cred/points	0.15 (1.15)	1.28 (10.39)	0.94 (74.33)	0.27	.13
All gambling	1.22 (3.11)	4.56 (23.16)	1.25 (74.49)	0.35	.17

Experience = years' experience with video games systems. *VG* = hours per week spent playing video games. *Money* = estimated frequency of gambling for money during the past 3 months. *Cred/Points* = estimated frequency of gambling for credits or points online during the past 3 months. *All Gambling* = estimated frequency of gambling (any form) during the past 3 months. All tests two-tailed. *** $p < .001$

Gender Comparisons

Interestingly, non-significant gender differences were found for reported 3-month frequencies of gambling for money (male $M = 1.32$, $SD = 5.19$; female $M = 1.89$, $SD = 10.44$; $t(483) < 1$), gambling for credits or points online (male $M = 0.14$, $SD = 1.00$; female $M = 1.34$, $SD = 10.40$; $t(75.26) = 1.01$, $p > .05$), and total gambling frequency (male $M = 1.46$, $SD = 5.40$; female $M = 3.24$, $SD = 20.73$; $t(76.90) < 1$).

In accordance with previous findings, males ($M = 33.67$, $SD = 20.78$) played video games for significantly more hours per week than females ($M = 27.41$, $SD = 15.88$), $t(127.99) = 2.99$, $p < .01$). However, no significant differences were found for total GAS scores (male $M = 44.50$, $SD = 13.98$; female $M = 43.79$, $SD = 13.62$; $t(483) < 1$) or problem gaming status ($\chi^2(df = 1, N = 485) < 1$).

Discussion

This study investigated a theorised association between gambling and video gaming, and suggested that this link may not be as strong as initially thought. On the basis of early arguments that video gaming might be one step in a pathway leading to pathological gambling (Brown 1989; Griffiths 1991), it was predicted that frequency of video game playing would be positively related to extent of gambling involvement. However, video gaming frequency did not correlate significantly with the frequency of gambling for money or for credits or points online, even when controlling for problem gaming scores. While the high number of zero responses makes effect sizes difficult to interpret, these findings were supported by a negative binomial regression that accounted for the non-normal distribution of the gambling frequency data. A statistical model including gender, age, video gaming frequency, and problem video gaming scores was able to significantly predict overall frequency of gambling, however the effect sizes were very small. Overall, age was the only reliable predictor of gambling frequency over a 3 months period.

It is noteworthy that gambling rates among Australian video gamers in the present sample were generally low. These findings are markedly different from those found in

earlier studies. Ladouceur and Dubé (1995), for example, found that 30 % of frequenters of a video game arcade in Canada gambled at least once per week, while Gupta and Derevensky (1996) reported that high frequency video gamers were three times as likely to be gambling at least once per week relative to low frequency gamers. Instead, the present findings are more consistent with those from more recent studies (King et al. 2012; Walther et al. 2012; Wood et al. 2004), with participants gambling on just two occasions during the 3 months prior to study, and only 26 % reporting having gambled at any stage during that time. For comparison, a recent survey of South Australian adults found that 36.4 % gambled at least once per month (Social Research Centre 2013).

There are several possible reasons for these discrepancies between older and more recent studies. The most likely explanation is that earlier research tended to examine a particular type of video gaming (arcade machines) that had far greater parity to gambling than modern video games. Another reason is that past studies tended to examine gambling and video gaming habits among the general population, whereas more recent studies have used samples of regular video gamers. While this latter approach does not allow for generalisation to the general population, it perhaps provides a better test of the proposition that regular video gaming leads to a greater interest in gambling. The present study's findings support suggestions that gambling is not an appealing activity to regular video game players, who tend to value specific types of experiences that cannot be provided by chance-based gambling. Such properties may include high skill level requirements, the need for strategy and planning, reward progression cycles, as well as the greater capacity to create powerful social identities within groups in virtual gaming worlds. A uses and gratifications approach (Sherry et al. 2006) to future research may provide additional evidence to support this assertion.

The demographics of video gamers have also changed markedly since the 1990 s in response to new types of video games (e.g., social gaming) that cater to different markets. Earlier research tended to focus on male youths and adolescents; perhaps the majority of modern video gamers have reached adulthood. The mean age of video gamers in the present sample was 26, while prevalence studies have suggested that it might be closer to 31 (Entertainment Software Association 2014). It may be that video gaming remains a significant risk factor for later problematic gaming habits among youth and adolescents; however, the present findings suggest that the clear majority of individuals who grow up playing video games do not develop an involvement with gambling that differs markedly from the wider population. Indeed, this study appears to support previous suggestions that gambling is a relatively unpopular activity among regular video gamers (King et al. 2012). If video gaming in youth remains a potential 'gateway' towards later pathological gambling, it may be that these activities become fully divergent by adulthood, with the transition from video gaming to gambling resulting in behavioural replacement rather than concurrent involvement in both activities. Future studies could examine this by focusing on the video gaming histories of adult pathological gamblers, with attention to particular types of gaming that may precede gambling involvement.

This study similarly presents mixed findings relating to the relationship between problematic video gaming and gambling involvement. It was predicted that video gamers exhibiting problematic behaviour would be involved in all forms of gambling to a greater extent. While problem video gamers reported gambling nearly four times more frequently than non-problem players, these effects did not reach significance due to unequal group variances. When problem gaming scores were used as a continuous measure, however, small but significant effects emerged. It is again noteworthy that reported gambling rates were low even among problematic video gamers. While these findings suggest that the

relationship between video gaming and gambling involvement may be mediated by the extent to which video gaming habits have become problematic for an individual, the effect still appears to be considerably smaller than suggested by previous studies.

Finally, this study also examined gender in the relationship between video gaming and gambling. Only a small correlation was found between male gender and frequency of gambling for credits or points online, and no gender effect was found for frequency of gambling for money. The finding that female video gamers gambled at least as frequently as males was intriguing, and in line with previous suggestions that, at least in terms of gambling, extensive involvement with video games may have a greater effect on females than males (Gupta and Derevensky 1996). Furthermore, while male participants played video games more frequently than females, no significant differences were found between genders for problem gaming scores, and gender was not a significant predictor of gambling frequency in either of the regression models.

The primary limitation of this study was its use of online methods for data collection, and consequently there may have been issues concerning participant self-selection and generalisability of the findings. As Griffiths (2010b) has pointed out, these disadvantages are similar to those experienced by researchers using offline methodologies. Furthermore, there are several benefits to using online methods, including reduced social desirability affecting participants' responses, potentially more representative samples of the wider gaming population, and the ability to collect detailed data concerning sensitive information such as the problems caused by video gaming or gambling activity. Nevertheless, the findings presented here are not necessarily generalisable to the wider population of regular video game players. For example, the combination of online and offline recruitment methods for South Australian participants may have resulted in sample bias. Further research is needed to confirm the present results in other samples. Another limitation was that gambling habits were calculated as a frequency from ordinal responses, and that a measure of pathological gambling was not used. It is also possible that results pertaining to Australian video gamers do not reflect relationships between video gaming and gambling in other populations. For example, Australia differs from the United Kingdom and Canada such that gambling machines may only be located in designated areas, and consequently they are rarely located in the same places as video gaming machines. It has been suggested that this geographical separation may lead to lower levels of concurrent involvement (Delfabbro et al. 2009). Finally, the correlational nature of this study means that causation cannot be inferred for any reported associations.

Conclusion

Previously reported links between video gaming and gambling may be less applicable to modern video games likely as a result of major structural changes in video gaming since the 1990 s. The present study found that gambling was a generally unpopular activity in a sample of regular video game players, and frequency of video game play was not associated with frequency of gambling. While it is possible that heavy video game use during youth or adolescence may remain a risk factor for later gambling involvement, the majority of adult regular and heavy video game players do not appear to gamble frequently. Future research could adopt a longitudinal approach to determine whether and why certain forms of video game playing, perhaps those with similar structural properties of gambling, leads to later gambling involvement. Alternatively, examining the video gaming histories of

current pathological gamblers could determine whether video gaming made gambling more appealing to them. Finally, while many studies have focused on similarities between gambling and video gaming, very few have focused on the apparent differences and the possibility that video gaming may be protective against uptake of gambling. Future research could ask video gamers how often they are exposed to gambling advertisements, and why they do not engage in gambling once exposed. Such studies could reveal important differences in the perceptions of gambling among video gamers relative to the general population.

Conflict of interest The authors declare no conflict of interest.

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