Video Game Playing and Gambling in Adolescents: Common Risk Factors

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ABSTRACT. Video games and gambling often contain very similar elements with both providing intermittent rewards and elements of randomness. Furthermore, at a psychological and behavioral level, slot machine gambling, video lottery terminal (VLT) gambling and video game playing share many of the same features. Despite the similarities between video game playing and gambling there have been very few studies that have specifically examined video game playing in relation to gambling behavior. This study inquired about the nature of adolescent video game playing, gambling activities, and associated factors. A questionnaire was completed by 996 (549 females, 441 males, 6 unspecified) participants from grades 7-11, who ranged in age from 10-17 years. Overall, the results of the study found a clear relationship between video game playing and gambling in adolescents, with problem gamblers being significantly more likely than non-problem gamblers or non-gamblers to spend excessive amounts of time playing video games. Problem

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gamblers were also significantly more likely than non-problem gamblers or non-gamblers to rate themselves as very good or excellent video game players. Furthermore, problem gamblers were more likely to report that they found video games, similar to electronic machine gambling, to promote dissociation and to be arousing and/or relaxing.

KEYWORDS. Youth gambling, video game playing, internet, risk factors, coping strategies

Video games and games of chance often contain very similar features with both providing intermittent rewards and elements of randomness (Gupta & Derevensky, 1996). Consequently, it has been suggested that video game playing may lead some adolescents to also develop a pattern of gambling behavior. For example, research in the UK (Brown, 1989; Griffiths, 1991) noted that video game playing was often a precursor to fruit machine (slot machine) playing. Griffiths (1991) has further suggested that video games might be considered a non-financial form of gambling where players try to gain as many points as possible rather than money. He noted that arcade video game machines require a payment before play can commence similar to slot machines. Griffiths (1990a; 1990b) also noted that the rationale underlying slot machine playing and video game playing is similar, that is, the general playing philosophy is to stay on the machine as long as possible using the least amount of money.

On a psychological and behavioral level, slot machine gambling and video game playing share many of the same features. Video games provide rapid visual and auditory feedback directly to the individual (Greenfield, 1984). Such rapid feedback can also occur in several types of gambling activities (e.g., video lottery terminals [VLT], instant scratch tickets, slot machines, roulette, etc.). Gambling and video game playing both offer 'near miss' opportunities, have similar intermittent reinforcement schedules and make extensive use of light, colour and sound effects (Griffiths & Wood, 2000). Fisher and Griffiths (1995) further suggested that fruit machines and video games share several important structural characteristics such as:

- The requirement of a response to stimuli that are predictable and governed by the software loop.
- The requirement of total concentration and hand-eye coordination.[1]
- Rapid span of play that may be influenced to a greater or lesser extent by the action of the player (more distinct with video game playing).
- The provision of auditory and visual rewards for winning (e.g., musical jingles and flashing light sequences).
- Reinforcement through rewards for winning moves (e.g., points, credits, prizes, or money).
- An electronic display of points gained or money (credits) won.
- The opportunity for peer group attention and approval through competition.

Despite the similarities between video game playing and gambling there have been very few studies that have specifically examined video game playing in relation to gambling. Gupta and Derevensky (1996) in a study involving 104 children from grades 4, 6 and 8 found that children and adolescents who reported excessive video game playing were also more likely to frequently participate in gambling activities as well. They found that significantly more high frequency video game playing males visited arcades, and played video games, compared to high frequency video game playing females (where high frequency players were defined as playing video games at least five times a week for a minimum of 1.5 hours per session). They also found that high frequency video game playing males were more likely to gamble at least once per week. Video game playing and gambling appeared to be engaged in for very similar reasons. Adolescents reported taking part in both gambling and video game playing primarily for the enjoyment and excitement that these activities provided. High frequency video game playing females' gambling behavior approximated their male counterparts. Gupta and Derevensky (1996) concluded that some children and adolescents may be drawn to these activities because of their shared properties, although they acknowledge that it is difficult to establish causality such that video game playing actually leads to increased child and adolescent gambling behavior.

In an examination of risk factors relating to youth problem gambling and video game playing, Griffiths and Wood (2000) reported that patterns of both problem slot/fruit machine gambling and problem video game playing share certain common characteristics. In particular, youth

problem gambling and video game playing were linked to the receiving of intermittent rewards. The rewards provided a partial reinforcement effect (PRE) for both types of activities, with the larger the eventual reward, the more reinforcing it will be (Wanner, 1982). It is also the case that the demographic variables of slot machine players and video game players are usually very similar (e.g., age and gender breakdown) (Griffiths, 1997). Furthermore, Gupta and Derevensky (1996) noted that the use of colour, graphics and music in video games can be very stimulating. They argue that such dynamic and interactive characteristics are particularly appealing to youth.

There are also distinct structural differences between video games and most forms of gambling. Video games usually involve the learning of specific skills to successfully complete a game, whereas gambling activities are predominantly dictated by the laws of randomness (Gupta & Derevensky, 1996). The danger may be that children and adolescents who play video games may assume that some forms of gambling also operate under similar principles where their acquired skills can influence the outcome of a game of chance based upon randomness. Thus, children and adolescents may believe that they can eventually master skills that will make them successful gamblers, in the same way that they are successful video game players. The structural characteristics of gambling and video game playing may be critical for the development of problem gambling or excessive video game playing, as they are likely to influence the player's arousal level. According to Jacobs' *General Theory of Addictions* (1986), the relationship between the individual and their addictive behavior is rooted in a need to increase or decrease arousal levels and relieve depressive states (i.e., an addicted person takes part in their chosen activity, or consumes a particular *substance*, to escape from painful reality). Therefore, any activity that has the capacity to be either arousing and/or relaxing, and that can allow a person to be distracted from their normal lives, is likely to be participated in excessively by some individuals. Both gambling and video game playing fall into this category of activity. Jacobs (1986) asserts that individuals with serious gambling problems would also be highly likely to exhibit similar problems with other rewarding activities such as drugs or conceivably video game playing.

The term *dissociation* is frequently used to refer to one's ability to disconnect from one's present experience, allowing people to feel good and lose track of time, or feel like a different person. Adults with gambling problems have been found to dissociate more frequently while gambling (Greco-Gregory, 2002; Kuley & Jacobs, 1988), with similar

findings being obtained with youth (Gupta & Derevensky, 1998). Dissociation remains an important factor and may very likely play an important role in the maintenance of addictive/excessive behaviors. Dissociation has also been linked to substance abuse (Penta, 2000), sex addiction (Griffin-Shelley, Benjamin, & Benjamin, 1995) and compulsive internet use (Greenfield, 1999). As such, it would be useful to assess whether high frequency video game players report greater tendencies towards dissociation.

Excessive gambling behavior has been linked to higher participation in other addictive behaviors including cigarette smoking, alcohol use, and substance use among both youth and adults (Gupta & Derevensky, 1998; MacCallum & Blaszczynski, 2002; Spunt, 2002; Toneatto, Skinner, & Dragonetti, 2002). Since it has been hypothesized that similar individuals are attracted to both video game playing and gambling activities (Gupta & Derevensky, 1996), it would be interesting to determine if youth who play video games very frequently are also more likely to engage in substance use, independent of gambling participation. While risk taking has been associated with adolescent and young adult excessive gambling (Gupta & Derevensky, 1998; Powell, Hardoon, Derevensky, & Gupta, 1999), the question remains as to its relationship with video game playing behavior.

The current study set out to further examine the relationship between video game playing and gambling behavior amongst adolescents. More specifically, are the same youth participating frequently in both of these activities? Furthermore, the focus of this research was to examine in greater detail those factors that may be common to both excessive video game playing and problem gambling, including dissociation, risk-taking, and involvement in other addictive behaviors.

METHOD

Participants

Nine hundred and ninety six students (549 females, 441 males, 6 unspecified) from grades 7-11, ranging in age from 10-17 years participated in the study. Students were selected from five English-speaking public high schools in Montreal who had previously offered to participate in the study. Participants were from regular classrooms, with no apparent psychological or psychiatric disorders.

Instruments

A *video game and gambling questionnaire* containing 93 Likert or categorical items inquiring about the nature of video game playing and gambling activities (e.g., frequency of play, duration of play, etc.) was constructed for this study. The questionnaire also ascertained information concerning family history of gambling, drug, alcohol, and cigarette use.

The *DSM-IV-J* (Fisher, 1992) was designed to screen for pathological gambling in children and adolescents and was closely modeled on the adult version (DSM-IV criteria for pathological gambling) with several significant differences. One such difference refers to the types of crimes that individuals may have perpetrated to acquire the money they use for gambling. The adult version refers to fraud and embezzlement whereas the DSM-IV-J version refers to theft from within the family and theft from outside the home, such as shoplifting. Overall, the scale contains 12 items relating to nine dimensions of problem gambling, i.e., (1) progression and preoccupation, (2) tolerance, (3) loss of control, (4) escapism, (5) chasing losses, (6) lies and deception, (7) illegal acts, (8) family and school disruption, and (9) financial bailout. Endorsement of 4 of the 9 categories is considered to be an indication that the adolescent is a probable pathological gambler and has serious gambling-related difficulties. Fisher concluded, with her population of young fruit machine players, that the DSM-IV-J was an effective discriminator for pathological gambling in children and adolescents with similar findings being reached by Derevensky and Gupta (2000).

The *Risk-Taking Questionnaire (RTQ)* (Knowles, 1976) is a 20-item scale evaluating risk-approach motivation. Participants indicate on a five point Likert scale how much they agree or disagree with each statement ranging from one (*agree very much*) to five (*disagree very much*). Eleven risk-avoidant items are scored directly; nine risk approach items are reversed so that a higher total score indicates greater risk approach. Knowles reported the scale to have a high internal consistency ($r = .85$, $n = 146$) for a sample of 146 undergraduates, and in another sample was found to be comparable for males ($r = .84$, $n = 178$), and females ($r = .86$, $n = 145$). The scale has also been found to relate positively with participants' self-ratings of risk taking ($r = .67$, $n = 47$; $r = .71$, $n = 134$). No significant gender differences were reported.

Procedure

Research assistants administered the questionnaires in the participants' classrooms and remained present to answer any questions. Indi-

viduals were informed that all information was anonymous and confidential. The questionnaires were group administered and took approximately 50 minutes to complete and participants were thanked at the conclusion of the data collection.

RESULTS

Video Game Playing

Nearly all of the participants (80.9%) reported playing video games at least once a week with 91.3% of youth reporting owning at least one home video game console. The most popular reason reported for playing video games was for enjoyment. Significantly more high frequency players (playing video games at least five times a week for a minimum of 1.5 hours per session) reported enjoyment as a reason for playing video games compared to low frequency video game players (playing video games 2 days a week or less, and an hour or less during each playing session) (see Table 1). Significantly more high frequency than low frequency video game players reported that they played video games for excitement. With respect to reported reasons for playing video games, no significant difference was found for the categories *making new friends* or *to alleviate depression,* for either the high or low frequency video game players. Significantly more high frequency than low frequency video game players reported escape and loneliness as reasons for playing video games.

There was a small but significant difference in the number of males who owned video game consoles (96.1%) compared to females (87.4%) ($\chi^2 = 23.4$, df = 1, $p = .001$). A much larger percentage of males (35.8%) were classified as high frequency video game players compared to females (6.6%) ($\chi^2 = 132.9$, df = 1, $p = .001$). Far more females (29.9%) were classified as low frequency video game players than males (12.5%) ($\chi^2 = 146.3$, df = 2, $p = .001$). Males reported playing video games for significantly longer periods of time (mean = 10.3 hours per week) than females (mean = 2.3 hours per week) ($t = -12.60$, df = 955, $p = .001$) and males (18.3%) were significantly more likely than females (3.7%) to be concerned about how much time they spent playing video games ($\chi^2 = 56.6$, df = 1, $p = .001$). Males (49.9%) were also much more likely to consider themselves as good or very good video game players compared to females (9.2%) ($\chi^2 = 267.6$, df = 8, $p = .001$). Significantly more males (61.6%) than females (34.0%) reported that they played

TABLE 1. Reported Percentages of High and Low Frequency Video Game Players' Reasons for Playing Video Games

Reasons for video game playing	*High frequency video game player*	*Low frequency video game player*	*Chi square*	*df*	*p*
Enjoyment	95.9%	82.6%	24.1	1	.001
Excitement	69.4%	33.3%	58.4	1	.001
Relaxation	63.3%	42.0%	31.1	1	.001
Make friends	23.0%	18.3%	4.8	1	.087
Depressed	6.7%	0.7%	18.9	1	.001
Escape	17.3%	4.6%	17.1	1	.001
Lonely	15.3%	9.1%	6.0	1	.48

Note: High frequency players were defined as playing video games at least five times a week for a minimum of 1.5 hours per session. Low frequency players were defined as playing video games two days a week or less, and an hour or less during each playing session.

video games for excitement ($\chi^2 = 74.6$, df = 1, $p = .001$). Males (55.9%) also reported playing video games for purposes of relaxation more so than females (37.1%) ($\chi^2 = 34.7$, df = 1, $p = .001$). No significant developmental differences were found.

Gambling Behavior

It was found that 58.5% of the participants reported gambling at least once a week. Using the DSM-IV-J diagnostic criteria and past year gambling behavior it was found that 6.6% (n = 66) of the sample could be classified as probable pathological gamblers on the basis of endorsing four of nine categories (49 males, 15 females, 2 unspecified). Enjoyment was the most frequently reported reason for gambling although this varied significantly between the types of gamblers identified using the DSM-IV-J (see Table 2). Excitement was also consistently reported as a primary reason for gambling. Furthermore, gambling behavior was viewed as a form of relaxation. Gambling for purposes of making friends, escape from problems, relaxation, and alleviating depression was reported more frequently amongst those who indicated experiencing gambling-related problems. Loneliness was not significantly related to gambling behavior as a reason for gambling. Finally, there were significant differences between types of gamblers and winning money as a reason for gambling.

TABLE 2. Reported Percentages of Gamblers' Reasons for Gambling According to the Severity of the Gambling Behavior

Reasons for gambling	*Social gambler* (Scores 0 or 1 on DSM-IV-J) (n = 411)	*Some problems gambler* (Scores 2 or 3 on DSM-IV-J) (n = 101)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n = 64)	*Chi square*	*df*	*p*
Enjoyment	70.6%	76.2%	87.5%	8.64	2	.013
Excitement	50.9%	78.2%	75.0%	9.69	2	.001
Relaxation	12.9%	19.8%	31.3%	20.89	2	.001
Make friends	15.6%	18.8%	29.7%	7.67	2	.022
Depressed	1.5%	5.9%	7.8%	11.62	2	.003
Escape	1.5%	7.9%	14.1%	27.87	2	.001
Lonely	2.2%	4.0%	6.3%	3.63	2	.163
Win money	59.0%	84.2%	84.4%	32.14	2	.001

It was found that regular gamblers (once a week or more) were significantly more likely than occasional and non-gamblers to report regular smoking ($\chi^2 = 39.0$, df = 1, $p = .001$), regular drinking ($\chi^2 = 33.3$, df = 1, $p = .001$), regular use of 'upper' drugs (e.g., amphetamines) ($\chi^2 = 13.08$, df = 1, $p = .001$), regular use of 'downer' drugs (e.g., marijuana) ($\chi^2 = 14.76$, df = 1, $p = .001$) and regular use of hallucinogenic drugs (e.g., LSD) ($\chi^2 = 9.44$, df = 1, $p = .002$) (see Table 3). Developmentally, it was also found that reported levels of smoking, alcohol and drug use generally increased in relation to the individual's age (grade level). However, the reported level of gambling behavior was fairly consistent across grades (see Table 4) and showed a high level of participation from grade 7 (56.2%) though grade 11 (68.8%).

Significantly more males (68.0%) reported gambling for money on a regular basis (once per week or more) compared to females (51.0%) ($\chi^2 = 29.1$, df = 72, $p = .01$). As well, more males (66.8%) reported that they gambled for reasons of excitement than females (48.6%) ($\chi^2 = 21.1$, df = 2, $p = .001$), and males (75.4%) were also more likely to report winning money as a reason for gambling than females (56.4%) ($\chi^2 = 23.3$, df = 1, $p = .001$). There were no significant gender differences with respect to smoking, alcohol or drug-taking behavior.

TABLE 3. Percentages of Participants Who Reported Regularly (Once a Week or More) Smoking, Drinking and Drug Use According to Gambling Behavior

Type of substance	*Non-gamblers* (n = 413)	*Social gamblers* (Scores 0 or 1 on DSM-IV-J) (n = 417)	*Some problems gambling* (Scores 2 or 3 on DSM-IV-J) (n = 100)	*Probable pathological gamblers* (Scores ≥ 4 on DSM-IV-J) (n = 62)	*Chi-square*	*df*	*p*
Smoke	7.5%	16.4%	27.1%	44.1%	70.83	2	.001
Alcohol	8.8%	16.0%	30.6%	50.0%	85.03	2	.001
Uppers	0%	1.2%	3.7%	13.2%	60.04	2	.001
Downers	4.1%	6.3%	14.0%	27.9%	52.88	2	.001
Hallucinogenic	0%	1.4%	7.7%	9.5%	35.38	2	.001

TABLE 4. Percentages of Participants in Each Grade Who Regularly (Once a Week or More) Smoked, Consumed Alcohol, Used Drugs, Gambled and/or Played Video Games

Type of substance/activity	*Grade 7* (n = 153)	*Grade 8* (n = 200)	*Grade 9* (n = 209)	*Grade 10* (n = 228)	*Grade 11* (n = 206)
Smoke	4.0%	10.6%	15.4%	22.1%	23.8%
Alcohol	2.6%	11.0%	14.9%	22.3%	30.1%
Uppers	0.7%	0.5%	1.0%	0.4%	1.5%
Downers	2.0%	3.0%	11.1%	10.5%	10.2%
Hallucinogenic	0.7%	0.5%	1.9%	0.4%	2.9%
Gambling	56.2%	49.2%	58.9%	59.0%	68.8%
Video game playing	87.4%	88.0%	79.3%	79.3%	72.5%

Video Game Playing and Gambling

It was found that regular gamblers (i.e., once a week or more) were significantly more likely than non-regular gamblers to report regular video game playing ($\chi^2 = 18.78$, df = 1, $p = .001$). There was a small but significant correlation between the number of hours per week that participants reported playing video games and the severity of their gambling behavior as measured by the DSM-IV-J ($r = 0.18$, $p = .001$). For both males and females, high frequency video game players were more likely to meet the criteria for pathological gambling than low frequency video game players (see Table 5).

Participants were asked to rate themselves on a scale from 1 to 9, ranging from "not at all good" to "excellent," to describe both their video game playing and gambling abilities. A positive correlation was found ($r = 0.38$, $p = .01$), suggesting that those who perceive themselves as good at one also believe they are good at the other. An ANOVA was run across the 4 categories of gamblers, with the self-ratings for video game playing as the dependent variable. The results suggest that those who are experiencing significant gambling-related problems are more likely to perceive that they are skilled at video-game playing ($F = 21.49$, df = (3,1), $p = .001$).

There was a significant association found between the severity of gambling behavior and the frequency of reported excitement as a reason for playing video games ($\chi^2 = 23.73$, df = 3, $p = .001$), and between the severity of the gambling behavior and the frequency of reported relaxation as a reason for playing video games ($\chi^2 = 11.46$, df = 3, $p = .001$).

TABLE 5. Percentage of Male and Female High and Low Frequency Video Game Players According to Severity of Gambling Behavior

*Frequency of video game playing by gender**	*Non-gambler*	*Social gambler* (Scores 0 or 1 on DSM-IV-J)	*Some problems gambler* (Scores 2 or 3 on DSM-IV-J)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J)
High Frequency Male VG (n = 145)	24.1% (38)	31.9% (60)	21.4% (31)	11.0% (16)
High Frequency Female VG (n = 25)	21.7% (11)	60.9% (14)	13.0% (3)	5.9% (1)
Low Frequency Male VG (n = 72)	38.9% (28)	41.7% (30)	12.5% (9)	6.9% (5)
Low Frequency Female VG (n = 306)	52.0% (159)	43.1% (132)	3.9% (12)	1.0% (3)

Note: High frequency players were defined as playing video games at least five times a week for a minimum of 1.5 hours per session. Low frequency players were defined as playing video games two days a week or less, and an hour or less during each playing session.
*Average frequency video game players were omitted from this table.

That is, as the severity of the gambling behavior increased, participants were more likely to report both excitement and relaxation as reasons for playing video games. Video game playing was not found to be significantly related to smoking, alcohol or other forms of drug use.

Dissociation While Playing Video Games

The frequency of video game playing was found to relate to a number of dissociative states (see Table 6). High frequency video game players were more likely than low frequency game players, and those playing at average frequency, to report going in to a trance-like state when playing video games ($\chi^2 = 67.54$, df = 2, $p = .001$), losing track of time when playing video games ($\chi^2 = 95.37$, df = 2, $p = .001$), experiencing blackouts when playing video games ($\chi^2 = 7.75$, df = 2, $p = .001$), feeling *"outside of yourself"* or *"watching yourself"* when playing video games ($\chi^2 = 40.37$, df = 2, $p = .001$) and feeling like a different person when playing video games ($\chi^2 = 57.93$, df = 2, $p = .001$). Furthermore, problem gambling, as measured by DSM-IV-J, was also related to these dissociative states when video game playing. The more serious the

gambling involvement by these individuals, the more they report dissociating when playing (see Table 7). Significant differences between groups of gamblers were found for several dissociative behaviors; going into a trance ($\chi^2 = 16.33$, df = 2, $p = .001$), losing track of time when playing video games ($\chi^2 = 12.64$, df = 3, $p = .002$), experiencing blackouts when playing video games ($\chi^2 = 19.26$, df = 2, $p = .001$), feeling *"outside of yourself"* or *"watching yourself"* when playing video games ($\chi^2 = 16.62$, df = 2, $p = .001$) and feeling like a different person when playing video games ($\chi^2 = 8.19$, df = 2, $p = .001$).

Dissociation While Gambling

Participants who reported problem gambling behavior, as measured by DSM-IV-J scores, were also more likely to report experiencing dissociative states when gambling (see Table 8), such as going into a trance-like state when gambling ($\chi^2 = 35.76$, df = 2, $p = .001$), losing track of time when gambling ($\chi^2 = 50.02$, df = 2, $p = .001$), experiencing blackouts when gambling ($\chi^2 = 35.62$, df = 2, $p = .001$), feeling *"outside of yourself"* or *"watching yourself"* when gambling ($\chi^2 = 20.29$, df = 2,

TABLE 6. Percentage of Participants Who Reported Entering Dissociative States When Playing Video Games Either Occasionally or All of the Time

Reported dissociative state	*High frequency video game players* (n = 169)	*Low frequency video game players* (n = 372)	*Chi-square*	*df*	*p*
Going into a trance-like state	46.7 %	14.0 %	67.5	2	.001
Losing track of time	74.6 %	40.1 %	95.4	2	.001
Experiencing blackouts	6.5 %	1.9 %	7.8	2	.021
Feeling "outside" of yourself or "watching" yourself	21.9 %	4.0 %	40.4	2	.001
Feeling like a different person	30.2 %	5.9 %	57.9	2	.001

Note. High frequency players were defined as playing video games at least five times a week for a minimum of 1.5 hours per session. Low frequency players were defined as playing video games two days a week or less, and an hour or less during each playing session.

TABLE 7. Percentage of Participants Who Reported Entering Dissociative States When Playing Video Games Either Occasionally or All of the Time

Reported dissociative states while playing video games	*Social gambler* (Scores 0 or 1 on DSM-IV-J) (n = 425)	*Some problems gambler* (Scores 2 or 3 on DSM-IV-J) (n = 103)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n = 63)	*Chi-square*	*df*	*p*
Going into a trance-like state	26.4%	34.0%	50.8%	16.33	2	.001
Losing track of time	58.7%	72.8%	76.6%	12.64	2	.002
Experiencing blackouts	2.8%	9.7%	14.1%	19.25	2	.001
Feeling "outside" of yourself or "watching" yourself	9.6%	17.5%	26.6%	16.62	2	.001
Feeling like a different person	14.3%	25.2%	21.9%	8.19	2	.017

$p = .001$) and feeling like a different person when gambling ($\chi^2 = 48.13$, df = 2, $p = .001$).

Risk-Taking

Severity of gambling behavior was significantly related to reported risk-taking as identified by the Risk-Taking Questionnaire (RTQ) scores ($r = .37$, $p = .001$). To better understand the relationship between risk-taking scores and gambling, the RTQ total scores were divided into quartiles. The middle two quartiles were combined, thus resulting in three categories of risk-taking scores. The percentages of non-gamblers, social gamblers, gamblers with some problems, and probable pathological gamblers falling into each of these RTQ categories were computed (see Table 9). The results indicated a strong relationship between gamblers experiencing problems and risk-taking scores, with the top quartile (greater risk-taking) being composed primarily of these individuals, whereas the non-gamblers and social gamblers comprise most of the bottom quartile. The relationship between video game playing and risk-taking was not as evident. High frequency video game players had significantly higher RTQ scores (M = 53.32) than low frequency video game players (M = 49.59) ($t = -3.792$, df = 378, $p = .001$), although a similar relationship was not found when grouping high and low frequency video game players into the RTQ quartiles. Al-

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Chi-quare	df	p
3.33	2	.001
2.64	2	.002
9.25	2	.001
3.62	2	.001
.19	2	.017

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TABLE 8. Percentage of Participants Who Reported Entering Dissociative States When Gambling Either Occasionally or All of the Time

Reported dissociative states when gambling	*Social gambler* (Scores up to 1 on DSM-IV-J) (n = 409*)	*Some problems gambler* (Scores 2 to 3 on DSM-IV-J) (n = 99)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n = 63)	*Chi-square*	*df*	*p*
Going into a trance-like state	3.7%	15.2%	22.2%	35.76	2	.001
Losing track of time	12.8%	37.1%	42.2%	50.01	2	.001
Experiencing blackouts	0.7%	5.1%	14.1%	35.6	2	.001
Feeling "outside" of yourself or "watching" yourself	2.1%	8.8%	13.3%	20.29	2	.001
Feeling like a different person	3.2%	16.2%	25.4%	48.13	2	.001

*Non-gamblers excluded from this analysis

though the percentage of high frequency video game players was smallest in the bottom RTQ quartile, the majority of these individuals fell into the middle quartile groups (49.7%) as opposed to the top quartile (33.7%) suggesting a positive relationship between video game playing and risk-taking, but not as strong as that between gambling and risk-taking.

There was also a significant gender difference in terms of RTQ scores between males (M = 52.5) and females (M = 48.5) ($t = -4.68$, df = 916, $p = .001$). Overall, males scored higher on the RTQ than females indicating that they were more likely to engage in risk-taking behavior. However, high frequency video game playing females, who also gambled, had higher RTQ scores than their male counterparts (see Table 10). Caution should be taken when considering this result due to the small number of females who were classified as high frequency video game players.

Further analysis of the items of the RTQ indicated that there were marked differences in the types of risks that males and females reported taking. Males scored higher on items that related to engaging in physically dangerous situations (e.g., males were more likely than females to report that they would rather ride with someone who rides very fast than walk), whereas females scored higher on items that related to excitement rather than risky situations (e.g., getting into situations that they did not know they could easily resolve).

DISCUSSION

Overall, the results of the study found a relatively strong relationship between video game playing and gambling in adolescents. This is perhaps not surprising considering the large numbers of participants who played video games at least once a week (80.9%) and those reporting

TABLE 9. Reported Risk-Taking Scores Compared to Severity of Gambling Behavior (the Higher the Score the Greater the Reported Risk-Taking)

RTQ scores by quartiles	*Non-gambler* (n = 389)	*Social gambler* (Scores 0 or 1 on DSM-IV-J) (n = 433)	*Some problems gambler* (Scores 2 or 3 on DSM-IV-J) (n = 108)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n = 68)
Top Quartile	13.4 %	27.0 %	47.2 %	67.6 %
Middle 50%	47.3 %	54.3 %	45.4 %	26.5 %
Bottom Quartile	39.3 %	18.7 %	7.4 %	5.9 %

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ıs ɔn	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n = 68)
	67.6 %
	26.5 %
	5.9 %

TABLE 10. Mean Risk-Taking Questionnaire (RTQ) Scores According to Gambling Behavior and Frequency of Video Game Playing

Frequency of video game playing by gender	*Non-gambler* (n = 389)	*Social gambler* (Scores 0 or 1 on DSM-IV-J) (n= 433)	*Some problems gambler* (Scores 2 or 3 on DSM-IV-J) (n= 108)	*Probable pathological gambler* (Scores ≥ 4 on DSM-IV-J) (n= 68)
High Frequency Male VG	M = 46.05 (35)	M = 52.30 (62)	M = 60.68 (14)	M = 62.42 (14)
High Frequency Female VG	M = 45.18 (11)	M = 53.56 (16)	M = 67.00 (1)	M = 81.00 (2)
Low Frequency Male VG	M = 43.95 (22)	M = 51.10 (20)	M = 55.80 (5)	M = 68.75 (4)
Low Frequency Female VG	M = 43.80 (120)	M = 50.48 (103)	M = 52.28 (7)	M = 59.50 (2)

gambling at least once a week (58.5%). Video game playing is a very popular activity amongst adolescents, particularly males. There were several features of video game playing that highlighted marked gender differences. Males reported significantly more frequently than females that they found video games either exciting or relaxing. Twenty-five percent of all the male video game players indicated that they often lost track of time while playing video games. Furthermore, males appeared to play video games for much longer periods of time than females. These characteristics may be indicative of a tendency for some adolescent males to use video game playing as a mood modifier.

Both excessive video game playing and excessive gambling were linked to elements of perceived excitement. That is, high frequency video game players were more likely than low frequency video game players to report excitement as a reason for playing video games. The same was true for gambling in that the more severe the gambling behavior, the more likely the participant was to report excitement as a reason for gambling. This finding was also found for relaxation and escape as reasons for video game playing and gambling. Furthermore, high frequency video game players and individuals who reported experiencing gambling problems were more likely to report various states of dissociation. These dissociative states were defined as going into a trance like state, losing track of time, feeling like a different person, feeling "outside of yourself" and experiencing blackouts (although this was less common). Interestingly, as the severity of the gambling problems increased so also

did the reported incidence of dissociation when video game playing. However, high frequency video game playing was not a predictor of dissociative states when gambling. While problem gamblers may engage in high frequency video game playing behavior in order to achieve states of dissociation, high frequency video game players were less likely to seek dissociation through gambling. This is likely due to adolescent's easy access to video games compared to gambling venues. That is, most video games are designed and marketed to children and adolescents, and they are rarely restricted from buying them. However, participation in most forms of gambling is restricted by legislation to individuals at least 18-years-old (the age may vary depending upon the type of activity [e.g., lottery vs. casino], and jurisdiction).

Adolescents with gambling problems may also undertake video game playing as a further means of coping with their problems. Some of these problems may conceivably arise from their gambling behavior. Either way, it is clear that dissociative states are fundamentally associated with youth problem gambling behavior. These findings supports Jacob's *General Theory of Addictions* (1986) that suggests youth who gamble excessively are either over- or under-aroused and use gambling, or other reinforcing behaviors, as a means of escape from the reality of their state of existence. This escape may then be used as a type of maladaptive coping strategy. It has been noted in previous research that problem gamblers often exhibit poor coping skills (Marget, Gupta, & Derevensky, 1999; Nower, Gupta, & Derevensky, in press). As such, gambling may be used as an alternative method of coping that some adolescents will use to distract themselves from having to deal with daily problems, hassles, and stressors. Consequently, when the behavior ceases, the person is faced with the prospect of dealing with those re-occurring problems. The excessive video game player and/or gambler knows that playing these activities provides relief from dealing with daily problems and consequently the behavior is likely to be repeated. As such, the behavior is rewarding and therefore a pattern of excessive video game playing and/or gambling behavior may develop. Furthermore, excessive gambling among youth also showed a high comorbidity rate with alcohol, cigarette, and drug consumption, which could also, conceivably, be used as maladaptive coping strategies.

These dissociative features were also found to be much more prominent in relation to males than for females. The reasons for this gender difference is not yet clear. Gambling is often regarded as a predominantly male pursuit and hence we might expect other males to be socialized to accept gambling more so than females. This socialization process

is likely to provide males with more gambling opportunities than females. It has been suggested that more gambling opportunities inevitably leads to more gambling problems (Griffiths, 1999; Jacobs, 2000). However, why more males play video games excessively than females is less obvious. There are several explanations that could account for this which have been outlined by Griffiths (1993). Firstly, most video games are designed *by* males *for* other males. Therefore, the content tends to conform to what the designers think males enjoy (e.g., fast-action and aggressive games, etc.). Furthermore, video games that feature strong female characters are more likely to alienate females than encourage them due to the idealized sexual image that they portray (e.g., Lara Croft in *Tomb Raider*). Secondly, there is again the issue of socialization. Video games, like many other activities, are perceived to be predominantly a male oriented activity. This does not preclude females from engaging in such activities but it does suggest that females are less likely to be rewarded for engaging in such behaviors. Thirdly, it has been shown that although females have better verbal ability skills, males tend to have better visual-spatial skills than females (Maccoby & Jacklin, 1974). Since video games rely on good visual-spatial awareness, it could be argued that the average male will do better than the average female on most video games and thus be more likely to be reinforced.

The current study also identified marked differences in reported risk-taking between males and females. Males were found to score higher overall on the Risk-Taking Questionnaire (RTQ), and the types of risks they reported taking might be considered more physically dangerous than those reported by females. This may relate to a tendency for male adolescents to increase their arousal level through the pursuit of high risk-taking activities. It was also found that high frequency video game players scored higher on the RTQ than low frequency video game players. Furthermore, as the severity of the problem gambling behavior increased so did RTQ scores. Interestingly, female high frequency video game players had higher overall RTQ scores than their male counterparts. However, caution should be taken when interpreting this result due to the relatively small number of high frequency video game playing females compared to males. It appears that these high-risk reporting females are atypical of other females and as high risk-takers it is perhaps not surprising that they also report playing video games more frequently and report gambling more extensively than the other females in the sample. More research is needed to examine the profiles of such females before any firm conclusions can be drawn.

It appears that problem gamblers and high frequency video game players are both high-risk takers. It could be that these participants felt under-aroused and their gambling, video game playing, or more general risk-taking behavior was an attempt to increase their perceived arousal levels. More research is needed to determine risk-taking and arousal differences between gamblers and non-gamblers, video game players, and males and females. It is possible that males may exaggerate the level of risk-taking that they engage in, or that females underestimate the risks that they take.

It is striking that those participants who exhibited the most severe gambling related problems were also those most likely to rate themselves as either excellent or very good video game players. This would seem to suggest that these problem gamblers may try to apply the skills that they learned as video game players to gambling situations. This is consistent with holding an illusion of control (Langer, 1975). These players may perceive that gambling skills can be learned and mastered in much the same way as the techniques required to win when playing video games. Increasingly, many forms of gambling have the appearance of a video game (e.g., VLTs, CD-ROM, some forms of internet gambling, etc.) and share many similar structural characteristics (e.g., intermittent rewards, flashing lights, etc.). The *Odyssey* slot machine incorporates video game technology and video game manufacturers are actively engaged in the gaming industry. As gambling becomes increasingly more technological, the similarity between some forms of gambling and video game playing becomes more apparent. The convergence of video games and gambling activities suggests that it is becoming increasingly difficult to establish what is and what is not a purely chance-based activity. Furthermore, some forms of technology-based gambling contain 'pseudo skill' elements that may actually contribute to fostering of an illusion of control (e.g., nudge and hold buttons on UK slot machines).

It may be that the gambling/gaming industry is deliberately producing products that foster an illusion of control within the player. After the completion of this study, Loto-Quebec released a series of interactive CD-ROM 'scratch ticket' lottery games. These games have very similar structural characteristics to some forms of gambling (e.g., scratchcards, VLTs, etc.) combined with the graphic animation and playability of a video game. The first of these games, *Trésors De Le Tour* (Treasure Tower), was a problem solving CD-ROM based game involving an animated character who must perform tasks to find and match winning symbols to win prizes ranging from a free ticket (value $4) to $1,000. In

addition, if the character reaches the top of the tower, the player wins a $25,000 jackpot. The latter aspect of the game is similar to the traditional children's game *Snakes and Ladders* as sometimes the player finds shortcuts that take the character up several floors, and sometimes they fall several floors. The game has no actual skill characteristics whatsoever and the player can receive help at any stage to solve the problems. In fact, the result of the game can also be obtained without actually playing it by simply returning the ticket to a lottery vendor who simply scans the bar code. However, the nature of the game certainly contributes to an illusion of control in the player by effectively mimicking the structural characteristics of a video game (e.g., skill-based problem solving). While this game is currently limited to the format of a CD-ROM, the technology exists to play these types of games over the internet. The internet would eliminate the need to leave the home to purchase these products and would also allow for continuous play.

The number of gambling related sites on the internet is vast and growing daily (O'Neill, 2001). The development of interactive technologies, in relation to gambling, means that it increasingly becomes difficult to separate gambling and video game playing. This appears to be a trend that is set to continue to escalate. Television and computer technology are merging and many cable companies now offer web access through the television. The introduction of 'Web TV' (i.e., internet through cable television) is likely to drastically increase the use of the internet over the next few years (Griffiths & Wood, 2000). Such inexpensive and easy to use internet access will vastly increase the number of households who use the internet and conceivably change the shape of family entertainment. It has been noted that lottery operators worldwide are currently investing heavily in online technology (Griffiths & Wood, 2000). These forms of gambling will arrive directly into people's homes and there is little scope for monitoring and controlling who gambles or how much they gamble. Currently, little is known about the prevalence and effects of participation in internet gambling and video game playing. The technologies relating to these activities are developing at a rapid rate and research is struggling to keep pace. Legislation to regulate online gambling is even slower and sometimes impossible to impose. Many online gambling companies operate in distant and remote parts of the world out of the jurisdiction of the countries where the gambling takes place. The similarity between these sites and some forms of video games is of concern.

If we are to minimize the negative impact of these technologies upon youth there are several areas that need to be addressed: (a) educating

children and adolescents about the nature and structure of gambling and similar activities such as video game playing. Teaching children and adolescents about the structure of, and the risks involved in gambling and video game playing, means that they can apply this information to new 'games' as they are developed. In particular, it may be beneficial to point to the distinction between gambling as a game of chance and video gaming as a game of skill, (b) raising awareness amongst the public about the possible problems that can develop in relation to these activities and to identify high-risk signs in their children, and (c) researching the underlying reasons for youth problem gambling and excessive video game playing. If some youth are playing to escape as a means of coping with their problems then they must be taught more effective coping strategies.

It is clear that adolescents who gamble excessively are also highly likely to play video games excessively and vice versa. Developments in technology mean that gambling is undergoing major structural changes. Many forms of gambling are beginning to emerge that combine the features of both video gaming and gambling activities. The situational characteristics of these activities appear to be such that they will be more easily accessible to youth (e.g., through internet access in the home). The structural characteristics of these activities may be such that they have a greater addictive potential than either conventional gambling or video game playing alone. The combination of intermittent rewards, stimulating sound and graphics together with the rapid interaction possible with such technologies may lead to a dramatic increase in youth gambling related problems. The challenge for researchers and clinicians is to keep pace with these developments and to try and establish the best way of minimizing the negative impact of these activities while simultaneously focusing on the underlying factors that result in some youth developing significant gambling problems.

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