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THE RELATIONSHIP BETWEEN VIDEO GAME PLAYING AND GAMBLING BEHAVIOR IN CHILDREN AND ADOLESCENTS

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Abstract

It is suggested that commercial video games and gambling activities make use of similar types of intermittent reinforcement schedules. This research seeks to examine the nature of this relationship amongst children and adolescents. One hundred and four children from grades 4, 6, and 8 participated. A questionnaire exploring issues related to video game playing and gambling behavior was completed and a computerized blackjack game was individually administered. High frequency video game players are compared to low frequency video game players with respect to their gambling performance on the blackjack gambling task as well as on information gathered from the questionnaire. Findings suggest that high frequency video game players not only gamble more than low frequency video game players but report that gambling makes them feel more important. Furthermore, they appear to be taking greater risks on the blackjack gambling task. Males exhibited greater risk-taking tendencies on the blackjack task than did females.

Résumé

Il est suggéré que les jeux de vidéos commerciaux et les jeux de chance ont des horaires de renforcement intermittent comparables. Cette étude cherche à examiner la nature de ce rapport parmi enfants et adolescents. Cent quatre étudiants de 4ième, 6ième, et 8ième année ont participés. Un questionnaire examinant les aspects reliés au comportement envers les jeux de vidéos et jeux de chance a été administré, ainsi qu'un jeu de 21 géré par ordinateur. Les enfants qui s'engagent à haute fréquence aux jeux de vidéos sont comparés aux enfants à basse fréquence par rapport à leur performance au jeu de 21, ainsi qu'au questionnaire. Les résultats proposent que les joueurs à haute fréquence gagent plus souvent que les joueurs à basse fréquence et rapportent que cette activité leur donnent un sentiment d'importance. De plus, ils prennent des risques plus substantiels au jeu de 21. Les garçons ont une tendance de prendre plus de risques que les filles.

CHAPTER 1

Introduction

This research program was designed in an attempt to better understand gambling behavior in children and adolescents. Recent survey studies have established that approximately 30-40% of children at the elementary and secondary levels gamble at least once a week, and 5-6% are pathological gamblers. Furthermore, retrospective studies reveal that adult pathological gamblers believe their addiction to have started at approximately 9 or 10 years of age. Like all addictions, pathological gambling can result in devastating consequences, such as losing friends, family and jobs, and turning to criminal acts to finance the habit. The only way to develop preventative measures which could play a role in preventing such habits from occurring, and to detect children at high risk for such an addiction, is to determine how and why children turn to this pastime to unhealthy degrees.

This research focuses mainly on the possible link between video game playing (both in arcades and at home) and gambling. More specifically, this research seeks to determine whether children who play video-game at arcades and/or at home numerous times per week are more prone to gamble and and engage in risk-taking in a gambling scenario than those who do not. It is hypothesized that individuals who are largely attracted to video games would be similarly attracted to gambling activities, considering the similar schedules of reinforcement employed in both activities. It is further hypothesized that children accustomed to controlling their video game playing through the use of skill will be more likely to believe that gambling activities involve a substantial amount of skill, and thus feel that they can exert control over gambling activities as well. In other words, high frequency video game players will believe that

they can transfer their ability to control games from video game playing to gambling tasks, in which case they will possess a mere illusion of control.

Considering that video game playing is so prevalent in our society, and that problematic gambling among today's youth is on the rise, this research seeks to establish any possible links between the two activities. This study also aims at understanding the nature of juvenile gambling, such as the reasons for participating in gambling, with whom and where they do so, they types of gambling preferred by these youngsters, and their concerns and cognitions revolving around this pastime. A combination of all this information will provide a better understanding of the problem and permit parents and educators to act as mediators in preventing the development of a problem.

CHAPTER 2

Review of Literature

Although we primarily think of gambling as an adult behavior, research tends to show that gambling remains a popular activity amongst the young (Arcuri, Lester, & Smith, 1985; Ladouceur, Dubé & Bujold, 1994; in press; Ladouceur & Mireault, 1988; Lesieur & Klein, 1987; Rosenstein & Reutter, 1980). It may be that because there are few observable signs of gambling dependence such problems in children and adolescents go undetected compared to other forms of addiction (e.g. substance abuse) (Arcuri et al., 1985; Lesieur & Klein, 1987). Retrospective studies indicate that adult problem gamblers report the onset of their pathological behaviors to have begun between the ages of 10-19 (Dell, Ruzicka, & Palisi, 1981). These researchers also report a high incidence of gambling and alcohol problems amongst family members of pathological gamblers. Others studies reveal that 20-25% of the children of adult gamblers gamble themselves and/or exhibit other forms of addictions (Kusyszyn, 1972; Lesieur & Klein, 1987; Lorenz & Shuttlesworth, 1983). The results suggest both a relationship between gambling and other forms of addiction as well as a strong social learning component involved in the acquisition of such behaviors.

Family background, or exposure to the habits of family members, may be one environmental factor predisposing individuals with certain personality characteristics to develop a problem with gambling as opposed to alcoholism since it has been found that there are high rates of parental gambling problems in individuals hospitalized for pathological gambling (Ciarrocchi & Richardson, 1989). Furthermore, pathological gamblers reveal extremely different personality traits when compared to controls (Graham & Lowenfeld, 1986). Such results support a general theory of addictions (Jacobs, 1986) outlining the likeliness that predisposed personality and/or physiological

characteristics interact with situation-specific factors in the development of a particular addiction.

Gambling defined

Pathological gambling, compulsive gambling, and problem gambling are three terms frequently used to describe gambling behaviors. Pathological and compulsive gambling imply an addiction and are synonymous with each other. Problem gambling, however, denotes a preoccupation with gambling which is not as severe, frequent, or intense. Using the DSM-IV (APA, 1994), at least five of the following ten diagnostic criteria must be met in order to qualify as a pathological gambler:

1) is preoccupied with gambling (e.g., preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble
2) needs to gamble with increasing amounts of money in order to achieve the desired excitement.
3) has repeated unsuccessful efforts to control, cut back, or stop gambling
4) is restless or irritable when attempting to cut down or stop gambling
5) gambles as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)
6) after losing money gambling, often returns another day to get even ("chasing" ones losses)
7) lies to family members, therapist, or others to conceal the extent of involvement with gambling
8) has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling
9) has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling
10) relies on others to provide money to relieve a desperate financial situation caused by gambling

The definition of problem gambling is not as clearly defined, and is often used as a "waste-basket" category for those who do not fit the profile of the pathological gambler. Basically, pathological and problem gamblers both have personality and coping problems and view gambling as a solution or escape. However, unlike those addicted to gambling, problem gamblers do not show progression (tolerance), they

exhibit different responses to winning and losing, and do not "chase" their money. Problem gamblers are often referred to as *potential* pathological gamblers since they remain at risk for developing an addiction (Rosenthal, 1989).

Pathological gambling has four primary characteristics: 1)progression, 2) an intolerance of losing, 3) a preoccupation with gambling, and 4) a disregard for consequences (Rosenthal, 1989). "Progression" refers to the notion of tolerance. The gambler is not able to quit while ahead and will often continue to play until all money is lost. The belief is that the gambler can never win enough and will frequently exceed the designated time and money initially intended for gambling. It is common for a gambler to increase the amounts of money wagered, and/or the odds against him/her, in order to obtain a desired state of arousal. The second characteristic, "an intolerance of losing" or chasing, is best described as an inability to accept failure and therefore always attempting to gain back what has been lost. For these individuals, losing is not considered part of the game and they repeatedly return to gambling as soon as possible to win back their money (to alleviate the guilt of gambling). "Preoccupation" constitutes the third category. The gambler's predominant thoughts focus upon gambling. He may be thinking of past gambling experiences, how money will be obtained for future gambling, and when and/or where the next gambling venture will take place. An individual with such a compulsion will repeatedly lie to cover up the extent of the problem. Gambling becomes a method of dealing with emotional or financial hardships, since little time remains to deal with them directly. Finally, pathological gamblers show little disregard for consequences. They become so preoccupied with obtaining money for gambling that they frequently borrow under false pretenses, institute false insurance claims, commit various illegal crimes which at times put their own lives at risk, and jeopardize intimate and familial relationships. Compulsive gamblers are perceived to no longer have control over their lives. Rather, everything revolves around this addiction, which in turn controls them.

Theories of Pathological Gambling

It is most probable that there are multiple processes involved in the development of pathological gambling behavior. It seems reasonable to assume, based on available research, that biological, psychological, and environmental processes come together in an interactive and complex fashion to form the etiology of problematic gambling.

Physiological theories

Lower levels of hemispheric differentiation have been found in pathological gamblers (Carlton & Goldstein, 1987; Goldstein et al., 1985), with patterns very similar to those found in children with attention deficit hyperactive disorder (ADHD). This was further supported from results of a questionnaire designed to show signs of ADHD. The 14 pathological gamblers assessed had significantly higher scores than did their controls. These data seem to support some biological connection between action seeking and pathological gambling, thus possibly placing hyperactive individuals at a greater risk. The arousal resulting from gambling can be highly motivating. Many compulsive gamblers report being "hooked" on their own adrenaline. Elevated levels of norepinepherine metabolites have been found in compulsive gamblers (Lesieur & Rosenthal, 1991), suggesting the involvement of neurochemical mechanisms common to many forms of addiction

Another biological link is found between compulsive gambling and the occurrence of depression. Rates of major affective disorders among 50 gambling inpatients at a medical center were examined. McCormick, Russo, Ramirez, and Taber (1984) found that 76% of the inpatients were diagnosed as having major depressive disorder, 38% as having hypomanic disorder, 26% of patients met the criteria for both disorders, and 8% were diagnosed with manic depressive disorder. Another study of 12

male Gamblers Anonymous members yielded similar results. Seventy-two percent of these individuals had experienced at least one major depressive episode and 52% had recurrent major affective episodes (Linden, Pope, & Jonas, 1986). However, one must exert caution when delineating causal relationships linking compulsive gambling with depression. It may be that depression precipitates these individuals to a life of addiction, or it could be that gambling itself has led these individuals into a depressive state due to their substantial financial and social losses.

Psychological theories

Personality theory

The view that there is some underlying personality type at the root of addictive behavior first originated with personality trait theorists. Several studies examining personality characteristics of compulsive gamblers have concluded that these individuals have higher scores on the need for achievement, exhibition, dominance, and heterosexuality (Moravec & Munley, 1983), they have more psychopathic deviation (Pd scale on MMPI) and higher rates of depression (Graham & Lowenfeld, 1986). They also report low ego strength and a high incidence of narcissistic personality disorders (Livingston, 1974; Taber et al., 1986).

Future research on addictive personalities should focus around five major personality constructs: 1) an obsessive-compulsive factor, 2) a mood factor (ranging from depression to hypomania), 3) the presence of traumatic and major life stressors, 4) a socialization factor, and 5) a substance abuse or multiple addiction factor (McCormick & Taber, 1987). It is evident that although "addictive personality" types may exist, it is unrealistic to view these characteristics as being independent from environmental influence. A more eclectic view may be necessary in order to understand personality traits of compulsive gamblers

Learning theory

How is it that gambling can have such a powerful hold on individuals when there are no extraneous substances involved in this addiction? Answers can be found within a "learning theory" paradigm. A behavioral approach explains compulsive gambling by the results of exposure to specific schedules and contingencies of reinforcement (Dickerson, 1984; Skinner, 1974). Such a theory maintains that the variable-ratio schedule of reinforcement, that occurs in gambling, is a very powerful pattern for maintaining and increasing a behavior (Dickerson, 1979; Skinner, 1953, 1974). These schedules of reinforcement increase the probability of response. The variable-ratio schedule of intermittent reinforcement, most common to gambling, leads to the continuation of such behavior and is highly resistant to extinction (Hilgard & Marquis, 1961). From the perspective of the gambler, reinforcement can occur at any time. Under such a schedule, behavior becomes highly resistant to extinction since the probability of reinforcement remains approximately constant at any moment (Dickerson, 1979; Hilgard & Marquis, 1961; Skinner, 1969; 1974).

Winning is not the only reinforcing aspect of gambling. Many secondary reinforcers emerge. The financial rewards of gambling permit the purchasing of both basic needs and luxuries that under normal circumstances may not be readily achievable. As well, internal, or emotional reinforcers are strong components of maintaining gambling behavior. The thrill of winning is very reinforcing. Still further, the reinforcing excitement of "almost winning" in the face of high odds is equally exhilarating. Both result in physiological arousal. Seeing two matching items on a slot machine, instead of three, can be highly stimulating, thus increasing the likelihood of repeated playing.

Social reinforcement also has been shown to have a powerful effect on playing behavior. Individuals who are praised and admired for risk-taking will often continue to

play since it will likely increase their self-esteem. Self-worth can eventually become contingent upon winning. In such an instance, it is very difficult for a compulsive player to accept a loss, thus resulting in "chasing" behaviors.

Social learning theory

Many activities which accompany gambling scenarios are reinforcing because they produce excitement, arousal, and tension. Depending on one's social entourage and developmental level, gambling behaviors can also be encouraged and reinforced by one's peers. Social learning theory maintains that individuals learn and maintain behaviors that are appealing and reinforcing. This theory readily explains why so many young people (e.g. adolescents) may be attracted to the gambling environment.

It is safe to assume that for many teens, gambling has several reinforcing qualities. Considering the importance of being accepted and highly regarded by one's peers during the adolescent years, being known as a gambler (or risk taker) leads to social recognition and thus to a higher status amongst friends (Opie & Opie, 1969; Smith & Abt, 1984). Using Miller's (1976) functional/behavioral analysis model as a theoretical framework, we can delineate three classes of antecedents and consequences to gambling behaviors in adolescents (Griffiths, 1989). The antecedents consist of social setting events, modeling, and self-control. Examples consist of: identification with gambling friends and family along with exposure to the gambling scene, the direct influence and teaching of gambling by peer models, and the influence of the individual's beliefs and cognitive factors as to the appropriateness of gambling. Consequences of gambling include the physiological effects of gambling, social reinforcement, and self-control factors.

Parents often serve as role models for gambling. Retrospective studies conducted on adult compulsive gamblers reveal that 25-40% of their parents were problem gamblers (Custer, 1982; Jacobs , Marstone & Singer, 1985). Also revealed are

comparable rates of parental drinking problems (Jacobs et al., 1985). It thus may not necessarily be the specific modeling of parental gambling that necessarily results in similar behaviors in their children, but rather the parental examples of developing addictions in order to cope with stressful situations. Social learning theorists maintain that children often model and imitate their parents and other powerful role models. In addition, children from households where parental gambling is of concern report feelings of insecurity and a need for acceptance (Lesieur & Rothschild, 1989). Gambling can be very rewarding since it often leads to social acceptance. A study of teenage gamblers in England (Ide-Smith & Lea, 1988) determined that the major locus for gambling was in the home, followed by gambling activities in the school, indicating that for many youths gambling is a socially accepted and rewarding pastime.

Physiological, personality, learning theory, and social-learning theory have all been presented individually and should not be considered as being full explanations, but should be viewed as possible contributors to the etiology of gambling behavior. Environmental influences and biological traits can not be teased apart when examining such complex behavior. Rather, the development of pathological gambling is the result of many concomitant factors interacting with each other. A general addictions model employs individual and environmental factors to explain the emergence of addiction.

A general addictions model

Pathological gamblers provide a unique opportunity to study addictive behaviors without having to tease out the effects of chemical agents. Most of the current research shows recognition that pathological gamblers have much in common with other addicted populations. A study comparing personality dimensions between alcoholics and pathological gamblers reported no differences in MMPI profiles of adult men addicted to gambling or to alcohol, even when the groups were controlled for co-existence of the two forms of addiction (Ciarrocchi, Kirschner, & Fallik, 1991).

Like alcoholics and drug abusers, pathological gamblers develop a preoccupation with seeking out opportunities to gamble, and tend to gamble for longer periods of time and use more money than they intend. Similar to the notion of tolerance in substance addicts, many problem gamblers need to increase the odds against them in order to create excitement. Gambling is often used by these addicts as a means of escaping problems, and many heavy gamblers report a euphoric state, similar to a "high" derived from cocaine or other drugs (Levinson et al., 1983; Miller, 1980; Moran, 1970). As well, like those addicted to other substances, pathological gamblers frequently try to decrease and extinguish their addiction since it affects social, educational, and occupational obligations (Lesieur, 1984).

There is empirical support of a general dissociative state which is common across gambling, overeating, and alcohol addictions (Jacobs, 1988; Kuley & Jacobs, 1988). Furthermore, a modification of arousal and reversal theory (Brown, 1987) strengthens the notion of a general theory of addiction by explaining gambling addiction as resulting from the switching from highly aroused to highly anxious states during the course of play, with the anxiety of losing associated with an eventual euphoria that results from winning. This association of a negative emotional state with eventual reinforcement is what is believed to keep the gambler continuously playing even in the face of major monetary loss. A complete understanding of this phenomena involves examining a combination of both cognitive and physiological processes.

Jacobs (1986) has proposed a comprehensive general theory of addictions, in which addiction is defined as a dependent state that is acquired over time with the goal of relieving stress. His three staged model maintains that there are two interrelated sets of predisposing factors that are characteristic of individuals with a high potential for developing an addiction, and which must be present for such maladaptive habits to be formed. The first of these two sets is a physiological resting state that is either chronically depressed or excited. His premise is that a person will tend to either

increase or reduce their arousal through gambling and thrill seeking. The second set of predisposing factors are of a cognitive or psychological nature. Feelings of inferiority, rejection by parents, and general feelings of inadequacy, which all stem from social and developmental experiences in childhood are thought to be crucial. It follows that one of the essential reinforcing features of gambling is that the individual can escape from hurtful reality while experiencing a sense of being an important, highly successful and admired person. Jacobs (1986) believes that these two co-existing predisposing factors can be used to predict the course of addictive patterns in a given individual as they progress through the three sequential stages. With this information, it is believed that one can determine the "level of readiness" of an addict to cling to or to consider rejection of their addictive pattern, suggesting the practicality of such a model in clinical use.

Support for a general theory of addictions comes from findings that compulsive gamblers often posses multiple addictions, thus implying commonalties amongst addictive disorders. Lesieur 's(1988) study of fifty Gamblers Anonymous women revealed that 52% had abused alcohol and/or drugs at some point in their life, 24% classified themselves as overspenders, 20% were classified as compulsive overeaters, and 12% reported to be sexually addicted. Similar results were found by Linden et al. (1986). A study conducted with 51 male Veterans hospitalized for compulsive gambling, revealed that 39% met the criteria for alcohol and/or substance abuse, and 47% met these criteria at some point in their lives (Lesieur & Rosenthal, 1991).

Other support for a general addictions theory comes from findings of common personality traits amongst gamblers and other addicts (Blaszczynski et al., 1985; Graham & Lowenfeld, 1986). Furthermore, common dissociative states were found among compulsive gamblers, alcoholics, and compulsive overeaters (Jacobs, 1988).

The Prevalence of Young Gamblers

To date, only one study examining the prevalence of gambling amongst elementary school children has been completed (Ladouceur et al., 1994). Of 1,320 children from grades 4, 5, and 6, 86% had reported gambling in some form and 40% reported gambling a minimum of once a week. Lotteries were the most popular form of gambling, followed by bingo, card playing, sports betting, wagering on specific events, video poker and slot machines, and games of skill.

A survey conducted in Atlantic City (Arcuri, Lester, & Smith, 1985) revealed that 64% of adolescents gambled in casinos with 9% gambling weekly, despite the fact that the legal gambling age in New Jersey is 21. Sixty-six percent of casino betting occurred on the slot machines and 25% of gambling was on blackjack. Interestingly, 79% of parents were aware of their children's casino gambling (Jacobs, 1989). Although this study brings attention to the fact that a significant number of teens are engaging in illegal gambling acts, it most probably under estimates the prevalence of gambling behaviors amongst adolescents by only surveying casino gambling as many adolescents are likely refused entry into the casinos because of their young appearance.

Lesieur and Klein (1987) conducted a more encompassing study examining the prevalence of pathological gambling in New Jersey high school students across a variety of activities. They found that of 892 students, 32% were gambling at least once a week, with card playing and casino gambling being the two most popular types of gambling, followed by sporting events and lotteries. Using the diagnostic criteria of the American Psychiatric Association (1987) for pathological gambling, they established that 5.7% of students showed evident signs of pathological gambling. Findings reveal that most gamblers were males with low grades, with one or both parents having a gambling problem, and who gambled when opportunities presented themselves. An interesting finding was that proximity to Atlantic City, versus living in northern and

central New Jersey, was not correlated with the presence of higher pathological gambling rates.

A similar study examining gambling trends in Francophone Canadian students from nine high schools in the Quebec City region (Ladouceur & Mireault, 1988) revealed that the three most popular forms of gambling were the lottery, sports betting, and card games. These researchers found that 24% of adolescents purchased lottery tickets weekly, participation in sports related gambling events was reported by 45% of adolescents, and 5.6% admitted to not being able to cease gambling despite their desire to do so. Finally, a small number of students, 1.7%, actually classified themselves as being pathological gamblers with most of them being addicted to card playing. As well, 90% of adolescents reported that their parents knew they gambled and that only 6% were opposed to such activities.

Problematic gambling amongst youths is not restricted to North America. Concern over the use of slot machines by teens in the U.K. is increasing since these "fruit" machines are readily available to them in arcades and coffee shops, and are not considered illegal under the age of 18. In one study, 50 adolescent slot-machine users agreed to a personal interview and completed a questionnaire as they exited a British amusement arcade (Griffiths, 1990). Twenty-three percent of the 39 male participants were classified as pathological gamblers as measured by the DSM III (APA, 1987) diagnostic criteria. A larger study done in the U.K. looking at 1,332 teens aged from 12 to 15 revealed 40% played slot-machines in arcades at least once a week, and 16% played 4 times a week or more (Huxley & Carrol, 1992). Fisher (1992) found similar results with 54% of adolescents classified as social gamblers and 5% exhibiting pathological gambling in the U.K.

Teenage gamblers present a distinct problem in today's society. Many researchers believe that severe gambling problems originate during the adolescent years

or younger (e.g. Custer, 1982; Livingston, 1974), and retrospective studies support this claim (Dell, Ruzicka, & Palisi, 1981; Griffiths, 1990). Results generally suggest that 5-6% of adolescents are compulsive gamblers (Fisher, 1992; Ladouceur & Mireault, 1988; Lesieur & Klein, 1987), while 24-40% engage in some gambling behavior weekly (Huxley & Carrol, 1992; Ladouceur & Mireault, 1988; Lesieur & Klein, 1987). Alarmingly, the percentage of youthful gambling appears to be on the increase. A follow-up study conducted by Ladouceur et al. (in press) on Quebec CEGEP (Junior College) students indicated that gambling rates are reported to have more than doubled since his original 1988 survey. Problematic gambling often results in increased crime and the disruption of relationships, both negatively affecting school and/or work activities. The most frequently illegal means used to gain money for gambling by high school students are selling drugs, working for a bookmaker, selling sports cards, and shoplifting (Ladouceur & Mireault, 1988; Lesieur & Klein, 1987). In both studies, 10% of high school students admitted to having performed illegal activities to support their gambling behavior.

Gender and age differences

Despite some conflicting findings, there appears to be an overall consensus that gambling is more popular amongst males than females (Fisher, 1990; Ide-Smith & Lea, 1988; Ladouceur et al., 1994; in press; Rosenstein & Reutter, 1980) , with pathological gambling being at least twice as common among males (Lesieur & Klein, 1987; Sommers, 1988; Volberg & Steadman, 1988; 1989a). Griffiths (1989) suggests that gambling is more popular among boys because it allows them to display their masculinity in a social environment by exhibiting courage and bravery. Gambling amongst males appears to be encouraged by parents, since more males than females are reported to gamble with their parents (Ladouceur et al., in press). Interestingly, several

studies have shown no gender differences in adolescents' slot-machine playing (Fisher, 1992; Huxley & Carrol, 1992), although males are reported to play at a higher frequency than females (Huxley & Carrol, 1992). It is plausible that slot-machines are more appealing to female adolescents than other forms of gambling, and/or that their participation in slot-machine playing is more socially acceptable than other gambling events. Little risk-taking is involved in the playing of slot machines since they require small amounts of money to play. In accord with Griffiths (1989), it is also possible that slot machines are not more popular amongst males due to the lack of perceived skill and lower levels of risk-taking involved.

Gender differences among primary school children with respect to frequency are not as apparent as during adolescence. The frequency of gambling activities related to bingo, card games, specific events, and skill testing games were similar for both males and females. Those gambling events which boys played more often were the lottery, sports betting, and video game wagering (Ladouceur et al., 1994).

There seems to be a lack of studies examining developmental differences in children's gambling behaviors. Those which have been conducted are limited to prevalence studies and self-report data. Furthermore, while many studies examine gambling behavior during adolescence relatively few studies have researched this issue during childhood. Kass (1964) examined risk-taking behavior with a gambling-type scenario in children aged 6, 8, and 10 years old and failed to find any developmental differences. Another study looking at gambling tendencies in children aged 6 to 16 (Slovic, 1966) reported that boys at ages 11 and 14-16 took more risks than did girls, but that girls aged 6-8 took slightly more risks than did boys. No differences were found in children aged 12 and 13. A replication of these findings was unsuccessful (Kopfstein, 1973). Ladouceur et al.'s (1994) study of primary school children revealed a developmental trend in children aged 8 to 12 such that the number of children who

reported gambling progressively increased at each grade level: 81% at grade 4, 84% at grade 5, and 92% at grade 6.

Gambling and Video Games

As previously noted, variable-ratio schedules of reinforcement are very powerful in shaping and maintaining behavior. Under such conditions, individuals respond in a specific manner because this behavior has been reinforced in the past, and they expect that a similar consequence will follow in the future. However, in variable-ratio schedules, reinforcement does not present itself at every occurrence of the behavior. With this type of schedule, one does not know when the reinforcement will occur. Individuals continuously perform the behavior in absence of the reinforcer for a long period of time with the belief that a positive consequence will eventually occur. This intermittent reinforcement raises the probability of responding above the value generated when all responses are reinforced, and makes the behavior more resistant to extinction (Skinner, 1969). Gambling may therefore result in compulsive behavior mainly because all systems of gambling employ variable-ratio schedules determined by the rules of the game. It is important to note that gambling behavior is an example of an operant that is affected by more than one kind of reinforcement. Some reinforcers may include: winning money, peer recognition and approval, and autonomic arousal. Such consequences or contingencies maintain behavior for hours, and can lead to a form of addiction similar to substance abuse, such that it becomes difficult to exert personal control over frequency of indulgence. As well, intermittent reinforcement schedules and classical conditioning paradigms easily lead to the development of superstitious behavior, most common amongst gamblers (Skinner, 1969). A person who accidentally performs a behavior just prior to the delivery of a reinforcement is likely to

interpret that behavior as being the causal stimulus. It is thus quite common to see gamblers perform certain rituals "for luck" prior to betting or rolling the die.

Since children and adolescents are the focus of concern with respect to gambling within the present research, it is important to determine which of their activities may be similar to, or influence the occurrence of gambling in order to gain insight into the problem. Very prevalent in our society is the use of video arcade games. Independent of socioeconomic status, many households now have home entertainment video game units (e.g. Nintendo, Super Nintendo, Sega Genesis, or personal computers which act as video game devices). Like gambling, video games are reinforcing because they sharpen the contingencies of winning and losing. Researchers have suggested that commercial video games make use of the same types of addictive reinforcement schedules as do gambling games (Koop, 1982) and that video players manifest compulsive tendencies in their play (Egli & Meyers, 1984).

Children enjoy video games because they are dynamic, interactive, and entertaining. These games employ several reinforcing stimuli such as color, graphics, and music. The games are action filled, and provide the player with a sense of control. The path through which a game unfolds is not entirely randomly determined, but is also controlled to a large extent by the actions of the child. Video games remain exciting in that they expose the player to seemingly random events such as unpredictable attacks by the "enemy". The child, not being aware of these spatial contingencies, must avoid extermination. Most video games involve complex rules, which unfold as the player becomes more skilled and advances to higher levels. But unlike conventional board games, the player must induce the rules through observation and practice rather than have them clearly defined (Greenfield, 1984). Each time the child improves in skill and achieves something new, reinforcement of playing behavior takes place, and the game is understood a little better through induction of the rules. The child eventually establishes a sense of mastery as randomness turns into order (once enough induction of rules has

taken place), and continually strives to improve. Video games are very appealing because they provide direct immediate feedback. The player knows instantly, through visual and auditory feedback, whether his/her response was correct, incorrect, too early, or too late. As the player gains experience, the consequences which contribute to or detract from performance are learned. Familiarity and strategy are two factors which result in the deductive process of understanding the nature of the game and in bringing the player one step closer to mastery. Correction and improvement usually occur from the deductive process of unfolding the rules. With familiarity comes the increasing ability to anticipate events that are likely to occur, thus permitting the player to develop elaborate strategies. Although a highly skilled player perceives the game will eventually be mastered if performance is improved, creators of video games are usually one step ahead. A more difficult situation or level is always presented to a player after each goal has been achieved. This never-ending cycle keeps the player striving for mastery but never allows perfection to occur (Chaffin, Maxwell, & Thompson, 1982). These games lead one to continually, sometimes compulsively, attempt to improve one's performance.

Video games and gambling games share several properties. Both are exciting, contain elements of randomness, and operate on schedules of intermittent reinforcement. One major difference is that video games provide feedback which allow a player to improve performance and have some control whereas many gambling situations allow considerably less room for skill to play a role (e.g. Roulette). Video game players eventually uncover the rules that allow them to transform randomness into order whereas gamblers always deal with uncertainty and randomness. Both video game players and gamblers continually believe they can exert control over a game, but the reality is that unlike video game playing, gambling is primarily a game of chance operating on a variable ratio schedule in which the player merely has an illusion of exerting skill, especially with children who have limited problem solving abilities to

uncover sophisticated laws of probability or card counting. Due to this false belief of control, the gambler attempts to establish a sense of mastery and control while playing. It therefore could be hypothesized that children who are avid video game players, and who are accustomed to controlling their games through skill, may have a tendency to be greater risk takers in gambling scenarios due to their belief that they are able to control games, and with practice master randomness. If the compulsive behaviors of gamblers and video game players are the results of similar mechanisms of reinforcement, then it would be logical to suppose that these video game players will carry their relentless effort to exert control in a video game over to a gambling situation.

Principal Aims

The present study is exploratory in nature and is designed to examine the relationship between video game playing behavior and gambling behavior in children. More specifically, high and low frequency video game players at the elementary and secondary level are compared on a blackjack task as well as on self-report data. It is hypothesized that high frequency video game players will be more attracted to gambling activities due to the similarity of the types of reinforcement schedules involved in both activities, and thus gamble more frequently in their daily lives. It is also hypothesized that high frequency video game players will take more risks on a gambling task due to a false belief that they can control a gambling scenario since they actively control and are successful in their video game playing. Furthermore, it is hypothesized that males will be greater risk-takers than females, as is consistent with the literature, but that females who are high frequency video game players will lessen the gap between the sexes with respect to their gambling behavior.

The present study was also designed to examine possible developmental differences in gambling behavior from mid childhood to early adolescence. One would

expect significant changes in performance during the elementary school years given the fact that as children mature, their cognitive abilities becomes more sophisticated and differentiated. Given Piaget's (1950, 1953) description of children's mathematical deductive reasoning strategies, one could assume that young children's limited cognitive understanding may predispose them to a greater number of errors as well as the belief that games of chance may in fact be skill driven and subsequently controllable to a certain degree. It thus follows that as children develop cognitively, they may become more aware that games of chance involve less skill and more luck. By the time children reach Piaget's level of formal operational thought, they are able to hold in mind simultaneously all potential outcomes in a gambling situation, and have an understanding of the probabilities for each possible outcome measure (Stein, 1989). It could therefore be hypothesized that children beyond the age of eleven will be wiser in their gambling behavior. Nonetheless, it could also be that the inclusion of intermittent reinforcement schedules found in specific gambling activities, and the levels of excitement often generated while playing, may lead these children (like adults) to ignore their own cognitive understanding of the laws of probability.

To date, there seems to be a lack of studies examining developmental differences in children and adolescent gambling behavior despite the fact that gambling is recognized as being a popular activity amongst the young. Those studies which have been conducted are limited to survey, self-report data. This research project examines developmental issues in children's gambling in the game of blackjack, while at the same time incorporating self-report data.

CHAPTER 3

Method

Subjects

Children and adolescents were initially classified on the basis of frequency and duration of video-game playing behavior. To qualify as high frequency, a child was required to have reported playing video-games a minimum of 5 days per week, and played a minimum of 1.5 hours during each session. Low frequency was defined as playing video-games 2 days a week or less, and an hour or less at each playing session. Approximately 500 children were screened before obtaining the final sample.

One hundred and four children from grades 4 (N=37), 6 (N=33), and 8 (N=34), ranging in age from 9 to 14, participated in the study. Forty-nine were classified as high frequency and 55 classified as low frequency video-game players. The children were selected from middle class, public, English elementary and high schools in Montreal. Of the total sample, 51 were males, and 53 were females.

Measures

A comprehensive questionnaire (appendix A) was completed by all individuals. The questionnaire contained 30 questions inquiring about the nature of both video-game playing and gambling activities, 16 pertaining to video games and 14 to gambling.

A computerized blackjack game was used to measure risk-taking behavior on a gambling task. Blackjack was selected due to the relatively simplistic nature of the game, because it involves both elements of randomness and skill, and is familiar to many children. A color Lap Top IBM compatible computer was used in order to render the task as "life-like" and stimulating as well as to maintain the element of color found in video-games. The MS DOS computer software, BlackJack! Version 2.20D, written by Donald L. Granger (1991) and published by Glencoe Computing, graphically simulates a casino blackjack game. It was deemed appropriate for the young subjects due to its graphic accuracy and the fact that it adds the cards for each hand, thereby avoiding potential errors resulting from faulty arithmetic. It provides statistics for each player, such as gross winnings and wagers, number of hands played, percentage of winnings, percentage of accuracy, and final balance.

Procedure

All children who obtained parental consent to participate in the study were administered the questionnaire in their classrooms. A research assistant explained that all information obtained is confidential, and was present at all times to assist the children and adolescents. The children required 10 to 20 minutes to complete the task depending upon their age. On the basis of their reported frequency of video-game playing, high and low frequency video-game players were selected for further testing on the blackjack task.

High and low frequency video game players were individually administered the blackjack task. Children did not play with actual money, but were provided with a bankroll of $100 and given the incentive of winning movie gift certificates, proportionate to their winnings. More specifically, for every 5 dollars that they win above the initial $100 at the conclusion of the game, they were given a ticket to be entered in a draw for $20 worth of movie certificates. Therefore, the greater the number of tickets a child wins and enters into the draw, the greater the chances of winning the movie certificates. The children played the game for a 10 minute period or until their bankroll was depleted. No children were omitted on the basis of not being familiar with task requirements. Each child was provided with the following standardized instructions while being shown on the computer screen certain aspects of the game:

> You will be playing a game called blackjack against the computer. The whole idea is to have your cards add up to 21 or as close to 21 as possible without going over. The one who's total is closest to 21 without going over wins the hand. Don't worry about being able to add up your cards because the computer does that for you. The dealer will first allow you to decide whether or not you want another card, and only after you have decided to stop will he play his hand. If you want another card, you press the green button (hit) and if you want to stop (stand), you press the red button. You should know that it is considered a risk to ask for another card if your cards add up to 17 or more, and that it is also considered a risk to stand if your cards add up to 16 or less. But really, it is up to you to decide what to do. You can change your bet at every hand. The minimum you can bet at each hand is $5 and the maximum amount you can bet is whatever you have remaining in your account. Don't forget that your goal is to end up with an amount greater than the initial $100 dollars we lent you in order to get as many tickets as possible for the draw. (The research assistant then demonstrated several hands to show how to operate the computer, and the child was then permitted 5 practice trials to ensure they understood the task). Good luck and have fun. You have 10 minutes to play, or until you have run out of money.

CHAPTER 4

Results

Results pertaining to information yielded from the questionnaire and the blackjack task will be presented separately. Video game playing behavior in general will be examined, followed by gambling behavior obtained from self-reports. Gambling behavior will be evaluated with respect to high and low frequency video game players. The final section will present results obtained from the blackjack task, once again analyzed with respect to frequency of video game playing.

Video game playing behavior

Information pertaining to video-game playing behavior was obtained from the questionnaire. The children were asked to indicate the different types of video game systems they have within their households, as well as the reasons why they engage in video game playing. Their perceptions of the degree of skill and luck involved in playing video-games were assessed by asking them to categorize each as requiring "none", "a little" or "a lot". Children also indicated how many times they frequented arcades per month. Finally, they rated themselves on a likert-type scale from 0 to 9, 0 being "not good at all" and 9 being "excellent", on how well they play and how good they would like to be at playing video games, thus assessing their perceived and desired level of skill.

Results indicate that 92% of the children sampled have at least one video game system unit in their households. More specifically, 32% have one system, 22% own two systems, 18% own three systems, and 20% have four or more units in their homes. Nintendo was the most commonly owned system, followed by personal home

computers, Game Boy, Super Nintendo, Sega Genesis, Game Gear, and Video Way (a service provided by cable companies permitting individuals to play conventional video games on television sets (Table 1).

Table 1

Percentages of Children Who Own Video Game Systems.

Nintendo	60%	Sega Genesis	24%
Personal computer	47%	Game Gear	12%
Gameboy	39%	*Video Way	7%
Super Nintendo	37%		

* Video Way is a video game service provided by cable.

Children appear to engage in video game playing for numerous reasons, as was revealed by self reports. They chose from 5 categories (for enjoyment, to pass the time, for excitement, so their friends will like them, and "other") and were permitted to select as many as necessary. Eighty-five percent of the total sample reported engaging in video game playing for enjoyment, 62% do it to pass the time, 47% do so for the excitement it provides, and 3% indicated engaging in this behavior to obtain approval from friends. A very small percentage indicated "other" reasons for playing video games, those mainly being "to get better", "to make it to the highest levels", and "to be the best". Developmentally, younger children report playing video games for the excitement more so than do older individuals, with 43% of grade 4's versus 24% of grade 8's reporting excitement to be a reason for playing (Table 2).

In general, children perceived video-game playing as being more skill driven than luck driven. Ninety-three percent believed it necessitated some element of skill while 51% believed it required significant skill. Seventy -four percent believed there is some luck involved with only 20% considering it required a lot of luck (Table 3).

Table 2

Developmental Breakdown of Reasons for Engaging in Video Game Playing

REASONS	Grade 4	Grade 6	Grade 8	Total
enjoyment	89% (n=33)	85% (n=28)	82% (n=28)	86% (n=89)
passing time	54% (n=20)	76% (n=25)	56% (n=19)	62% (n=64)
excitement	43% (n=16)	39% (n=13)	24% (n=8)	36% (n=37)
social recognition	5% (n=2)	0% (n=0)	0% (n=0)	2% (n=2)

Table 3

Percentages of Perceived Skill and Luck in Video Game Playing

	NONE	A LITTLE	A LOT
SKILL	7%	42%	51%
LUCK	26%	54%	20%

Developmentally, children's perceptions of amounts of skill involved in video game playing do not change. However, perceptions of the role that luck plays changes with age such that its importance decreases. Thirty percent of grade 4 students indicated that "a lot" of luck is involved whereas only 3% of grade 8 students believed this to be true.

Children with a high frequency of video game playing were significantly more likely to go to arcades than those who rarely play video games with respected means of 8.5 and 0.9 visits per month ($t=4.17$, $df=102$, $p<.001$). This was not unexpected as the sample was previously selected based upon video-game playing behaviors. High frequency video-game playing males visit arcades significantly more frequently than do low frequency males ($t=3.58$, $df=49$, $p<.001$), and similarly, high frequency females go to arcades significantly more often than do low frequency females ($t=2.06$, $df=51$, $p<.044$). When comparing the sexes, it was found that high frequency males surpass the

amount of times high frequency females go to the arcades (t=-2.86, df=47, p<.006), whereas low frequency males did not differ from low frequency females (See Tables 4 and 5). It is interesting to note that there are no significant developmental differences in the amount of times children report going to arcades per month, the means being 5.08, 3.80, and 4.40 for grades 4, 6, and 8 respectively. Considering that older children are usually given more autonomy, one would expect that visits to arcades would increase with age.

Table 4

Rates of Arcade Attendance and Cognitive Perceptions of Video Game (VG) Playing for Female High and Low Frequency Video Game Players

	High Frequency		Low Frequency	
	MEAN	S.D.	MEAN	S.D.
Arcades per month	2.86	6.06	.48	1.82
Perceived VG playing ability	6.20	1.26	5.00	2.12
Desired VG playing ability	8.29	1.24	6.79	1.86

Table 5

Rates of Arcade Attendance and Cognitive Perceptions of Video Game Playing for Male High and Low Frequency Video Game Players

	High Frequency		Low Frequency	
	MEAN	S.D.	MEAN	S.D.
Arcades per month	13.15	15.95	1.33	2.73
Perceived VG playing ability	7.96	.10	6.33	2.01
Desired VG playing ability	8.89	.58	8.04	1.49

Not surprisingly, high frequency players rated themselves as being more skillful at playing video-games (t=4.349, df=101, p<.001) than did low frequency individuals,

and expressed greater desired levels of skill (t=4.365, df=100, p<.001) (see Tables 4 and 5). High frequency males rated themselves as possessing more skill (t=3.73, df=49, p<.001), and indicated having higher optimal desired levels of skill (t=2.74, df=49, p<.01) than their low frequency counterparts. Similarly, high frequency females rated their playing abilities as being greater (t=2.37, df=50, p<.02) and indicated higher desired abilities than did low frequency females (t=3.27, df=49, p<.002). High frequency male video game players rated themselves significantly higher in terms of skill (t=5.50, df=47, p<.001) as well as expressed a higher desired level of playing ability than did high frequency females (t=-2.21, df=47, p<.03). Finally, low frequency males perceive themselves as being better at playing (t=-2.35, df=52, p<.02), and hold higher ideals for their playing ability (t=-2.56, df=52, p<.01) than do low frequency females. Across grades, children rated their abilities consistently, with means of 6.28, 6.61, and 6.16 on the nine point scale for grades 4, 6, and 8 respectively. However, their desired level of video game playing ability decreases significantly with age (F=3.79, df=2, p<.026), the means being 8.40, 8.09, 7.40 respectively.

Gambling behavior

Information on gambling behavior was obtained from both the questionnaire as well as the computerized blackjack task. Within the questionnaire individuals indicated the amount of skill and luck they perceive is involved in gambling, as they did for video game playing. Data concerning whether or not they gamble, their frequency of gambling, and the largest amount of money they used to gamble at any one time.was ascertained. Furthermore, they were asked to rate themselves on how good they perceive themselves to be at gambling and to indicate how good they would like to be on a 10 point likert scale (0-9) similar to the one used in the video game section. Finally, they were asked to indicate whether or not gambling makes them feel important. The blackjack task was used to assess actual playing behavior and yields

measures of gross wagers (cumulative amount of money bet) and gross winnings (cumulative amount of money won), winning percentage (gross wins/gross wagers), number of hands played, percentage of accuracy and the final balance of each player.

Although 70% of children who report gambling perceive gambling as involving a lot of luck, 56% believe that a lot of skill is involved as well (Table 6). If one adds the category of a little skill, the result increases to 87%. This finding reveals that despite their awareness that luck plays a big role, they remain under the illusion that a substantial amount of skill is also involved. These findings are consistent across grades (Table 7).

Table 6

Percentages of Perceived Skill and Luck Involved in Gambling

	NONE	A LITTLE	A LOT
SKILL	13%	31%	56%
LUCK	7%	23%	70%

Table 7

Percentages of Perceived Skill and Luck Involved in Gambling by Grade

Grade Level	LUCK			SKILL		
	NONE	A LITTLE	A LOT	NONE	A LITTLE	A LOT
Four	10%	24%	67%	10%	24%	67%
Six	11%	15%	74%	15%	33%	52%
Eight	0%	30%	70%	13%	35%	52%

The children and adolescents indicated engaging in gambling activities for several reasons, the most popular reason being for the enjoyment (74%). The second most indicated reason was "for the excitement" (49%), followed by "to pass the time"

(25%), "to win money" (22%), and to win peer approval (1%). These reasons were consistent across gender, with the exception of males reporting more excitement than females, these percentages being 30% and 19% respectively (Table 8). It is also interesting to note the comparisons between the reasons why individuals play video games and why they gamble. It appears as though both activities are primarily engaged in because they provide enjoyment, but that video game playing is more often used to pass the time than is gambling. Individuals who gamble find video games more exciting than do non-gamblers, with 47% of gamblers versus 10% of non-gamblers playing video games for that reason (Table 9).

Table 8

Reasons for Engaging in Gambling Activities

REASONS	MALE	FEMALE	TOTAL
enjoyment	38% (n=28)	36% (n=26)	74% (n=54)
passing time	10% (n=7)	15% (n=11)	25% (n=18)
excitement	30% (n=2)	19% (n=14)	49% (n=36)
social recognition	0% (n=0)	1% (n=1)	1% (n=1)
win money	12% (n=9)	10% (n=7)	22% (n=16)

Table 9

Reasons Why Gamblers and Non-Gamblers Engage in Video Game Playing

Reason	Non-Gamblers			Gamblers		
	Male	Female	Total	Male	Female	Total
enjoyment	91% (n=10)	81% (n=17)	84% (n=27)	85% (n=34)	87% (n=28)	86% (n=62)
passing time	55% (n=6)	62% (n=13)	59% % (n=19)	45% (n=18)	84% (n=27)	63% (n=45)
excitement	18% (n=2)	5% (n=1)	9% (n=3)	60% (n=24)	31% (n=10)	47% (n=34)
social recognition	0% (n=0)	0% (n=0)	0% (n=0)	3% (n=1)	3% (n=1)	3% (n=2)

Of the total sample, 70% reported having gambled in the past, and 53% of those individuals reported gambling a minimum of once week or more. Gambling was defined as using real money for any of the following activities: purchasing lottery tickets, betting on sports pools, playing cards, playing bingo, playing slot machines, betting on video-game or video-poker, and betting on other games of skill.

Chi-square analyses revealed that high frequency video-game players were significantly more likely to have gambled (X^2=13.0, df=1, p<.001) and to be gambling once a week or more (X^2=20.5, df=1, p<.001). When analyzing with respect to gender, high frequency males are not statistically more likely to have gambled in the past than low frequency males (X^2=3.7, df=1, p<.054), yet are almost three times as likely to be gambling once a week or more (X^2=7.4, df=1, p<.007). A similar trend was found for females such that twice as many high frequency females report having gambled than low frequency female video-game players (X^2=8.4, df=1, p<.004). Furthermore, 55% of high frequency females reported gambling once a week or more versus only 0.1% of low frequency females gambling that often (X^2=12.8, df=1, p<.001) (Table 10).

Table 10

Percentages of High and Low Frequency Individuals Reported to Engage in Gambling Activities

	High Frequency		Low Frequency	
	Males	Females	Males	Females
Gambles in general	89%	86%	67%	42%
Gambles more than once per week	63%	55%	25%	.1%

High frequency males and females did not differ on whether they have gambled or whether they gamble once a week or more, nor do low frequency males and females differ statistically with respect to whether they gamble once a week or more. However, less than 1% of females reported engaging in this behavior whereas 25% of males

indicate their participation in some weekly gambling activity. Developmentally, no statistically significant differences were found, with 57% of grade 4 children, 85% of grade 6 children, and 68% of grade 8 adolescents reporting having gambled at one point. The percentages of those who engaged in gambling activities a minimum of once a week are 48% for both 4th and 8th graders, and 61% for grade 6 students (Table 11).

Table 11

Percentages of Children Gambling by Grade Level

Grade level	Gambles in general	Gambles more than once per week
Four	57%	48%
Six	85%	61%
Eight	68%	48%

The most common reported form of gambling for these children is the lottery (50%), followed by playing cards for money (41%), wagering on sports pools (38%), playing bingo (34%), buying sport lottery tickets (30%), playing video games and/or video poker for money and playing games of skill for money (27%), and finally, playing slot machines (16%). Chi-square analyses reveal that high frequency video game players engage in the following gambling activities more so than do low frequency video game players: lottery tickets (X^2=10.07, df=2, p<.007), cards (X^2= 16.78, df=2, p<.001), sports pools (X^2=12.176, df=2, p<.002), sport lottery tickets (X^2=13.08, df=2, p<.001), and wagering on video games and/or video poker (X^2=12.55, df=2, p<.006),. Table 12 illustrates the percentages of high and low frequency video game players who participate in the specific gambling activities less than once a week, or once a week and more. Within the high and low frequency groups, the males engage in each of the

activities more so than females. However, when further examining gender differences across frequency groups, it is revealed that high frequency female video game players engage in the following gambling pastimes more frequently (once a week or more) that do low frequency male video game players: lottery tickets (45% vs. 13%), cards (9% vs. 4%), sports pools (18% vs. 8%), bingo (9% vs. 4%), video games and/or video poker (14% vs. 8%), and slot machines (5% vs. 4%). No meaningful developmental differences were found with respect to the different types of gambling activities the students engage in.

Table 12

Percentages of Involvement in Various Gambling Activities by High and Low Frequency Video Game Players

Activity	Occurrence	High Frequency		Low Frequency		Total	
		male	female	male	female	male	female
lottery tickets	never	48%	18%	63%	65%	55%	45%
	less than once a week	33%	36%	25%	26%	29%	30%
	once a week or more	19%	45%	13%	10%	16%	25%
cards	never	30%	55%	75%	74%	37%	66%
	less than once a week	33%	36%	21%	26%	27%	30%
	once a week or more	37%	9%	4%	0%	22%	4%
sports pools	never	37%	59%	54%	90%	45%	77%
	less than once a week	22%	23%	38%	6%	29%	13%
	once a week or more	41%	18%	8%	3%	26%	10%
bingo	never	52%	68%	71%	74%	61%	71%
	less than once a week	26%	23%	25%	23%	25%	23%
	once a week or more	22%	9%	4%	3%	14%	6%
sport lottery tickets	never	37%	73%	75%	94%	56%	83%
	less than once a week	33%	18%	13%	3%	23%	11%
	once a week or more	30%	9%	13%	3%	21%	6%
video games/ poker	never	52%	64%	83%	90%	67%	76%
	less than once a week	33%	23%	8%	10%	21%	17%
	once a week or more	15%	14%	8%	0%	12%	7%
games of skill	never	44%	81%	67%	97%	55%	90%
	less than once a week	33%	14%	21%	3%	27%	8%
	once a week or more	22%	5%	13%	0%	18%	2%
slot machines	never	70%	86%	92%	87%	80%	87%
	less than once a week	22%	9%	4%	10%	14%	9%
	once a week or more	7%	5%	4%	3%	6%	4%

No significant differences between high and low frequency players were found for the greatest amounts of money bet while gambling. Similarly high and low frequency males did not differ with respect to this behavior, but high and low frequency females differed significantly, with avid video game players betting greater amounts of money ($t=2.09$, $df=30$, $p<.05$). An increasing developmental trend is noted, with grade 4's having bet a mean of $8.20, grade 6's having a bet mean of $8.10, and grade 8's having bet a mean of $13.00. Males show a similar increasing trend, with mean amounts being $9.00, $10.50, and $14.50 in grades 4, 6, and 8 respectively. Females are consistent across grades, showing no increases in their betting behavior with age. Not unexpectedly, males reported betting significantly larger amounts of money (M=$11.33) than females (M=$5.53) ($t=-3.13$, $df=69$, $p<.003$).

As can be seen in Tables 13 and 14, high frequency players did not differ from low frequency players in terms of perceived gambling ability, but indicated higher desired gambling abilities ($t=2.42$, $df=69$, $p<.02$). No developmental differences were noted for perceived ability, with means being 5.81 (grade 4), 4.93 (grade 6), and 5.30 (grade 8) (see Table 15). Across grades, males consistently rated themselves as being slightly above average, while females showed a decreasing trend, with grade 4 children rating themselves as being slightly above average, and grade 6 and 8 females rating their gambling abilities as slightly below average (Tables 16 & 17). Males viewed themselves as having greater gambling ability than females ($t=-2.12$, $df=69$, $p<.04$). For desired ability, the total mean score was only 7.47 revealing that in general, they desire to be above average, but not excellent or superior at gambling. With respect to developmental differences, grade 4 students indicated a higher optimal ability level than either grade 6 or 8 students, although not meeting statistical significance (Table 15). It might be that older children are more realistic. Across grades, males consistently indicated higher desired abilities than females, although not to a significant degree (Tables 16 and 17).

Interestingly, 23% of high frequency video-game players who gamble reported that gambling activities make them feel more important whereas only less than 1% of low frequency individuals who gamble reported this belief. However, this finding tends to decrease with age such that 24% of grade 4's, 19% of grade 6's, and 9% of grade 8's reported this perception (Table 18). In grade 4, males were more likely to indicate this effect whereas an equal amount of males and females did so for both grades 6 and 8.

Table 13

Means and Standard Deviations of Gambling Behavior for High and Low Frequency Male Video Game Players

	High Frequency		Low Frequency	
	MEAN	S.D.	MEAN	S.D.
Perceived ability	5.71	1.85	5.75	1.91
Desired ability	8.25	1.36	7.06	2.52
Largest bet	9.00	1.99	6.50	2.25
Number of hands	46.63	21.67	39.08	17.60
Gross wagers	607.07	346.64	387.54	207.91
Gross winnings	292.83	202.30	191.35	120.81
End balance	-27.02	91.62	-42.31	62.12
% of accuracy	77.15	6.73	75.75	77.22
Percentage of wins	46.47	9.29	42.06	13.82

Table 14

Means and Standard Deviations of Gambling Behavior for High and Low Frequency Female Video Game Players

	High Frequency		Low Frequency	
	MEAN	S.D.	MEAN	S.D.
Perceived ability	5.06	1.59	4.38	2.29
Desired ability	7.39	1.79	6.38	2.06
Largest bet	5.00	1.65	2.00	.91
Number of hands	44.09	22.45	41.03	17.52
Gross wagers	355.86	148.53	377.13	214.60
Gross winnings	149.54	80.18	176.66	131.33
End balance	-66.00	47.32	-32.64	71.88
% of accuracy	78.41	5.65	77.42	6.64
% of wins	39.70	11.46	42.47	13.35

Table 15

Means and Standard Deviations of Gambling Behavior by Grade

	Grade 4		Grade 6		Grade 8	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
Perceived ability	5.81	2.16	4.93	1.92	5.30	1.66
Desired ability	8.14	1.50	6.93	2.11	7.35	2.10
Largest bet	8.20	2.06	8.10	1.76	13.00	2.05
Number of hands	35.60	15.63	38.64	19.07	54.32	19.45
Gross wagers	433.16	290.80	395.64	238.81	474.38	251.35
Gross winnings	200.80	160.08	186.23	149.84	226.19	144.50
End balance	-60.53	48.82	-38.79	85.82	-39.84	50.25
% of accuracy	75.73	8.10	78.12	6.41	77.82	4.45
% of wins	40.24	11.41	44.10	13.04	44.42	12.08

Table 16

Means and Standard Deviations of Gambling Behavior for Males by Grade

	Grade 4		Grade 6		Grade 8		Total males	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
Perceived ability	5.92	2.36	5.33	1.83	5.87	1.41	5.72	1.85
Desired ability	8.38	1.32	7.08	2.47	7.80	1.93	7.77	1.97
Largest bet	9.00	2.14	10.50	1.96	14.50	2.09	11.33	2.10
Number of hands	37.16	14.79	40.86	23.59	51.06	20.30	43.08	20.03
Gross wagers	539.74	352.08	470.36	317.63	491.78	259.51	503.76	307.59
Gross winnings	264.95	186.02	227.75	190.64	237.58	157.68	245.08	174.96
End balance	-56.95	63.91	-11.46	96.45	-27.92	75.82	-34.22	78.73
% of accuracy	75.00	8.57	76.86	7.86	77.78	3.44	76.49	6.93
% of wins	43.32	7.91	46.66	12.53	43.77	14.60	44.39	11.74

Table 17

Means and Standard Deviations of Gambling Behavior for Females by Grade

	Grade 4		Grade 6		Grade 8		Total Females	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
Perceived ability	5.62	1.92	4.60	1.99	4.25	1.67	7.77	1.91
Desired ability	7.75	1.75	6.80	1.86	6.50	2.27	6.97	1.94
Largest bet	5.50	1.98	5.30	1.46	5.80	1.80	5.53	1.48
Number of hands	33.94	16.72	37.00	15.41	58.00	18.40	42.30	19.53
Gross wagers	320.67	147.41	340.58	144.85	454.81	248.79	368.30	188.66
Gross winnings	133.08	90.40	155.63	106.48	213.37	132.02	165.41	112.82
End balance	-60.53	48.82	-38.79	85.82	-39.84	50.25	-46.49	64.50
% of accuracy	76.50	7.75	79.05	5.11	77.87	5.49	77.83	6.21
% of wins	36.99	13.70	42.21	13.43	41.32	8.86	41.32	12.56

Table 18

Feelings Associated With Gambling Reported by Frequency and Grade

	feelings of importance	fear of getting caught	gambles more than desired	gambles too much
Frequency				
High	23%	29%	31%	14%
Low	.1%	17%	13%	6%
Grade Level				
Four	24%	48%	43%	29%
Six	19%	33%	19%	4%
Eight	9%	4%	22%	9%
TOTAL	16%	28%	27%	13%

Twenty-eight percent of those who gamble report a fear of being caught when doing so. High frequency video game players are more fearful of being caught while gambling than low frequency players, the percentages being 29% and 17% respectively. A decreasing trend is noted with age such that as children get older, their fear of being

caught participating in some gambling activity decreases. At the grade 4 level, males appear to be more fearful, but at grades 6 and 8, reports for both males and females are similar (Table 18).

Of those who gamble, 27% indicated that they engage in gambling activities more than they would like, and 13% feel they gamble too much. High frequency video game players report gambling more than they would like to and gambling too much, twice as often as do low frequency video game players (Table 18). Surprisingly, children in grade 4 have the greatest proportion of students who fall into those two categories, with 43% stating that they gamble more than they want, and 29% reporting that they gamble too much. Looking across grades, 84% of individuals reporting gambling more than they want were males, and 100% of those who revealed that they gamble too much were males as well.

Interestingly, a great proportion of these children's gambling activities occur with and around family members. Fifty-one percent of students who gamble report gambling with their siblings, 36% gamble with their parents, 49% gamble with other relatives, and 78% gamble in their own homes. Students also indicated gambling with their friends (63%), gambling alone (18%), and with strangers (3%). Thirty-nine percent gamble at friends' homes, and 17% gamble at school. Tables 19 and 20 further break down the percentages with respect to frequency and gender respectively. Developmental differences are noted, with a greater percentage of older students gambling with friends and at friends' houses. Similarly, gambling is more likely to occur in high schools than in elementary schools. A decreasing developmental trend was found for children gambling alone and/or with strangers, such that children are less likely to do so as they get older. Grade 6 students gamble with their parents, and in their own homes, more so than children from other grades. Gambling with siblings and with other relatives remains consistent across the age groups. Table 21 presents the percentages developmentally.

Table 19

With Whom and Where Gambling Takes Place by Frequency of Video Game Playing

DESCRIPTION	High Frequency N=43	Low Frequency N=30
with friends	67% (n=29)	53% (n=16)
with siblings	56% (n=24)	43% (n=13)
relatives	47% (n=20)	50% (n=15)
parents	37% (n=16)	33% (n=10)
alone	16% (n=7)	20% (n=6)
with strangers	5% (n=2)	0% (n=0)
at home	72% (n=31)	83% (n=25)
at friends'	44% (n=19)	30% (n=9)
at school	16% (n=7)	17% (n=5)

Table 20

With Whom and Where Gambling Takes Place by Gender

DESCRIPTION	Males N=41	Females N=32
with friends	71% (n=29)	50% (n=16)
with siblings	39% (n=16)	66% (n=21)
relatives	54% (n=22)	41% (n=13)
parents	37% (n=15)	34% (n=11)
alone	15% (n=6)	22% (n=7)
with strangers	5% (n=2)	0% (n=0)
at home	56% (n=31)	78% (n=25)
at friends'	46% (n=19)	28% (n=9)
at school	24% (n=10)	6% (n=2)

Table 21

Developmental Breakdown of With Whom and Where Gambling Takes Place

DESCRIPTION	Grade 4 N=22	Grade 6 N=28	Grade 8 N=23
with friends	36% (n=8)	64% (n=18)	83% (n=19)
with siblings	50% (n=11)	50% (n=14)	52% (n=12)
relatives	55% (n=12)	43% (n=12)	48% (n=11)
parents	32% (n=7)	46% (n=13)	26% (n=6)
alone	23% (n=5)	18% (n=5)	13% (n=3)
with strangers	5% (n=1)	3% (n=1)	0% (n=0)
at home	77% (n=17)	82% (n=23)	70% (n=16)
at friends'	18% (n=4)	36% (n=10)	61% (n=14)
at school	18% (n=4)	0% (n=0)	35% (n=8)

Gambling behavior on the blackjack task

With respect to performance on the blackjack task, high frequency individuals wagered significantly greater amounts of money (M=$493.00) (t=2.23, df=102, p<.028) than low frequency video game players (M=$381.20). High frequency males (Table 13) were found to wager more money (M=$607.07) than did low frequency males (M=$387.54) (t=2.70, df=49, p<.01), however a similar trend was not found for females (Table 14). Not surprisingly, high frequency males had significantly higher gross wagers (M=607.07) than high frequency females (M=$355.86) (t=-3.40, df=47, p<.003), while males and females did not differ within the low frequency group.

No significant findings were found for gross winnings or for percentage of winnings when comparing high and low frequency video game players. However, high frequency males had higher gross winnings (M=$292.83) than low frequency males

(M=$191.35) (t=2.14, df=49, p<.04). Furthermore, high frequency males had higher gross winnings (t=-3.12, df=47, p<.003) and a greater percentage of winnings (t=-2.28, df=47, p<.03) than high frequency females. No significant differences were found between high and low frequency females, nor between low frequency males and females.

No significant findings were found with respect to frequency of video game playing and/or gender for the following playing behaviors: number of hands played, percentage of accuracy, or end balance (See Tables 13 and 14). Percentage of accuracy refers to the number of times the players hit and stand when they should over the number of times they hit or stand when the laws of probability suggest they should not. However, the blackjack software also factored in "double-downs", a notion judged as being too complex for the young subjects to grasp. As such, obtained percentages of accuracy are not a true reflection of the players performance, and thus may account for the lack of any meaningful findings.

Although males were found to place greater wagers, and experience greater total gross winnings, their final balances at the completion of the task were not statistically superior to that of any other group, merely suggesting that high frequency video-game playing males are greater risk-takers on the blackjack task. Yet, it is interesting to note that the high frequency males, in general, had the lowest mean losses for all groups. This was the reverse for females. For males, this might be reinforcing their risk-taking.

Significant developmental differences were found with respect to the total number of hands played, with children playing a mean of 35.60 hands in grade 4; 38.64 in grade 6; and 54.32 in grade 8 (F=10.75, df=2, p<.001) (Table 15). This increasing trend may be accounted for by the fact that children are able to process information more quickly as they mature, and thus play at a faster rate. Furthermore, the older children in this sample were more likely to play the entire 10 minutes since fewer of

them depleted their bankrolls before the time limit was reached. There were no gender differences found for the number of hands played.

No significant developmental differences were noted for the following variables: gross wagers, gross winnings, final balance, percentage of accuracy, and percentage of winnings, suggesting that children's playing behaviors are developed and maintained from a relatively young age. However, although not significant, grade 4 students finished with lower end balances in their bankroll than did grades 6 and 8, indicating a somewhat overall poorer performance on the task.

As well, no significant findings were found when looking at gender differences within grades, although some trends are worth noting with respect to female players. Female students show an increasing trend with age in the amount of total wagers they make, gross winnings they yield, and total percentages of money won (Table 17).

With respect to gender differences across grades, males in general were found to make higher gross wagers ($t=-2.72$, $df=102$, $p<.008$) and have greater gross winnings than females ($t=-2.77$, $df=102$, $p<.007$), suggesting that they are exhibiting greater risk-taking behaviors (Table 16).

CHAPTER 5

Discussion

This research was an exploratory study attempting to establishing a relationship between video-game playing and gambling behavior. Interestingly, a higher proportion of individuals who are high frequency video game players reported having gambled, and both high frequency males and females were significantly more likely to be gambling once a week or more. High and low frequency females differ more dramatically than do high and low frequency males, possibly suggesting that engaging in video game playing has a greater effect on females in terms of gambling behavior. However, it is more likely that predisposing and constitutional factors that are important determinants of why certain individuals engage in video game playing also may predispose them to take greater risks and engage in gambling behavior. It may be that risk-taking is viewed as "masculine" activity, and that high frequency female video game players are more closely associated with the male sex-role than the female sex-role. Research has suggested that problem-solving abilities are more closely related with the male sex-role (masculine personality type) rather than gender itself (Kelly, Wildman, & Uney, 1982). Since betting in itself involves problem-solving, high frequency female video game players may therefore be more forceful and dominant in nature, thus differentiating themselves from the other females. Other such factors may include physiological levels of arousal, social influences, emotional states, etc.

A more interesting revelation was that high frequency video game playing females were more likely to have gambled, and to gamble once a week or more, than low frequency males. This magnifies the link between video game playing and gambling since males usually engage in these behaviors more so than females.

Nonetheless, high frequency male video game players appear to be the individuals who are most attracted to gambling activities, a finding consistent with the literature on gender differences (Fisher, 1990; Ide-Smith & Lea, 1988; Ladouceur et al., in press; Rosenstein & Reutter, 1980). The fact that prevalence rates do not differ significantly with respect to age suggests that these behavior patterns may be established fairly early on in life. Occasional gambling amongst today's youth should not necessarily be considered a problem, however, the probability of these children developing a gambling addiction is worrisome. Children's gambling rates appear to be on the rise (Volberg & Steadman, 1989b), and have been associated with poor academic achievement, social problems, and criminal activities (Ladouceur & Mireault, 1988; Lesieur & Klein, 1987). Of particular concern is the proliferation of legalized gambling opportunities and the fact that pathological gamblers report the onset of their problem to have occurred at a very young age (Custer, 1982; Livingston, 1974).

High frequency video-game players were found to wager more money on the blackjack task suggesting that frequency of video-game play is related with greater risk-taking behavior. High frequency males in particular, appear to be taking the greatest amounts of risk on this task. Despite their higher wagering and overall greater gross winnings, they fail to generate a higher end balance indicating that they are being less cautious in their playing decisions. It is not surprising high frequency individuals take greater risks since they view gambling as an activity which involves a large amount of skill. More specifically, their tendency to wager greater amounts of money could be viewed as an indication of a false sense of security and confidence that they are exerting control over the gambling situation. This illusion of control, or belief that events determined by chance are in fact somewhat under their control, suggests that the players' cognitions appear to be driven by the intermittent schedules of reinforcement in the game. More specifically, since the players are expecting reinforcement to occur at any time, when it finally occurs they believe it has something to do with their ability to

control outcome of events, despite the number of times reinforcement did not take place. It appears as though they get so caught up in the excitement of the game (physiological arousal) that their ability to think rationally is lost. These behaviors in children are consistent with research on adult cognitions such that when they are asked about the controllability of outcomes of independent events in interviews or in surveys, they tend not to endorse an illusion of control. However, in contradiction, when in a gambling situation, they claim to be able to predict when a machine is about to pay off (Dickerson, 1993).

According to Piaget's (1950) theory of cognitive development, children from ages 7 to 11 are in the concrete operational stage and are limited to concrete problem solving abilities. At approximately 11 years of age, they enter the formal operational stage and possess the ability to think abstractly, formulate hypotheses, and use deductive reasoning. Changes with age result in new, more sophisticated levels of organization which differs in their degree of complexity of the rules of transformation (Elkind, 1981). Children from grades 6 and 8 reflect this higher level of cognitive ability in their playing behaviors, such that performance for children at these two grade levels resemble each other, with the greatest differences found being between grades 4 and 6, the age span in which the shift from concrete to formal operations takes place. When taking into account the ratio of gross wagers over the total number of hands played, older children appear to be betting more conservatively on the blackjack task. Furthermore, even though the grade 8 individuals were found to be betting less per hand, and have the same amount of gross winnings as grades 4 and 6, they have the highest end balances, revealing that they are "playing smarter" and exerting greater judgment, and likely using more sophisticated cognitive strategies and an understanding of the laws of probabilities.

It is noteworthy that the children and adolescents in this study indicated in the questionnaire that a great degree of both skill and luck are involved in gambling in

general. They thus differ from adults in terms of rationality such that despite their awareness of the role of chance in gambling activities, they are irrational in their belief that skill also plays a "significant" part. It may be that they are not yet cognitively sophisticated enough to realize that chance precludes skill, and thus respond in a manner consistent with an illusion of control. Since high frequency video game players appear more likely to experience this false sense of control, it is plausible to postulate that they are relating their gambling experiences to their ability to exert control when playing video games, an activity which is mostly skill driven despite employing reinforcement schedules similar to those used in gambling activities. If this indeed is a transfer of "skill" from video-game playing to the blackjack task, it would be interesting to see whether such a transfer would occur on a gambling task which does not necessitate any skill whatsoever, such as roulette.

In accordance with previous studies which have postulated that gambling behavior is frequently motivated by the desire to escape boredom and experience excitement (Jacobs, 1982; Kallick, Suits, Dielman, & Hybels, 1979), children and adolescents in this research project engage in gambling activities primarily for the enjoyment and excitement of the activity. A great majority of gambling was found to take place in the home with relatives, revealing that gambling itself is an enjoyable, exciting pastime without the stimulating environment of a casino.

The fact that high frequency children reported that gambling generates within them feelings of importance is alarming. It has been suggested that children who engage in risk-taking behaviors are positively regarded by their peers, since such activities are viewed as acts of bravery. This, coupled with the excitement of playing and false sense of control, may account for why these feelings of importance are generated. Grade 4 children appear to be the most influenced by these feelings, followed by grade 6 and 8 students. It is possible that as children mature, other more meaningful factors (e.g. relationships, appearance, accomplishments) influence their

self-reflections and self-concept, thus leaving them less impressionable to the effects of gambling.

Younger children appear to be more fearful of getting caught in the act of gambling than older individuals such that there is a decreasing trend in the percentages of children reporting this fear with age. This may reflect a societal view that as children get older, their gambling becomes more and more acceptable as a legitimate pastime. By the time they reach adolescence, very few individuals may feel they are doing something wrong. Society has taken it upon itself to educate children and adolescents about the negative consequences of smoking, drug, and alcohol addictions. It is time that gambling be addressed as well. Furthermore, the fact that gambling is glamorized and highly publicized in today's society must be contributing to the acceptability of juvenile gambling. Within the present sample, selected on the basis of high and low frequency of video game playing, 70% of children and adolescents reported having gambled. Of those, 53% report gambling a minimum of once a week. These percentages are in accordance with findings from other recent survey studies (Ladouceur et al.; in press; Ladouceur & Mireault, 1988). Of considerable concern is the rising prevalence of pathological gambling in the general population (Volberg & Steadman, 1989b), and the introduction and prevalence of legalized gambling establishments. In fact, many "instant win" lotteries appear aimed at a young audience, a population anxious for immediate rewards. These lottery tickets of low cost, have a high pay out rate, but with small payoffs. This intermittent reinforcement schedule maintains the interest of children and adolescents. The use of sports related betting and lotteries are particularly attractive to young males.

It is interesting to note that a greater proportion of high frequency video game players, especially at the grade 4 level, indicated that they gamble more than they would like to, and gamble too much, suggesting that they are unsuccessful at regulating their own gambling behavior. All of these individuals who revealed that they feel they

gamble too much were males. Children and adolescents are thus aware, at some level, that gambling is not a very healthy pastime since they realize that some limits need to be placed upon their participation in this activity. The fact that the children themselves are aware that gambling can be a problem highlights the potential severity of the matter.

Gambling in youth has been associated with criminal involvement and poor academic achievement (Ladouceur & Mireault, 1988; Lesieur & Klein, 1987), and retrospective research has shown that the majority of pathological gamblers started gambling at a young age (Custer, 1982; Dell et al., 1981; Livingston, 1974). This study lends further support to the widely held belief that gambling commences at a very young age, and has found that young high frequency video game players are more prone to be engaging in gambling related activities. While it is not suggested that these reports of early gambling behavior will directly lead to an increase in compulsive or pathological gambling disorders, it nevertheless remains a concern. There are clear indications that there exists a co-morbidity with other psychiatric disorders (see review by Lesieur & Rosenthal, 1991). The fact that parents perceive gambling behavior in their children to be socially acceptable and that such gambling behavior may be linked to juvenile delinquency and poor academic performance is alarming. As well, the research indicates that the amount of money wagered and risk-taking strategies, especially for males, increases with age. The data suggests that children as young as 9 years of age, in grade 4, are actively involved in some form of gambling activity and are very familiar with the game of blackjack. The intermittent reinforcement schedules associated with the game of blackjack, coupled with excitement, enthusiasm, arousal, and possibility of winning money or prizes, significantly increases the likelihood that they will continue to engage in such behaviors.

Male high frequency video-game players appear to be the group most "at risk" for developing problematic gambling habits, and this trend is already established at the elementary school level. Educating young children as to the devastating consequences

of a gambling problem could prove to be beneficial. Relatively little is known concerning the potential harmful or beneficial effects of video game playing. The same remains true for young gamblers. Can it be as Jacobs (1989) said that underage gambling may be simply dismissed as "harmless fun and games"? Jacobs argues that in 1988 as many as 7 million juveniles were gambling for money, some with and some without the knowledge and approval of their parents. Still further he reports that more than 1 million of these youths had serious gambling-related problems. Treatment programs designed for adult pathological gamblers, or Gamblers Anonymous, may not be the appropriate intervention strategies for children and young adolescents.

The present study represents a primary attempt to facilitate our understanding of the relationship between video game playing and gambling behavior in children, and to further our understanding of children's gambling practices, perceptions, strategies, cognitions, and behaviors.

Limitations

This study presents an initial evaluation of children's gambling behaviors with use of an actual gambling task. Although interesting findings were yielded in terms of gross wagers and gross winnings of these youths, the existing blackjack software was not sensitive enough to measure their percentage of accuracy, a measure which would provide greater insight into risk-taking behavior. One would assume that the greater the risk, the lower the accuracy. Studies utilizing more sophisticated measures would provide better insight into children's gambling behaviors.

It has been suggested that laboratory confined studies of gambling have several limitations, mainly being that bringing real life situations into a controlled unrealistic setting changes the nature of the task as well as excludes "hidden interactions" which take place in real life situations (Anderson & Brown, 1984). However, considering that the focus of this study revolves around the intermittent schedules of reinforcement

present in gambling tasks, and since no attempt was made to fabricate an unrealistic "social scenario" or to measure levels of arousal, the nature of the task was deemed to be uncompromised. Furthermore, survey information about their gambling activities outside of the experimental environment were also gathered to lend support to the findings. The fact that the children and adolescents in this research were not using their actual money to gamble with represents a limitation, although it appears as though the incentives given to them were sufficiently motivating. Due to ethical considerations, it remains difficult to have children engage in "real" gambling activities involving risking their own money.

It should be noted that no causality can be established from this study, such that it still remains unclear whether experience with video-games leads one to gamble, or whether both activities attract the same children due to their shared properties. It may be that children who are avid video-game players are drawn to activities which employ intermittent schedules of reinforcement. Gambling may be viewed by these children as being similar and even more interesting than video games due to the added element of the excitement of winning money or prizes. It is also plausible that gambling is influenced by exposure to arcades rather than by video-games themselves since high frequency video-game players frequent them more often. Only longitudinal studies can address such issues. Furthermore, of equal importance is whether information yielded from the blackjack task is generalizable to other forms of gambling. Further studies employing different gambling tasks along with other measures of risk-taking with children are necessary.

Recommendations for future research

Similar research incorporating other gambling tasks would be beneficial in assessing children's gambling behavior on a more global scale. Furthermore, investigation into the personality constructs of young female gamblers to determine

what differentiates them from their non-gambling counterparts appears warranted. The fact that high frequency video game playing females are more likely to engage in gambling, and that they significantly distinguish themselves from low frequency male video game players in terms of gambling behavior, suggests that this population is indeed unique and warrants further investigation. Finally, gambling research investigating special populations of young high risk children and adolescents is lacking. Emotionally disturbed, hyperactive, and conduct-disordered youths are just a few examples of populations which are in dire need of research in the area of juvenile gambling.

With more of our youth succumbing to other forms of addiction, in particular substance abuse, little attention is being paid to therapeutic and/or preventative programs aimed at decreasing children's gambling behavior. More research is needed to determine which factors play a role in leading children to gamble, to understand the underlying processes and etiologies, to establish which populations are at greatest risk, and to initiate and systematically evaluate intervention programs. The potential negative consequences to our society remain obvious. The proliferation of legalized gambling activities is increasing at an alarming rate. It is now time to address these issues.

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APPENDIX A

Name: _____ Grade: _____ Sex: ____m ____f

Part A: VIDEO GAME PLAYING BEHAVIOR

1) Please indicate which types of systems you have?

_____ none
_____ Nintendo
_____ Super Nintendo
_____ Game Boy
_____ other
(which one?) _____
_____ Sega
_____ Game Gear
_____ Video way
_____ a computer on which you play video games

2) Do you play video games outside your home? (you can have several answers)

_____ no
_____ at arcades
_____ at friends
_____ other (please specify) _____

2b) How many times do you go to the arcade per month? _____

3) In general, how many days a week do you play video games?

_____ none
_____ 1
_____ 2
_____ 3
_____ 4
_____ 5
_____ 6
_____ 7

4) In general, how long do you play video games EACH TIME you play?

Monday to Friday		Saturday & Sunday	
less than 1/2 hour	_____	less than 1/2 hour	_____
1/2 hour	_____	1/2 hour	_____
1 hour	_____	1 hour	_____
2 hours	_____	2 hours	_____
3 hours	_____	3 hours	_____
4 hours	_____	1/2 day	_____
more than 4 hours	_____	full day	_____

5) How many video games do you own?

_____ none
_____ between 4 and 6
_____ between 11 and 15
_____between 1 and 3
_____between 7 and 10
_____more than 15

6) How many times a week do you rent video games? _____

7) How many games do you or your parents usually rent for you at a time?_____

8) Do you think you play video games too much? _____ yes _____ no

9) How much skill is needed to be a good video game player?

_____ none _____ a little _____ a lot

10) How much luck is needed to be a good video game player?

_____ none _____ a little _____ a lot

11) List your favorite video game cartridges

1)_____

2)_____

3)_____

4)_____

12) If you could buy 3 new video game cartridges, what would they be?

1)_____

2)_____

3)_____

13) Please rate yourself on how good you are at playing video games (circle the number)

1 2 3 4 5 6 7 8 9
poor average excellent

14) How good would you like to be at playing video games?

1 2 3 4 5 6 7 8 9
poor average excellent

15) Why do you play video games? (you can have more than one answer)

_____ for enjoyment
_____ to pass the time
_____ for excitement
_____ so my friends will like me
_____ other (please specify) _____

16) Do you feel more important than usual when you play video games?
____ yes ____ no

Part B: GAMBLING BEHAVIOR

17) Please check the following types of gambling you have done. Please mark only one answer for each.

	never	less than once a week	once a week or more	
a)	____	_____	_____	play cards for money
b)	____	_____	_____	bet on sports (i.e. sports pools) with friends
c)	____	_____	_____	buy sports lottery tickets
d)	____	_____	_____	buy lottery tickets
e)	____	_____	_____	play video games or video poker for money
f)	____	_____	_____	play bingo for money
g)	____	_____	_____	play slot machines for money
h)	____	_____	_____	bowling, pool, or other games of skill for money
i)	____	_____	_____	another form of gambling not listed above Please list_____

*** IF YOU HAVE ANSWERED "NEVER" TO ALL THE CATEGORIES IN THE ABOVE QUESTION, YOU HAVE FINISHED COMPLETING THE QUESTIONNAIRE. THANK YOU!**

18) What is the largest amount of money you have ever gambled with in one day?

_____ less than $1
_____ between $1 and $3
_____ between $4 and $6
_____ between $7 and $10
_____ between $11 and $15
_____ between $16 and $20
_____ more than $20
(please specify how much) _____

19) When you gamble, who do you gamble with? (You can have more than one answer)

_____ alone
_____ my parents
_____ my friends
_____ my brother or sister
_____ strangers
_____ other relatives

20) Where do you gamble? (You can have more than one answer)
_____ at home _____ at school
_____ at friends _____ other (please specify) _____

21) Do you ever gamble more than you want to? _____ yes _____ no

22) Have you ever borrowed money to gamble? _____ yes _____ no

23) Are you afraid of getting caught when gambling? _____ yes _____ no

24) Do you think you gamble too much? _____ yes _____ no

25) How much skill is needed to be a good gambler?

_____ none _____ a little _____ a lot

26) How much luck is needed to be a good gambler?

_____ none _____ a little _____ a lot

27) Please rate yourself on how good you are at gambling (circle the number)

1 2 3 4 5 6 7 8 9
poor average excellent

28) How good would you like to be at gambling?

1 2 3 4 5 6 7 8 9
poor average excellent

29) Why do you gamble? (you can have more than one answer)

_____ for enjoyment
_____ to pass the time
_____ for excitement
_____ so my friends will like me
_____ other (please specify) _____

30) Do you feel more important than usual when you gamble?
_____ yes _____ no

THANK YOU!