

An Empirical Examination of Jacobs' General Theory of Addictions: Do Adolescent Gamblers Fit the Theory?

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The present study examines 817 adolescent High School students' gambling behavior. Participants completed the DSM-IV-J, a gambling screen examining severity of gambling problems along with the High School Personality Questionnaire (HSPQ), the Reynolds Adolescent Depression Scale (RADS) and a questionnaire devised by the authors inquiring about gambling behavior, substance abuse, alcohol consumption, and cigarette smoking. The study seeks to test the Jacobs' (1986) General Theory of Addictions, using problem and pathological adolescent gamblers as the *prototype* to test the model. The results obtained through path analysis and logistic regression suggest that Jacobs' theory is a plausible and likely explanation for the development of a gambling addiction amongst adolescents. The clinical implications are addressed.

It is likely—at least in the short term—that the conceptual future of the compulsive gambling field will be shaped in part by the important concepts drawn from the better known addictions. After all, we now view compulsive gambling—for better or worse—as an addictive behavior. It is very important, then,

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that we understand—and hopefully learn from—the conceptual problems of the other addictions.

(Shaffer, 1989, pp. 7–8)

Gambling has proven to be a very popular pastime among youth (e.g. Gupta & Derevensky, 1996, Jacobs, 1989; in press; Stinchfield, Cassuto, Winters, & Latimer, 1997; Wynne, Smith, & Jacobs, 1996). Being known as a gambler (or risk-taker) leads to social recognition and subsequently to a higher status amongst friends (Smith & Abt, 1984). Fisher (1993) and Griffiths (1991) have painstakingly studied the social milieu of arcades in England where adolescents play the fruit machines, and have identified a social hierarchy ranging from the almost to the least respected, based upon playing performance. Most youth participate in gambling activities without serious consequences or the development of a dependency, yet some feel the need to gamble excessively, assigning it priority above all else. The need to understand what differentiates this small subset of individuals is what feeds addiction theorists and fuels research such as the current study. To date, there remains a lack of empirical research investigating the relationship between personality factors and degree of gambling among adolescents.

Although gambling behavior can be traced back for centuries, it was not until the past decade that it has come to be viewed as an addictive behavior similar to other addictions. In 1983, Levinson, Gerstein and Maloff conducted a series of meta-analyses in an attempt to uncover psychological, sociological, and biological commonalities amongst the different disorders of addiction. Although they were unable to provide sufficient empirical support, they concluded that regularities across addictions were evident. Blaszczynski, Buhrich, and McConaghy's (1985) examined personality variables among heroin addicts and pathological gamblers, and concluded that gambling, like heroin dependency, is an addictive disorder. Carlton and Goldstein (1987), examined physiological correlates of pathological gambling and concluded that these factors are a necessary and integral part of any formulation or theory of pathological gambling, not unlike the theories and research concerning alcohol and drug dependency. In addition, numerous investigators report multiple comorbid addictions amongst addicts, suggesting they all fulfill a similar need (Lesieur, Blume, & Zoppa, 1986). Withdrawal symptoms, which are common to

all addictions, were also experienced by up to 50% of Gamblers Anonymous members when they stopped their gambling (Wray & Dickerson, 1981).

Jacobs (1989) defines an addiction as "a dependent state acquired over time by a predisposed person in an attempt to relieve a chronic stress condition" (p. 35). In this definition, only certain individuals can fall victim to an addiction, and the chosen addiction provides relief from a stressed state. But what predisposes a person to addiction? Jacobs postulates several basic premises. Firstly, he contends that two sets of interdependent, predisposing factors must be present for an individual to be at risk for developing and maintaining an addictive behavior, one being an abnormal physiological resting state that is chronically either excessively excited or hypotensive, and the other being a psychological nature characterized by feelings of inferiority, rejection, inadequacy, and/or guilt stemming from childhood, and low self-esteem. Accordingly, "... both sets of predisposing factors must coexist and exercise their respective effects before an individual will maintain an addictive pattern of behavior in a conducive environment" (Jacobs, 1989, p. 39).

A physiological condition of either being chronically hyper or hypo-aroused is believed to be stress-inducing. Individuals suffering from either of these extreme arousal levels are motivated to seek activities or substances that correct the altered resting state with the goal of obtaining a more comfortable homeostatic state. It remains plausible that a person with a hypotensive physiological arousal level may find relief in a stimulating and exciting activity such as gambling, temporarily eliminating their boredom and possible depression. It follows that such individuals would likely have a greater propensity for risk-taking and sensation-seeking than the norm. In contrast, a person with a hypertensive arousal state would likely find more relief in alcohol or marijuana, two substances known for their depressant effects. In both these examples, gambling and substances serve to regulate and "normalize" physiological resting states. Impressive support for this theory was obtained by Martinez-Pina et al. (1991) who found that pathological adult gamblers reported feelings of inferiority and rejection in their childhood, reported experiencing dissociative states when engaged in gambling, and showed a higher prevalence of depression than controls.

In Jacobs' general addictions theory, an addictive preoccupation,

such as gambling, enables the individual to had escape from painful realities and further fosters the sense of being a highly successful and admired individual who, at the time of indulgence, feels invincible. Dissociative states are common to all forms of addiction and permit the individual to escape into denial and bliss from psychological distress. This "altered state of identity" is believed to be the common goal of all addictive patterns of behavior, is extremely rewarding, reinforcing, and is believed to play an instrumental role in the maintenance of the addiction. More specifically, Jacobs views addictive behaviors as a form of self-treatment, considering they permit escape from, and momentarily correct, a chronic stress condition. This "immediate gratification" of both a psychological and physical nature, whether it is obtained from gambling, drinking, shopping or overeating, is believed to perpetuate the addiction (Jacobs, 1989). Convergent evidence reveals that excitement and escape from daily stressors were the primary motives for gambling, providing support for Jacobs' theory (Kallick et al., 1979; Kulley & Jacobs, 1988).

Still further, Jacobs postulates that a conducive environment is necessary, and must accompany the coexisting predisposing factors in the development of an addictive behavior pattern. As such, it is likely that the individual will happen upon an activity by chance (such as gambling, overeating, or drug consumption) that will serve to regulate their abnormal physiological resting state and alleviate psychological distress. This "chance triggering event" must present the individual with sufficient intensity and novelty in order to motivate him/her to actively pursue a similar activity in the future.

Not all individuals remain at risk of developing an addictive pattern of behavior. Rather, Jacobs suggests that only those individuals with chronically aroused or depressed physiological levels of arousal, who also suffer from feelings of rejection and inferiority, are at greatest risk for the development of an addiction. Jacobs cautions that adolescence is a time of heightened vulnerability due to the numerous psychological stressors and physiological changes characteristic of this developmental period.

Depression is often present in pathological gamblers. Clinical depression may be an expression of a hypotensive physiological resting state, and/or it may also be an expression of overwhelming stress that one is incapable of coping with effectively. An investigation of pathological gambler inpatients found that 76% were diagnosed with major

depressive disorder, 38% with hypomanic disorder (26% meeting the criteria for both disorders), and 8% with manic depressive disorder (McCormick, Russo, Ramirez, & Taber, 1984). More recent studies have concluded similar results (Blaszczynski, McConaghy, & Frankova, 1991; 1990; Blaszczynski & McConaghy, 1989; Lesieur & Blume, 1990; Linden, Pope, & Jonas, 1986; McCormick, 1993; Ramirez, McCormick, & Lowy, 1988; Raviv, 1993; Torme & Konstanty, 1992). In a national survey of 500 Gamblers Anonymous members, Frank, Lester, and Wexler (1991) found that 49% had contemplated suicide and 13% reported having actually attempted to end their lives. One must be cautious when assigning a causal relationship linking compulsive gambling with depression. It is possible that the depression fosters the addiction, or it could be that gambling itself has led these individuals into a depressive state due to accompanying substantial financial and social losses. According to Jacobs' theory, depression would likely precede the addiction, since gambling is perceived as the *solution* to unpleasant states of existence. Depression, characterized by hypotonic arousal and negative emotional states, accounts for two prerequisites of Jacobs' theory. Gambling is conceptualized as the activity that provides the lacking stimulation, bringing upon dissociative states, and therefore, escape from emotional pain. In such cases, problem and pathological gambling may likely serve as antidepressants (Raviv, 1993). There exist many forms of addictive behaviors, but the contention is that they are similar in that they all fulfill a similar need to *escape reality*.

Not unlike depression, personality characteristics are believed to be genetically influenced to a significant degree, and researchers are including biological differences in their theories of personality (e.g. Eysenck, 1967; Gray, 1973; Kagan, 1996). Eysenck (1967) proposed that two extremes of arousal distinguish the Extroversion (E) and Neurosis (N) dimensions of his personality theory. He proposed that the biological basis of Neurosis originates from the sensitivity of the limbic-autonomic system that tends to be highly reactive to environmental and psychological stimuli. These individuals are typically easily startled and agitated. In contrast, he proposed that the biological basis of Extroversion is more closely related to the level of arousal in the neocortex, as modulated by the ascending reticular activating system, with individuals high on the E dimension having a low level of cortical arousal. Such individuals are not as reactive to stimuli and require

larger amounts of stimulation to maintain an optimal level of cortical arousal, thus resulting in their extroverted social behavior. Hebb (1955) was among the first psychologists to advocate physiological underpinnings of behavioral psychology, and developed an optimum level of stimulation theory. In his theory, arousal is the physiological basis of behavioral drive. He states that at low level of arousal, an increase in arousal is rewarding and pleasurable, and at much higher initial levels of arousal, a decrease is rewarding. Similar views were expressed by Duffy (1957) 40 years ago who suggested that individuals may differ in arousal, for either genetic and/or environmental reasons, and such differences affect a person's disposition. She was a strong believer that the goal of an optimal level of arousal is likely the basis for sensation-seeking-type behavior. Fiske and Maddi (1961) similarly expressed that there are likely individual differences in the preferred levels of stimulation, with behavior being strongly motivated by the desire to achieve an optimal arousal state.

Gambling is often referred to as a form of risk-taking or sensation seeking behavior. Zuckerman (1979) proposes a number of interesting links between biological processes and the personality construct of sensation seeking, and believes sensation seeking to be a global trait, defining it as "the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences". Sensation seeking appears to be correlated with the Eysenck E dimension, especially the impulsivity factor of the E dimension (Farley & Farley, 1970). Zuckerman's (1994) findings suggest that individuals with higher sensation seeking needs more frequently engage in gambling activities and are more likely to engage in high-risk activities such as drinking and reckless driving. Pathological gamblers are known to be high sensation seekers, scoring significantly higher than social gamblers on the Disinhibition, Boredom Susceptibility, and Experience Seeking subscales of Zuckerman's Sensation Seeking Scale (Dickerson, Hinchy, & Fabre, 1987; Gupta & Derevensky, 1997b). The application of sensation seeking behavior is believed to be an attempt to correct low cortical activity (Quay, 1965). Other researchers have found that high sensation-seeking males exhibit a stronger orienting response than normals to novel stimuli, as indicated by changes in electrodermal skin conductance (Feij, Orleberke, Gazendam, & van Zuilten, 1985; Neary & Zuckerman, 1976), and heart-rate (Orleberke & Feij, 1979; Ridgeway & Hare, 1981), lend-

ing support to Jacobs' General Theory of Addictions, with respect to his premise that problem and pathological gamblers have abnormally depressed arousal levels and orient themselves toward activities which compensate for the lacking stimulation. Meyer (1987) maintains a similar view and stipulates that the primary goal of addicts is an immediate change in their emotional state toward a state of well-being, where the outside world is completely "turned off", and further elaborates that gambling serves as a "release mechanism" resulting in an increase in levels of physiological arousal. Similarly, using a Boredom Proneness scale and the Beck Depression Inventory, pathological gamblers were characterized by tendencies toward boredom and depression (Blaszczynski, McConaghy, & Frankova, 1990), with gambling providing temporary relief from both.

Research in other areas of addictive behavior provide support for a general theory of addictions. If a general theory is warranted, the findings from all areas of addiction research are pertinent to furthering the understanding of the development of gambling addiction. The fact that multiple addictions are common amongst adult pathological gamblers suggests a link across addictive disorders. "*Alcoholism and drug abuse and pathological gambling have commonalities. All involve states of arousal which heighten or depress one's state of awareness*" (Lesieur, Blume & Zoppa, 1986). Recently, adolescent problem gamblers were found to be more likely to smoke, drink heavily, and consume illicit drugs (Gupta & Derevensky, in press; Wynne, et al., 1996). These results support further inquiry into a possible common neurological pathway for addictive disorders and common personal characteristics which may typify an "addictive personality". Studies that have been successful in identifying associated risk factors which may contribute to the development of addictive behaviors provide valuable information, and there appears to be a growing understanding that there exist predisposing characteristics which place individuals at heightened risk for addiction problems. Sharma (1995) examined the relationship between drug dependence and personality traits among 140 adolescents. The author concluded that the addictive personality precedes addiction, and that addiction itself does not create the addictive personality. A study of 76 adolescents in treatment for chemical dependencies found that more than half of the sample were multiply addicted, showing compulsive behaviors with food, sex, relationships, and gambling (Griffin-Shelley, Sandler, & Lees, 1992). Gupta and Derevensky (in press) observed

that as the severity of gambling involvement increased, so did participation in other addictive behaviors.

Addictions research has identified several at-risk characteristics. Adolescent alcohol and drug abuse was associated with low self-esteem, psychological distress, learning difficulties, anxiety, impulsiveness, anti-social behavior, suicide attempts, and a history of abuse (Cookson, 1994; Harrison & Hoffman, 1989; Harrison & Luxenberg, 1995). The onset of cigarette smoking was found to be associated with alcohol use, risk-taking, and low self-esteem (Simon, Sussman, & Dent, 1995).

The present study seeks to empirically test Jacobs' theory, incorporating measures selected to assess the two predisposing factors (abnormal physiological resting state and psychological distress) and the need to "escape". It is expected that problem and pathological gamblers will demonstrate abnormal physiological resting states, have a lower self-concept, obtain higher depression scores, show tendencies towards being guilt-prone and insecure, and report an unhappy childhood, and will report greater levels of dissociation while gambling. Further, they will be more likely to indicate that they gamble for reasons of escape and to alleviate depression, reflecting an increased skill (Jacobs contends that this is a learned adaptive mechanism) in "escaping" from a chronic state of stress. The problem and pathological gamblers are expected to reflect higher rates of comorbidity with regular alcohol and substance use. The importance of assessing the validity of this model for adolescents lies in its potential clinical and educational implications.

METHODOLOGY

Subjects

Participants included 817 adolescents (417 males and 400 females) from grades 7, 9, and 11, with an age range spanning from 12 years to 17 years. Approval was obtained from three school boards, and five high schools within these boards volunteered to participate. The schools sampled were from middle class communities in the Greater Montreal region, and the adolescents were predominantly Caucasian. The distribution of the sample with respect to grade and gender is outlined in Table 1.

Table 1
Sample Distribution by Gender and Grade

Grade	Males	Females	Total
7	117	141	258
9	190	146	336
11	110	113	223
Total	417	400	817

Instruments

DSM IV-J (Fisher, 1992): This 12 item instrument is a screen for pathological gambling during adolescence, modeled after the DSM-IV (APA, 1994) criteria for diagnosis of adult pathological gambling. Each item endorsed is given a score of 1, with a score of 4 or greater being the scoring criteria for pathological gambling. Fisher concluded, with her population of young fruit machine players, that the DSM-IV-J is an effective discriminator of pathological gambling in children and adolescents.

High School Personality Questionnaire (HSPQ) (Catell, Cattell, & Johns, 1984): The HSPQ is a character trait inventory often used to diagnose behavior problems during adolescence. It is a self-report instrument focusing on 14 personality traits: warmth, intelligence, emotional stability, excitability, dominance, conformity, boldness, sensitivity, withdrawal, enthusiasm, apprehension, self-sufficiency, self-discipline, and tension. The HSPQ is one of the more widely researched instruments among all psychological tests. Reliability for the HSPQ is .83 for Forms A + B. The HSPQ requires approximately 45 minutes to complete.

The reason for utilizing this measure is to test a portion of Jacobs' theory with the HSPQ personality factors, Excitability (Factor D) and Apprehension (Factor O), which reflect possible hyper- and hypo-levels of physiological arousal as well as the emotional characteristics of self-doubt and guilt-proneness. Factor D represents a continuum from excitable (D+) to phlegmatic (D-). D+ individuals tend to be impatient, overactive, demanding, impulsive, and easily distracted. These descriptions are not unlike characteristics common to Attention Deficit Hyperactivity Disorder. Factor O represents a continuum rang-

ing from self-assured (O-) to apprehensive (O+). O+ adolescents are self-blaming, guilt-prone, insecure, and tend to worry and be anxious. They are overly sensitive to the approval or disapproval of others, and cry easily. In contrast, those low on this trait tend to be secure, guilt-free, untroubled, and self-satisfied. They are resilient individuals, who do not rely upon the opinions of others. The dependability coefficients for the single personality factors of Excitability and Apprehension are .90, and .91 respectively.

The validation of the HSPQ was accomplished using both construct and criterion validation. The authors report there have been no fewer than 12 replications of its personality structure using factor analytic techniques (Cattell et al., 1984, manual pp. 27-28), all indicating a similar factor structure.

Sensation Seeking Scale-Form V(SSS) (Zuckerman, Eysenck, & Eysenck, 1978): The SSS consists of 40 forced choice items with individuals selecting statements that best describes them. Examples include, "I like wild uninhibited parties", and "I would like to try parachute jumping". The SSS has four subscales, each comprising 10 items; Thrill and Adventure Seeking, Disinhibition, Boredom Susceptibility, and Experience Seeking. The Disinhibition subscale is of primary interest in the present study given that a high score is believed to be a reflection of low cortical activity, thus indicating a hypotonic physiological resting state. Internal reliabilities for the total scale have been found to range from .83 to .86.

Gambling Questionnaire. This is a revised version of the questionnaire developed by Gupta and Derevensky (1996). It inquires about gambling behavior with respect to frequency of play, types of games played, with whom they engage in these activities, their underlying cognitions concerning gambling, and concomitant behaviors such as alcohol and drug consumption, and criminal activity. Included are the Dissociative Scale (Jacobs, 1988), and a measure of arousal developed by Jacobs (personal communication) for the purpose of the present study. The Dissociative Scale is comprised of 5 items, with a range of possible responses from never (0 points) to all the time (3 points). The questions ascertain whether the individual experiences a) loss of time, b) blackouts, c) trance-like states, d) feeling like a different person, and e) an out-of-body feeling while gambling. Possible scores range from 0 to 15 for the overall score. The Arousal scale consists of

the following question, "I feel best when . . ." and is followed by 4 forced choice items, an example being: I am resting (1 point) vs. I am active (2 points). A higher score indicates a preference for a stimulating environment, whereas a lower score reflect a preference for a non-stimulating environment. Possible scores range from 4 to 8 for the overall score. Also included is a question asking the adolescents to rate their level of happiness during their preschool and elementary years, as compared to other children their age, on a 5 point likert-scale.

Self-Perception Profile for Children (Harter, 1985): The Global Self-Worth subscale was included and measures the extent to which children and adolescents like themselves and feel happy about the way they are leading their life. The total score is sum of the 5 questions, each ranging from 1 point (perceptions of inadequacy) to 4 points (perceptions of adequacy), thus resulting in a minimum total score of 5 and a maximum of score of 20.

Reynolds Adolescent Depression Scale (RADS) (Reynolds, 1987): This scale is a widely used measure of depression amongst adolescents. It consists of 30 items and utilizes a four point likert-type response format. The adolescent is required to indicate whether the symptom-related item has occurred almost never, hardly ever, sometimes, or most of the time. Items are worded in the present tense to tap into present symptom status. Responses are weighted from one to four points, so that the total score on the RADS can range from 30 to 120. Reliability coefficients range from .91 to .94.

Procedure

All students who obtained parental permission and were willing to participate were included in the study. The instruments were group administered in their classrooms and/or school gymnasiums and scored according to their respective manuals. Students were provided the directions for each instrument according to the test manual, and were required to work individually. Teachers were not present during the administration of the questionnaires and research assistants were present at all times to answer questions. Students were ensured confidentiality and each was assigned an identification code. Students required approximately 60 minutes to complete the instruments.

RESULTS

A classification system was devised and all participants were grouped into one of four categories, based upon frequency and severity of gambling behavior. Group 1, non-gamblers (N = 163), consists of individuals who reported never gambling during the previous 12 months. Group 2, occasional gamblers (N = 414), includes individuals reported gambling less than once per week and indicate no gambling related problems on the DSM-IV-J (score = 0). Group 3, regular gamblers (N = 175) includes individuals who reported gambling at least once per week and report a maximum of 2 problems gambling related to the DSM-IV-J (score = 1 or 2). Group 4, problem and pathological gamblers (n = 65) consists of individuals who reported gambling at least once per week and report a minimum of three problems related to gambling on the DSM-IV-J. This group includes adolescents who do not quite meet the criteria for pathological gambling as well as those meeting the criteria (4 + problems on the DSM-IV-J). The rationale behind lowering the criteria of the DSM-IV-J by 1 item was to include those who may be in the process of progressing into a diagnosis of pathological gambling as well as those who may be shifting out of a diagnosis of pathological gambling. It is our opinion that those individuals who approach the criteria for pathological gambling (a score of 3 on the DSM-IV-J) and those who are in the first stages of transgressing out of a diagnosis of pathological gambling (a score of 3 on the DSM-IV-J) share similar characteristics as those clearly meeting the DSM-IV-J criteria. The distribution of the total sample by group composition and gender can be found in Table 2.

A 4 x 2 x 3 multivariate analysis of variance (MANOVA) was performed, including Group, Gender, and Grade as fixed variables and the RADS, HSPQ, SSS, Harter, and Arousal measures as dependent variables. To ensure accuracy, 52 HSPQ questionnaires were discarded due to suspicious completion (i.e., last question did not indicate that the student had answered the entire measure truthfully), thus reducing the total subject pool to 765 for the MANOVA. Furthermore, the dissociation scale was not included in this analysis since those in Group 1 (non-gamblers) did not respond to the questions as they were not applicable. The results of the MANOVA (Univariate results will be reported in their appropriate section) are presented in Table 3. SPSS MANOVA (Version 7.5) was used for the analysis with the Type III

Table 2
Sample Distribution Among the Four Groups According to Gambling Severity

Group	Grade 7	Grade 9	Grade 11	Total Gender		Total Group
				M	F	
1	54	72	37	78	85	163
2	138	161	115	174	240	414
3	45	72	58	112	63	175
4	21	31	13	53	12	65

Table 3
Results of the MANOVA

Effect	Value	F	df	Sign.	Observed Power
GROUP					
Wilks Lambda	.861	7.432	(15, 2007.33)	$p < .001$	1.00
GRADE					
Wilks Lambda	.971	2.139	(10, 1454.00)	$p < .019$.912
GENDER					
Wilks Lambda	.921	12.458	(5, 727.00)	$p < .000$	1.00
GROUP*					
GRADE					
Wilks Lambda	.943	1.438	(30, 2910.00)	$p < .058$.940
GROUP*					
GENDER					
Wilks Lambda	.973	1.320	(15, 2007.33)	$p < .181$.780
GRADE*					
GENDER					
Wilks Lambda	.984	1.88	(10, 1454.00)	$p < .239$.631
GROUP*					
GRADE*					
GENDER					
Wilks Lambda	.937	1.60	(30, 2910.00)	$p < .021$.965

sequential adjustment for nonorthogonality. The Box's M statistic was not significant ($p < .666$) thus maintaining the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

There were no significant Group x Gender or Group x Grade interaction effects, thus allowing for comparisons of the four classification groups without needing to control for either gender or grade. The three-way interaction of Group x Grade x Gender was found to be significant, with grade 9 females in Group 4 being the group of adolescents to obtain the highest scores on most of the measures.

Physiological Resting State

The Excitability personality trait (Factor D) of the HSPQ, the Disinhibition subscale of the SSS, and the Arousal scale in the Gambling Questionnaire were used as indirect measures of physiological resting state, and all are shown to increase linearly with degree of gambling involvement. Means and standard deviations are presented in Table 4. The univariate ANOVA results revealed significant differences across the four classification groups for Excitability on the HSPQ ($F(3, 764) = 10.31, p < .001$), Disinhibition subscale of the SSS ($F(3, 764) = 27.02, p < .001$), and the Arousal scale ($F(3, 764) = 4.98, p < .002$). Post hoc Scheffe pairwise comparisons indicate that with the exception of occasional and regular gamblers, all groups differed from each other on Factor D (HSPQ), and on the Disinhibition measure. Of importance is that the problem and pathological gamblers exhibited the highest levels of excitability and disinhibition, and differed significantly from the other groups of adolescents. For the Arousal scale, the problem and pathological gamblers did not differ from the occasional or regular gamblers. Rather, gamblers in general differed from non-gamblers on this measure.

Emotional Indices

The measures used to assess psychological distress included the RADS, Harter Global Self-Worth Scale, Apprehension personality trait (Factor O) of the HSPQ, and the childhood happiness rating. The means and standard deviations for these measures are displayed in Table 4. The univariate ANOVA results across the four classification

Table 4

Means and Standard Deviations for Measures of Predisposing Factors

	Group 1	Group 2	Group 3	Group 4
<i>Physiological resting state</i>				
Excitability (HSPQ) ^a	M = 5.01 SD = 2.14	M = 5.48 SD = 1.84	M = 5.53 SD = 1.89	M = 6.86 SD = 1.86
Disinhibition (SSS)	M = 2.52 SD = 2.23	M = 3.64 SD = 2.62	M = 4.67 SD = 2.84	M = 6.52 SD = 2.38
Arousal	M = 4.53 SD = 1.18	M = 6.82 SD = 1.17	M = 6.91 SD = 1.11	M = 7.11 SD = .98
<i>Emotional state</i>				
RADS	M = 58.00 SD = 13.95	M = 60.51 SD = 13.49	M = 57.93 SD = 13.42	M = 64.98 SD = 13.78
Harter	M = 9.48 SD = 3.22	M = 10.18 SD = 3.28	M = 10.01 SD = 3.18	M = 11.09 SD = 3.35
Apprehension (HSPQ) ^a	M = 4.70 SD = 2.28	M = 5.03 SD = 2.07	M = 4.53 SD = 1.75	M = 5.56 SD = 1.75
Childhood happiness	M = 3.60 SD = 1.09	M = 3.54 SD = 1.44	M = 3.54 SD = .99	M = 3.42 SD = 1.13

^aNormative mean = 5.50 (SD = 1.00) (Cattell et al., 1984).

groups revealed significant differences across the four groups for the RADS ($F(3, 764) = 8.23, p < .001$), Harter ($F(3, 764) = 3.27, p < .021$), and Apprehension ($F(3, 764) = 4.16, p < .006$) scales, but not for the childhood happiness measure ($F(3, 764) = .737, p < .530$). The groups did not differ significantly with respect to their rating of childhood happiness, with the problem and pathological gamblers indicating a slightly above average childhood happiness rating. Post hoc Scheffe pairwise comparisons reveal that for the RADS and Apprehension subscale, the problem and pathological group of adolescent gamblers differed from the other three groups, indicating greater depression and apprehension. However, it is important to note that adolescents in Group 4 did not differ significantly from the normative mean on the

Apprehension factor. For the Harter Global Self-Concept scale, the non-gamblers and occasional gamblers differ from the problem and pathological group. Regular and problem gamblers do not differ significantly from each other on the Harter.

The percentages of individuals meeting the criteria for clinical depression (a score of 77 or more on the RADS) was found to be 9.8% for Group 1, 11.8% for Group 2, 10.8% for Group 3, and 23.1% for those in Group 4 ($\chi^2(3, 816) = 8.43, p < .038$). The significant Group x Gender interaction ($F(3, 816) = 3.66, p < .012$) highlights the finding that females in Group 4 are the individuals with the highest occurrence of depression (58%). However, it is important to note that the males in Group 4 show higher rates of depression (15.1%) than males in Groups 1 (5.1%), 2 (6.9%), and 3 (5.4%).

Escape from Problems

The non gamblers were not required to complete the dissociative scale since it measured dissociative behaviors while gambling. The total dissociative mean scores for occasional gamblers ($M = 1.22, SD = 1.90$), regular gamblers ($M = 1.79, SD = 2.06$), and for problem and pathological gamblers ($M = 4.18, SD = 2.84$) differed. A one way analysis of variance (ANOVA) was performed across the three groups of gamblers for each of the items, as well as for the total score, and the results are presented in Table 5. Post hoc Scheffe pairwise comparisons indicate that for all of the dissociation items, as well as for the overall score, the problem and pathological gamblers differed significantly from the regular and occasional gamblers with respect to all items. Percentages of those who reported experiencing any type of dissociation while gambling were also calculated, and are presented by group. These percentages and chi-square results can be found in Table 5 as well. *Losing track of time* and *feeling like a different person* were the most frequently reported types of dissociation for regular and problem gamblers, while experiencing *blackouts* is the least reported type of dissociation.

In the Gambling Questionnaire, respondents were asked to indicate their reasons for engaging in gambling behavior from a list presented to them. They were allowed to indicate as many reasons as they felt perceived were applicable. Table 6 depicts the percentages of responses per group for each reason. The problem and pathological

Table 5
Results for the Dissociative Items

Dissociation Items	ANOVA				Percentage of Endorsements				Pearson Chi-Square
	F (3, 663)	p	Gp 2	Gp 3	Gp 4	Gp 3	Gp 4		
Feel like in a trance	30.14	.001	12.3%	14.9%	53.8%				$p < .001$
Feel like a different person	20.72	.001	24.2%	30.9%	61.5%				$p < .001$
Lose track of time	22.28	.001	35.5%	48.6%	67.7%				$p < .001$
Experience blackouts	5.99	.001	3.1%	4.6%	13.8%				$p < .001$
Feel outside of self	14.34	.001	11.6%	17.7%	41.5%				$p < .001$
Total Dissociation	40.05	.001							

Table 6
Reported Reasons for Gambling

Reason	Group 1	Group 2	Group 3	Group 4
Enjoyment	N/A	76.2%	81.7%	92.3%**
Excitement	N/A	51.5%	66.9%	92.3%**
Make money	N/A	55.1%	70.9%	87.7%**
Social involvement	N/A	10.3%	12.0%	27.7%**
Escape problems	N/A	1.5%	2.3%	20.0%**
Alleviate depression	N/A	.7%	2.9%	10.8%**
Relaxation	N/A	5.6%	10.9%	10.9%
Feel older	N/A	2.2%	1.1%	9.2%**
Loneliness	N/A	.2%	1.1%	4.6%**
Other reasons	N/A	6.6%	5.1%	3.1%

Group 1 consists of non-gamblers and therefore responses to this question were not applicable.

**Statistically significant ($p < .01$) as tested by Pearson chi-square analysis.

gamblers, appear to endorse most reasons more frequently than the other two groups. As with the occasional gamblers, these individuals gamble primarily for reasons of enjoyment and excitement, followed by the desire to win money. Like the regular gamblers, almost 11% report gambling to promote relaxation. These problem/pathological adolescent gamblers are much more likely to report gambling for social involvement, to escape problems, to relieve their feelings of depression, to feel older, and to escape loneliness.

A comparison across groups, examining the reported reasons for gambling, reveals a linear increase from Group 2 to Group 4 for most variables, with the most dramatic increase being that of gambling to escape one's problems (1.5% to 20%). A marked linear increase is also noted for gambling to alleviate feelings of depression from Group 2 to Group 4 (.7% to 10.8%).

Comorbidity with Regular Drug and Alcohol Use

The adolescents were asked about their alcohol and illicit drug consumption (see Table 7). They were provided with a list of different types of drugs, alcohol, and cigarette smoking, and were required to indicate the frequency with which they use these substances (never, less than once per week, or once per week or more). Regular use is defined as using any of these substances a minimum of once per week. The percentages of adolescents who regularly engage in alcohol use are 4.9% for non-gamblers, 9.2% for occasional gamblers, 22.3% for regular gamblers, and 40.0% for problem and pathological gamblers ($\chi^2(3, 674) = 67.21, p < .001$). The percentages of adolescents who regularly engage in illicit drug use are 0% for non-gamblers, 2.7% for occasional gamblers, 5.7% for regular gamblers, and 10.8% for problem and pathological gamblers ($\chi^2(3, 674) = 19.88, p < .001$). The percentages of adolescents who regularly engage in cigarette smoking are 7.4% for non-gamblers, 12.2% for occasional gamblers, 29.2% for regular gamblers, and 44.6% for problem and pathological gamblers ($\chi^2(3, 674) = 69.93, p < .001$). Table 7 provides more detailed information regarding the different types of drugs and substances, and frequency of use. The percentage of total use of substances increase linearly from non-gamblers to problem and pathological gamblers, indicating that substance use is positively correlated with degree of gambling participation.

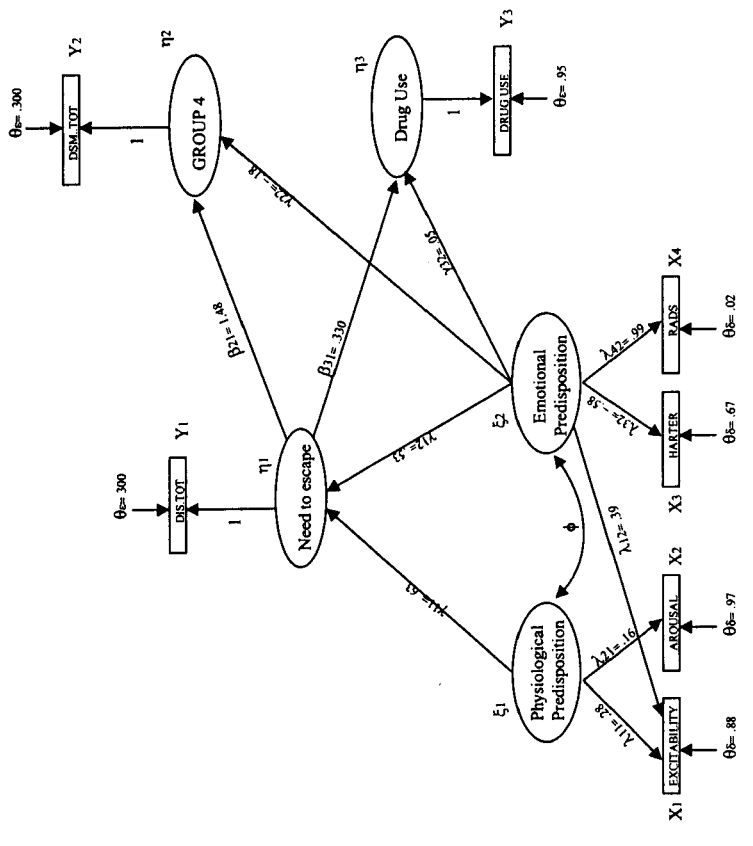
Table 7
Frequencies of Drug, Alcohol, and Cigarette Use for Adolescents

Substance	Group 1	Group 2	Group 3	Group 4
<i>Alcohol</i>				
Uses the substance	38.7%	61.25	65.6%	78.5%
Less than once per week	33.7%	51.9%	43.3%	38.5%
Once per week or more	4.3%	9.0%	20.0%	36.9%
Daily use	0.6%	0.2%	2.3%	3.1%
<i>Upper Drugs</i>				
Uses the substance	0.0%	1.9%	2.9%	10.8%
Less than once per week	0.0%	1.5%	1.7%	7.7%
Once per week or more	0.0%	0.5%	1.1%	3.1%
Every day use	0.0%	0.0%	0.0%	0.0%
<i>Downer Drugs</i>				
Uses the substance	7.4%	8.5%	19.4%	32.3%
Less than once per week	7.4%	6.8%	14.3%	23.1%
Once per week or more	0.0%	1.2%	4.6%	9.2%
Daily use	0.0%	0.5%	0.6%	0.0%
<i>Hallucinatory Drugs</i>				
Uses the substance	1.8%	3.6%	5.7%	12.3%
Less than once per week	1.8%	2.9%	4.0%	12.4%
Once per week or more	0.0%	0.5%	1.7%	0.0%
Daily use	0.0%	0.2%	0.0%	0.0%
<i>Cigarette Smoking</i>				
Uses the substance	17.8%	30.3%	41.7%	67.7%
Less than once per week	10.4%	18.2%	12.6%	23.1%
Once per week or more	3.7%	4.4%	10.3%	12.3%
Daily use	7.4%	7.8%	18.9%	32.3%

Path Analysis

Path analysis, or structural equation modeling, was performed to test a model based upon Jacobs' (1986) General Theory of Addictions (see Figure 1), using LISREL 7 (Jöreskog & Sörbom, 1989). The analysis requires an explicit assumption of independent and dependent variables, and is a method of studying existing variability among variables. The primary purpose of path analysis is to separate correlations

Figure 1
Model Adapted from Jacobs' (1986) General Theory of Addictions



among variables into causal and non-causal components. This is accomplished by combining correlational data with an explicit theory of cause and effect. The cause and effects are inferred from the theory and the correlations provide the basis for the calculations.

The tested model includes five latent variables, or factors: physiological predisposition, emotional predisposition, the need to escape, comorbid addictive behavior, and gambling severity. These factors are theoretical constructs, and are comprised of the following measured variables: Excitability (HSPQ), Arousal, Self Concept (Harter), RADS, Total Dissociation score, Drug use, and the DSM-IV-J. The Disinhibition (SSS) subscale and the Apprehension Factor (HSPQ) were excluded from the model. Initially, Disinhibition was included in the model as a measure of physiological predisposition in place of Arousal,

but the model did not fit the data, and so the variable was removed and substituted with Arousal. The Apprehension personality trait was not included since the problem and pathological gamblers were not found to differ from the normative mean on this measure.

With respect to the diagram presented in Figure 1, measured variables are represented by rectangles. Factors, also called latent variables, are represented by ovals. Relationships between the variables are indicated by lines, and a lack of a line connecting two variables implies that no direct relationship has been hypothesized. A line with one arrow represents a hypothesized direct relationship between the two variables. A line with arrows at both ends indicates an unanalyzed relationship; it is simply a covariance between the two variables with no implied direction of effect. Thus, in this model, the need to escape is directly predicted by physiological and emotional predispositions, both latent variable factors. These factors are predicted by their respective measured variables. These measured variables are hypothesized to indirectly predict the need to escape, via their latent variable factors. Similarly, gambling severity is directly predicted by the latent variables of the need to escape and emotional predisposition, etc.

The maximum likelihood method was used to analyze the data. The measures of the overall fit are presented in Table 8. Some of the rules of thumb for a good model are the following: Chi-square should not be significant, the Goodness of fit index (GFI) should be greater than .90, the Adjusted Goodness of fit index (AGFI) should be greater than .80, and the Root Mean Square Residual (RMR) should be smaller than .10 (Kline, 1990). The results of the path analysis indicate that the model fits the data very well, and that it is an overall good model.

All the variables together explain 95% of the variance in the model. The total coefficient of determination for the latent variables is

Table 8
Indices of Overall Fit of Model

Chi-Square with 9 Degrees of Freedom	Goodness of Fit Index	Adjusted Goodness of Fit Index	Root Mean Square Residual
16.30, $p = .059$	0.994	0.980	.023

Table 9
Variance Accounted for by Individual Variables

<i>Squared Multiple Correlations for Y Variables</i>	<i>Squared Multiple Correlations for X Variables</i>
Total dissociation	Excitability $R^2 = .12$
DSM-IV-J	Arousal $R^2 = .03$
Drug use	Harter $R^2 = .33$
	RADS $R^2 = .97$

.75, indicating they account for 75% of the variance. The measured variables were found to account for 98% of the total variance. The R^2 coefficients identifying the amount of variance accounted for by each variable separately can be found in Table 9. The reader should be reminded that even though most of the R^2 values are small, the overall effect of these measures is large.

Direct effects between two factors are indicated by Gamma coefficients in Figure 1. The direct effect of physiological predisposition on the need to escape ($\gamma_{11} = .63$) indicates a fairly large effect, greater than the direct effect of emotional predisposition on the need to escape ($\gamma_{12} = .534$), which indicates a moderate effect. Similarly, the direct effect of emotional predisposition on gambling severity indicates a weak relationship ($\gamma_{22} = -.181$). However, the indirect effect of emotional predisposition on gambling severity, via the need to escape factor, is .80, suggesting a very healthy effect. Similarly, the indirect effect of physiological predisposition on gambling severity is .93 indicating a strong effect. Thus, both the emotional and physiological predispositions are causally related to gambling severity, and this is manifested through the need to dissociate or escape. If the need to escape factor were to be removed, the model would not adequately fit the data, thus highlighting the key role of this latent variable. The indirect effects of physiological and emotional predispositions on drug use, via the need to escape, are .21 and .18 respectively indicating a weaker causal relationship than to gambling severity. Considering the measure of drug use was not a validated measure of drug severity, these moderate causal relationships are not surprising.

Logistic Regression

A forward logistic regression analysis was performed through SPSS to assess prediction of membership into the group of problem and pathological gamblers (Gp 4). Separate analyses were performed for males and females to better understand the relative contributions made by the physiological and emotional predisposing factors. The variables included in the Model obtained via path analysis were employed in the logistic regressions, Excitability (HSPQ), Arousal, RADS, Self-Concept (Harter), Total Dissociation score, and drug use. Group 4 was included as the dependent variable.

Of the original 817 cases 210 were deleted due to the fact that they either were non-gamblers and did not complete the Dissociation Scale, or for inaccurate completion of the HSPQ. Thus, 607 cases were included in the overall analysis, 309 were included in the analysis for males, and 298 cases were available for the analysis using females.

For the overall logistic regression, there was a good model fit (discrimination among groups) on the basis of two predictor variables alone (Excitability and Dissociation), correctly classifying 90.4% of individuals. The same results were obtained using only adolescent males, correctly classifying 85.2% of individuals. However, the analysis with females resulted in different findings. For females, three significant predictor variables for membership into Group 4 were obtained (RADS, Dissociation, Drugs) correctly classifying 96.3% of cases. The results of the performed logistic regression analyses suggest that, for membership into the problem and pathological gambling group, an abnormal physiological resting state is a better predictor for males, whereas emotional distress is a better predictor for females. The need and desire to escape from problems is found to be an important predictor for both groups. Degree of drug use among adolescent females suggests that they are more likely to become problem or pathological gamblers, but this was not found for males.

Logistic regression analyses were performed, substituting general drug use for use of upper drugs, and it was found that upper drugs accounted for most of the drug effect, correctly classifying 97% of cases for females as opposed to the previously reported 96.3%. The use of upper drugs in the analysis in place of general drug use did not alter the results for the overall regression using both genders, nor the

Table 10
Logistic Regression Results for the Three Models

Variable	B	S.E.	Wald	df	p	R	Odds Ratio*
<i>Total sample</i>							
Excitability	.36	.08	18.66	1	.001	.20	1.43
Dissociation	.36	.05	49.96	1	.001	.34	1.44
<i>Males</i>							
Excitability	.37	.09	15.52	1	.001	.22	1.45
Dissociation	.30	.06	24.32	1	.001	.28	1.35
<i>Females</i>							
RADS	.07	.03	5.41	1	.02	.18	1.07
Dissociation	.52	.12	17.99	1	.001	.40	1.67
Upper drugs	1.69	.65	53.90	1	.001	.22	5.43

analysis using only males. Both the Arousal and Harter Global Self-Concept variables were not found to contribute significantly, and thus were rejected as meaningful predictors in all logistic regression analyses. Table 10 depicts the relationship between the predictor variables and membership into Group 4 for the three performed analyses, using upper drugs as the variable reflecting comorbidity. The Wald statistic evaluates the contribution of an individual predictor to a model, and a significant result indicates a predictor that is reliably associated with Group 4 membership. The Odds Ratio is a measurement of relative risk when directionality is determined. For example, the results suggest that adolescents who dissociate while gambling are approximately 1.5 times more likely to become problem or pathological gamblers. Similarly, females who consume upper drugs appear to be more than 5 times more at risk for becoming problem or pathological gamblers.

Goodness-of-fit is evaluated with use of the Hosmer-Lemeshow statistic, where a good model produces a non-significant chi-square (Tabachnick & Fidell, 1996). By this criterion, we see that the three tested models provide adequate fit to a perfect model since $p > .05$ (see Table 11). The appropriateness of the three models suggests that males and females likely follow a slightly different path toward the development of a gambling addiction.

Table 11
Evaluation of Goodness of Fit: Hosmer-Lemeshow Statistic

	Chi-Square	df	p
<i>Total sample</i>			
Goodness of Fit	3.31	4	.51
<i>Males</i>			
Goodness of Fit	7.44	8	.49
<i>Females</i>			
Goodness of Fit	4.89	8	.77

DISCUSSION

Strong support for the applicability of Jacobs' General Theory of Addictions for adolescent gamblers was obtained. Adolescent problem and pathological gamblers were found to have exhibited evidence of abnormal physiological resting states, showed evidence of greater emotional distress, reported greater levels of dissociation, and reported higher rates of comorbidity with other addictive behaviors. A path analysis testing a model adapted from the General Theory of Addictions was found to fit the data, providing impressive validation of the theory. The model tested shows a strong path from both the physiological and emotional predispositions, to a deliberate need to escape, to severity of gambling. Thus, gambling severity was empirically found to be caused by the need to escape, or dissociate, which is fueled by aversive physiological and emotional states. Gambling, therefore according to the model and Jacobs' theory, is a solution, or coping response, albeit a negative one, to aversive life conditions.

The logistic regression analyses, however, suggest that the path leading to addiction may be somewhat different for adolescent males and females. More specifically, males and females may be somewhat differentially *predisposed* to a gambling addiction. For males, the Excitability (HSPQ) personality factor and the total dissociation score were strong predictors for membership into the problem and pathological gambling group. For females, depressed mood, dissociation and upper drug use were meaningful predictors. These results suggest that ado-

lescent males, more specifically, problem pathological gambling adolescent males, may fit the General Theory of Addictions better than females, as Excitability was found to be a measure of both physiological and emotional predisposition in the path analysis model. However, depression and the desire to escape are more characteristic of females who are predisposed to gambling problems. The fact that the use of upper drugs surfaced as a meaningful predictor of problem gambling may be an indication of a hypotonic physiological resting state. There is little doubt that depression includes abnormal physiological resting states as well as an emotional factor, although this relationship is not clear. It is possible that an under-aroused resting state manifests itself as excitable behavior in males, and the drive to use stimulants in females.

The adolescent problem and pathological gamblers indicated their preference for stimulating environments and activities, and obtained higher scores on the Disinhibition subscale of Zuckerman's Sensation Seeking Scale. These results provide indirect evidence of the theory that gamblers deliberately select stimulating experiences, such as gambling, to self-correct a hypotonic physiological resting state. Furthermore, adolescents also indicated gambling for reasons of excitement, to escape problems, and to alleviate depression. These reports provide anecdotal support for the theory as well. Of particular importance is that these adolescents are *aware* of their reasons for engaging excessively in gambling activities. Jacobs (1989) has consistently maintained that gambling is a *deliberately* chosen means for achieving a dissociative state, or altered state of identity.

Problem and pathological gamblers appear to have low arousal resting states. Individuals high on Extroversion, as defined by Eysenck, are believed to have low levels of cortical arousal. Sensation seeking (Eysenck, 1967) and the Excitability factor of the HSPQ have been found to be positively correlated with Extroversion, and are both characteristic of problem and pathological gamblers. Gambling activities are stimulating and thus would be a logical attraction to individuals seeking external stimulation. The problem/pathological adolescents indicated *feeling best* when in a stimulating environment, to a greater degree than those in the other three categorization groups, thus providing greater support to the hypothesis that gamblers may be characterized by low levels of cortical arousal. This premise requires confirmation through physiological brain research with pathological

gamblers, providing data directly measuring cortical activity, rather than inferring physiology from behavioral measures.

Low self-esteem, a construct found to be associated with the occurrence of other addictions in adolescence (e.g., Simon et al., 1995), was not found to be a meaningful predictor in the logistic regression analyses, nor did it account for an appreciable amount of variance in the path analysis. This may be due to the limited sensitivity of Harter's Global Self Concept as a measure of self-esteem. It is also plausible that other measures, such as the RADS and the Excitability personality trait, overshadowed its effect in these statistical procedures. Alternatively, self-esteem may not be a meaningful construct in the development of addiction. This last hypothesis seems unlikely in light of the extensive literature suggesting the self-esteem scores to be a risk-factor associated with the development of substance dependencies (e.g., Harison & Hoffman, 1989; Simon et al., 1995), as well as the significant differences obtained in self-esteem across the four groups of gamblers in the current study.

The occurrence of depression among adult pathological gamblers has been identified by numerous researchers, but it was not known whether similar results would be obtained with adolescents. It turns out that the problem and pathological group of adolescent gamblers reported higher levels of dysphoric mood and clinical depression than their peers. Twenty-three percent of these adolescents qualified for a diagnosis of clinical depression on the Reynolds Adolescent Depression Scale. Females account for slightly more than half of these cases of depression. This finding is meaningful considering that the problem and pathological group is predominantly male (53 males, 12 females). It is possible that depression plays a larger role in the development of pathological gambling in females than in males, although such conclusions are not yet warranted due to the small number of females in the present sample. More research examining gender differences amongst male and female pathological gamblers is needed. The results of this study suggest that depression and dysphoria play a significant role in the *syndrome* of pathological gambling. Gambling activities help these adolescents cope with their already existing depression. Support for this comes from other researchers who propose that gambling is engaged in to relieve depressive and hypomanic tendencies, anxiety, and low self-esteem (Bolen, Caldwell, & Boyd, 1975; Fisher & Bellringer, 1996; Ohtsuka, Bruton, DeLuca, & Borg, 1997).

However, depression may also play a role in the development of gambling problems *other* than its link to hypotonic physiological resting states and emotional distress, but rather due to the negative cognitive styles typical of depressed individuals (McCormick, 1988). Individuals with these pessimistic thought processes and attribution styles may be more prone to developing an external locus of control, which has been moderately linked to problematic gambling behavior (Moran, 1970).

The percentage of substance use increases with the degree of gambling participation. Problem and pathological adolescent gamblers are considerably more likely to drink, take illicit drugs, and smoke, than non-problem gamblers. In hindsight, it would have been useful to have included standardized scales assessing substance use, the degree of abuse, and level of addiction. It is difficult to infer, from only self-reports of frequency of substance use, abusive or addictive qualities to their actual use. Testing the theory with one type of addiction is a good start. The evidence gathered in the current research suggests that Jacobs' theory is a plausible one for the development of pathological gambling. A stronger test of the theory will incorporate many different types of addictions into the model. The rational for including drug use in the path analysis model was to test whether an increase in drug use was associated with physiological and emotional predispositions. A causal effect was established, indirectly, via the need to escape, although the effect was moderate at best. Considering that the drug use measure consisted of a 4 point scale (never, less than once per week, once per week or more, daily), and only the frequency of use is evaluated, the moderate effect of the predisposing factors on drug use was not surprising. Nonetheless, this moderate effect may serve as preliminary evidence that the model holds true for all addictions, which is the premise underlying Jacobs' theory.

The preliminary evidence is very encouraging and holds with it many implications. With respect to children and adolescents, the problem of gambling can be targeted in the school system in tandem with the other addictions, and the development of the prevention interventions can be informed by the theory, with emphasis on the predisposing factors. Feelings of worthlessness, inferiority, and depression can be remedied and children can be directed toward other, more appropriate activities, which provide similar levels or types of stimulation. Knowledge of the predisposing and "at-risk" traits (also see results of

Gupta & Derevensky, 1997b) in a child or adolescent presenting with an addiction will provide counselors, psychologists, social workers, and school officials with a deeper understanding of why adolescents are engaging in addictive activities. The direct instruction of alternative coping mechanisms may be a beginning step in helping adolescents deal with the many familial, academic, economic, and social pressures facing them.

Another implication is directed toward mental health professionals and physicians and their efforts at understanding addictions. As Jacobs (1989, p. 37) notes, "*Should this prove to be, it could redirect the current flow of scarce dollars from multiple and often redundant projects into a powerfully focused and cost effective program of coordinated research . . .*" There are no doubts that numerous benefits will manifest themselves through confirmation of the General Theory of Addictions, the principal one being the possible unification of addiction prevention research into a pooled effort, as opposed to the continued separate research paradigms.

While Jacobs (1986) emphasizes the necessity of a conducive environment, this theory may not place enough emphasis on the role of society and family in the development of addiction. Research with children (Gupta & Derevensky, 1997c) highlights the influence of familial and social acceptance of juvenile gambling beyond having a parent with a severe gambling problem. It nevertheless remains true that most children who are introduced and provided repeated exposure to gambling by their parents and 'significant others' will never develop a real gambling problem. Nonetheless, some will, and societal acceptance of gambling most likely plays a role in this. The same premises can be stated for other addictions as well (e.g. alcohol and to a lesser degree smoking which has recently seen a huge backlash). Therefore, other external factors likely have a meaningful place in a comprehensive general addictions theory.

One of the weaknesses of this study is the lack of an appropriate measure which taps into feelings of *rejection and inferiority* emanating from childhood, as proposed by Jacobs. It is however plausible that these feelings stemming for childhood do not play as large a role as has been suggested. Dysphoria and depression, may be an accumulation of past early childhood experiences, and may be a better conceptualization of the emotional predisposition to addiction.

It remains unclear, and is not specified in Jacobs' theory, whether

one's physiological resting state is fixed across the life span, or whether it changes over time with age or as a result of certain interacting environmental circumstances. This would shed light to the issue of whether an individual is born with the physiological predisposition, and remains at risk for life, or whether if environmental, economic or social circumstances change, and individuals can move in and out of the *predisposed* group. The definition of *physiological resting state* remains somewhat vague, and may refer to either cortical arousal, peripheral arousal, or biochemical balance. Further research is needed to provide a stronger conceptualization and reliable measures of an individual's physiological resting state.

While adolescence remains a period of rapid growth and change, physically, socially and emotionally, it also represents a time of experimentation. It is during this developmental period that many adolescents begin smoking, drinking, experimenting with drugs and sex, and engage in gambling activities that were previously restricted. There is little doubt that excessive risk-taking and the use of various substances will decrease with maturity, and that the excitation brought about from gambling will be replaced by alternative activities. Nevertheless, for those individuals at-risk for developing an addiction, adolescence remains a critical period.

We are now one step closer to understanding the etiology of gambling dependency in adolescents. It is hoped that others will continue to test Jacobs' theory, with use of different addictions as the prototype, and with different populations. Further validation of the theory will serve to provide addictions research with the *tangible and reliable* experimental evidence of a general theory of addictions and make an important theoretical and clinical contribution.

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