

Problem Gambling in Adolescents: An Examination of the Pathways Model

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Executive Summary

Using a sample of 1,133 adolescents from Quebec and Ontario, the present study sought to (a) test the applicability of the Pathways Model proposed by Blaszczynski and Nower (2002) and Nower and Blaszczynski (2004) for adolescent problem gamblers, and if necessary, to refine or modify the model in order to accurately differentiate among different subtypes of adolescent problem gamblers, and (b) to test the applicability of the Pathways Model for adolescents experiencing substance abuse and dependency, in the absence of gambling problems.

Results

The research findings confirm a three cluster categorization of adolescent problem gambler. The three clusters obtained bear great similarity to the three subtypes proposed by Blaszczynski and Nower (2002), although some differences are noted, resulting in minor refinements to the Pathways Model in its application to adolescents. Subgroups obtained in the current study are referred to as Cluster 1, Cluster 2, Cluster 3 whereas those proposed in the original model are referred to as Pathway 1, Pathway 2, and Pathway 3.

- The three subtypes of problem gamblers found in the current research were not impacted by demographic variables, gambling preferences, gambling severity, or reasons for gambling. However, there was a greater representation of males in both the Cluster 1 and Cluster 3 subgroups.
- The Cluster 1 subgroup is very similar to Pathway 1 gamblers proposed in the model. For the most part, they are devoid of significant psychopathology and have unremarkable histories. Nevertheless, the rates of anxiety were found to be higher than normal among these youth but it is not clear whether the anxiety preceded the gambling problem or is a result of the negative consequences associated with excessive gambling.
- The Cluster 2 subgroup bears greatest resemblance to Pathway 2 gamblers. These individuals were subjected to pre-morbid family dysfunction (abuse and family discord) and are characterized by emotional instability, clinical syndromes, personality disorders, suicidality, substance use, acting-out behavior, and impulsivity. Consistent with the Pathways Model, it is probable that depression and emotional problems are manifested in impulsive behaviors.
- The Cluster 3 subgroup resembles individuals proposed in Pathway 3, such that they are defined by their delinquent and antisocial nature, and report meaningful levels of family discord. However, unlike Pathway 3 gamblers, this subgroup failed to exhibit other indications of significant emotional instability or psychopathology. Furthermore, levels of impulsivity, while significant, were not greater than among those in Cluster 2.

- ADHD and Inattentiveness were found to be characteristic of all problem gamblers independent of subtype. This finding is somewhat different from the proposed Pathways Model which postulates that this trait distinguishes those falling in Pathway 3 due to higher levels/severity of impulsivity and related issues. Nevertheless, this finding is consistent with some recent research (Breyer, Botzet, Winters, Stinchfield, & August, in press; Hardoon, Gupta, & Derevensky, 2004; Vitaro et al., 2003).
- Results also confirm a three cluster categorization of substance abuser subtypes almost identical to those found among problem gamblers. This suggests that the Pathways Model could be applicable to a range of appetitive behaviours falling within the spectrum of impulse-control disorders or even those classified as addictive disorders. The greater application of the Pathways Model is something that deserves further exploration.
- Qualitative, semi-structured interviews with adolescents undergoing inpatient treatment for co-morbid substance abuse and gambling addiction shed further light into the different pathways leading to their dependencies. The findings lend further support for a three group classification system. It also raises questions about constructs not in the model, such as the issue of loss and genetic tendencies toward addiction.

Implications

- Adolescents entering treatment for a gambling or substance abuse problem should undergo a detailed screening process assessing what subtype they represent as therapeutically addressing underlying issues (i.e., abuse, neglect, loss), co-morbid psychological problems, and biological tendency towards impulsivity remains critical when treating problem gamblers.
- As proposed in the Pathways Model, treatment should be tailored specifically to the subtype of problem gambler.
- ADHD is a meaningful risk-factor for the development of problem gambling among adolescents. High scores on the Conners-Wells' Adolescent Self-Report Scale for attention deficit and hyperactivity disorder and inattentiveness permeate all problem gamblers irrespective of their typology. Primary prevention efforts should address this finding.

It is not known whether the subtle differences between the subtypes of gamblers found in the current study and those proposed by the Pathways Model are due to developmental differences or methodological issues. The Pathways Model was originally hypothesized to best describe adult pathological gamblers, with some refinements being made in the conceptualization for youth (Nower & Blaszczynski, 2004). It is possible that this framework is not completely applicable to adolescents due to developmental issues as well as opportunity and availability of gambling. The Pathways Model is

complex, involving many different factors and constructs, and thus difficult to properly test on relatively small populations and requires further replication. The construct of impulsivity and antisocial tendencies may be very different among adolescents versus adults, as these tend to be somewhat characteristic of teenagers. The current findings differ from the Pathways Model primarily as a function of degree/severity of impulsivity not being the distinguishing factor between the Cluster 2 and Cluster 3 subtypes obtained. The Pathways Model hypothesizes that Pathway 3 problem gamblers are biologically predisposed to impulsivity due to higher indicators of the trait, a premise our findings could not support. However, since our Cluster 3 subtype does not carry with it other co-morbid disorders such as depression, it could be argued that the impulsive behavior is not a manifestation of emotional problems (and thus biologically based). The lack of reported abuse in childhood, and the higher tendency in this group towards antisocialism supports the theoretical basis of Pathway 3 gamblers. The implications of needing to further examine the different causes of impulsive behavior and its role in the etiology of gambling problems among the different subtypes warrants greater examination. A refined model should be tested empirically on larger samples of both problem gamblers and substance abusers, employing behavioural, biological, and temporal measures.

Table of Contents

Executive Summary	- 1 -
List of Tables	- 5 -
List of Figures.....	- 6 -
Acknowledgements	- 7 -
Abstract.....	- 8 -
Introduction.....	- 9 -
Literature Review.....	- 9 -
Research Goals and Hypotheses	- 14 -
Method	- 16 -
Participants.....	- 16 -
Procedure	- 17 -
Instruments.....	- 17 -
DSM-IV-MR-J	- 17 -
Gambling Activities Questionnaire.....	- 18 -
Erroneous Gambling-Related Cognitions Questionnaire.....	- 18 -
Millon Adolescent Clinical Inventory	- 18 -
Connors-Wells' Adolescent Self-report Scale	- 21 -
Personal Experience Screening Questionnaire	- 22 -
Analytical strategy	- 23 -
Results	- 25 -
Gambling Behaviour.....	- 25 -
Cluster Analysis	- 26 -
Description of the clusters	- 28 -
Demographic Characteristics of the Clusters.....	- 48 -
Familial Gambling Problems and Personal Problems	- 49 -
Description of Gambling Severity within the Cluster Subgroups.....	- 50 -
Endorsement of items on the problem gambling screen	- 51 -
Reasons for gambling	- 52 -
Self-Perceptions and Self-Awareness	- 53 -
Problem Alcohol and Drug Use.....	- 54 -
Applying the Pathways Model to problem substance users.....	- 55 -
Distribution of Gender among Substance Abuse Subtypes	- 62 -
Qualitative Data: Semi-structured interviews	- 62 -
Discussion	- 66 -
Comparing the current findings to the Pathways Model	- 67 -
Distinctions between the current findings and the Pathways Model	- 70 -
Additional considerations	- 71 -
Limitations.....	- 72 -
References.....	- 73 -

List of Tables

Table 1. Age and grade distribution of sample	16 -
Table 1. Age and grade distribution of sample	16 -
Table 2. Distribution of sample according to gambling problem severity and gender. -	25 -
Table 2. Distribution of sample according to gambling problem severity and gender. -	25 -
Table 3. Frequency of participation in various forms of gambling	26 -
Table 3. Frequency of participation in various forms of gambling	26 -
Table 4. Comparison of means for the MACI variables used to derive clusters across the three resulting clusters	28 -
Table 4. Comparisons on Conners-Well's ADHD, Inattention, and Hyperactivity	40 -
Table 5. Multiple Comparison of Conners-Wells' Hyperactivity subscale for the Normative Group and the 3 Clusters	41 -
Table 6. Multiple Comparison of Conners-Wells' Inattention subscale for the Normative Group and the 3 Clusters.....	42 -
Table 7. Multiple Comparison of Conners-Wells' ADHDsubscale for the Normative Group and the 3 Clusters.....	43 -
Table 8. Results of the tests of equality of group means for each of the selected MACI variable before model creation.....	44 -
Table 9. Eigenvalues and measures of importance as relative percentage of variance -	45 -
Table 10. The overall and successive function test for equality of population means . -	45 -
Table 11. Function and variable correlations.....	46 -
Table 12. Gender distribution within problem gambler subtypes.....	49 -
Table 13. Prevalence of family and personal risk factors	50 -
Table 14. Severity of gambling problems by problem gambling subgroup	51 -
Table 15. Weekly participation in different gambling games by problem gambler subgroup.....	52 -
Table 16. Gambling frequency by problem gambler subtype.....	52 -
Table 17. Reported reasons for gambling by problem gambler subtype	53 -
Table 18. Concordance rates between self-rating and DSM-IV-MR-J screen categorization	54 -
Table 19. Regular usage of substances by problem gambler subtyp	55 -
Table 20. Comparing groups on MACI variables selected for clustering	57 -
Table 21. Gender distribution within the substance abuse clusters	62 -
Table 22. A comparison of reported problems and etiologies	66 -

List of Figures

Figure 1. Cluster centroids for MACI self-demeaning variable	29 -
Figure 2. Cluster centroids for MACI family discord variable.....	29 -
Figure 3. Cluster centroids for MACI childhood-abuse variable	30 -
Figure 4. Cluster centroids for MACI substance abuse proneness variable	30 -
Figure 5. Cluster centroids for MACI impulsive personality variable	31 -
Figure 6. Cluster centroids for MACI anxious feelings variable.....	31 -
Figure 7. Cluster centroids for MACI depressive affect variable	32 -
Figure 8. Cluster centroids for MACI suicidal tendency variable	32 -
Figure 9. Variable importance chart for Cluster 1	34 -
Figure 10. Variable importance chart for Cluster 2	35 -
Figure 11. Variable importance chart for Cluster 3	36 -
Figure 12. Mean BR scores on MACI Personality Patterns by cluster.....	37 -
Figure 13 Mean MACI Expressed Concern levels by cluster.....	38 -
Figure 14. Mean MACI clinical syndrome levels by cluster	39 -
Figure 15. Cluster centroids for MACI self-demaning variable for the substance abuse subsample.....	58 -
Figure 16. Cluster centroids for MACI family discord variable for the substance abuse subsample.....	58 -
Figure 17. Cluster centroids for MACI childhood-abuse variable for the substance abuse subsample.....	59 -
Figure 18. Cluster centroids for MACI impulsive propensity variable for the substance abuse subsample.....	59 -
Figure 19. Cluster centroids for MACI anxious feelings variable for the substance abuse subsample.....	60 -
Figure 20. Cluster centroids for MACI depressive affect variable for the substance abuse subsample.....	61 -
Figure 21. Cluster centroids for MACI suicidal tendency variable for the substance abuse subsample.....	61 -

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Abstract

This study, using a mixed-design approach (quantitative and qualitative) is the first to explore the applicability of Blaszczynski and Nower's (2002) proposed Pathways Model with an adolescent population. Such a framework is extremely useful in informing future screening, prevention and treatment efforts, and in providing essential guidance towards future research. The results find meaningful similarity to the proposed Pathways Model. Cluster and confirmatory analyses revealed three distinct subtypes of adolescent gamblers. Irrespective of their classifications, all adolescent problem gamblers were marked by high degrees of self-reported inattentiveness. While these results justify the three group classification proposed in the Pathways Model, some differences are noted and theoretical refinements of the model are discussed. Nevertheless the findings suggest a need to incorporate specific assessment strategies in the identification and classification of pathological gambling and the need for refined treatment approaches based upon not only the degree of gambling severity and types of games played, but underlying psychopathologies, developmental history, and co-morbid behaviours.

Key words: adolescent gambling, etiology, co-morbidity

Introduction

The Pathways Model proposed by Blaszczynski and Nower (2002) theoretically integrates current empirical knowledge concerning biological, personality, developmental, cognitive, learning theory and environmental factors into one coherent framework in an attempt to better understand different subtypes of pathological gamblers. Such a framework, if applicable, should be extremely useful in guiding future screening, prevention and treatment efforts. This study, using a mixed-design approach (quantitative and qualitative) is the first to test the applicability of this model for youth problem gamblers. Such a model has significant implications for pathway-specific assessment protocols and for treatment. This study provides some preliminary evidence of the applicability of the Pathways Model for youth experiencing substance abuse and dependency.

Literature Review

Pathological gambling is currently conceptualized as an impulse control disorder, characterized by persistent and recurrent maladaptive gambling behavior that leads to significant deleterious legal, financial, physical and psychosocial consequences (APA, 2000). Lifetime prevalence rates in adults range from 1% to 5% worldwide (National Opinion Research Center (NORC), 1999; National Research Council (NRC), 1999), with higher rates reported among youth (Jacobs, 2004; Shaffer & Hall, 1996). There remains considerable consensus that gambling and wagering among youth is a relatively common and popular activity (Derevensky & Gupta, 2004; Jacobs, 2004; NRC, 1999).

Acknowledging difficulties in comparing data sets, the NRC concluded that “the proportion of pathological gamblers among adolescents in the United States could be more than three times that of adults (5.0% versus 1.5%)” (NRC, 1999, p.89). Despite higher prevalence rates of problem gambling among youth, there is ample evidence that, similar to adults, adolescent problem gamblers are, in fact, not a homogenous group.

Several divergent theoretical approaches have attempted to explain problem and pathological gambling including addiction, psychodynamic, biological/genetic, neurobiological, learning, cognitive-behavioral, and sociological theories (Gupta & Derevensky, 2004; Petry, 2005). Conceptually, most of these models perceive pathological gambling either as a categorical or a spectrum disorder. While many of these models share common elements, they each assume that the interaction of significant

bio-psycho-social variables in the etiological process may be accounted for by one set of fundamental principles presuming that disordered gamblers are essentially a homogeneous population. The corollary is that theoretically driven treatments are applied universally to all individuals with gambling problems irrespective of gender, ethnicity, type of gambling, developmental history, or neurobiology, although some attention has been given to the type of gambling activity (e.g., machine player, poker player, etc.) preferred.

Currently, the majority of explanatory models of pathological gambling have failed to differentiate specific typologies of gamblers and pathological gamblers despite the recognition of multiple causes precipitating gambling problems and possible causal pathways (Blaszczynski & Nower, 2002; Nower & Blaszczynski, 2004). Blaszczynski and Nower (2002) have hypothesized a conceptual Pathways Model that identifies three primary subgroups/clusters of gamblers; behaviorally-conditioned, emotionally-vulnerable and biologically-based impulsive pathological gamblers. All three groups have common exposure to related ecological factors (e.g., availability, accessibility, and acceptability), cognitive processes and distortions, and contingencies of reinforcement. However, according to their proposed model, predisposing emotional stressors and affective disturbances for some individuals and biological impulsivity for others represent significant additive risk factors. Their differential Pathways Model has significant implications for the assessment and treatment of adult and adolescent pathological gamblers (Blaszczynski & Nower, 2002; Gupta & Derevensky, 2004; Nower & Blaszczynski, 2004).

Based upon the research literature, the Pathways Model proposes three subtypes of gamblers who display similar phenomenological features resulting from distinctly different etiological factors. The three gambling pathways put forward are distinguishable from each other in their presence (and/or absence) of specific pre-morbid psychopathology and biological vulnerabilities.

Pathway 1: Behaviorally conditioned problem gamblers

Pathway 1 gamblers are distinguished by the absence of specific pre-morbid features of psychopathology. They fluctuate between regular/heavy and excessive gambling largely as a result of the effects of conditioning, distorted cognitions

surrounding the probability of winning as well as a disregard for the notion of independence of events, and/or a series of bad judgments/poor decision-making rather than because of impaired control. *Pathway 1* gamblers initially gamble primarily for entertainment and socialization, facilitated by easy access and availability. Gambling-related symptoms, such as a preoccupation with gambling, chasing losses, substance dependence, depressive symptomatology and state anxiety are conceptualized as the consequence and not the cause of patterns of excessive gambling behavior.

Pathway 2: Emotionally vulnerable problem gamblers

Similar to Pathway 1 individuals, *Pathway 2* gamblers share similar ecological determinants, conditioning processes, and cognitive schemas. However, these individuals are quite different, as they also present with anxiety, and/or depression, a history of poor coping and problem-solving skills, problematic family background experiences, and major traumatic life events. Together, these factors contribute to an emotionally vulnerable gambler whose participation in gambling is motivated by a desire to modulate affective states and/or meet specific psychological needs. Gambling and pre-morbid drug abuse is used to relieve aversive states by providing escape or arousal (Jacobs, 1986). Psychological dysfunction in these gamblers results in more resistance to change and necessitates differential treatment addressing underlying vulnerabilities as well as excessive gambling and drug abusing behaviors (where applicable).

Pathway 3: Antisocial impulsivist

Pathway 3 gamblers also possess psychosocial and biologically-based vulnerabilities similar to Pathway 2 gamblers, but are primarily distinguished by features of impulsivity, antisocial personality traits and behaviours, and attention deficits (ADHD), manifesting in severe multiple maladaptive behaviors. Specifically, impulsivity directly affects the gambler's general level of psychosocial functioning. Clinically, these impulsive gamblers exhibit a wide array of behavioral problems independent of their gambling (Blaszczynski, Steel, & McConaghy, 1997; Rugle & Melamed, 1993; Vitaro, Arseneault, & Tremblay, 1999). Excessive alcohol and multiple drug experimentation, poor interpersonal relationships, non-gambling related criminality and a family history of antisocial behavior and alcohol problems are typically characteristic of *Pathway 3* individuals. These gamblers are less motivated to seek treatment, have poor treatment compliance

rates and generally respond poorly to any form of intervention (Blaszczynski & Nower, 2002).

Since the publication of the Pathways Model, a number of studies have identified relationships among various predisposing factors in the model as they apply to the homogeneous group of adult pathological gamblers. Investigating differences between problem and pathological gamblers in DSM-IV Axis II disorders, Sacco et al. (2008) found that pathological gamblers reported more symptoms of borderline personality disorder before but not after controlling for depression, suggesting a complex relationship between these variables. Similarly, Clark (2006) and Bagby et al. (2007) both reported that trait impulsivity and emotional vulnerability were additional risk factors for pathological gambling, though Clark (2006) further hypothesized that impulsivity served as a mediator for depression. A number of other studies have found relationships between problem gambling and other factors; sensation seeking (Bonnaire, Varescon, & Bungener, 2007); negative affect and distress tolerance (Daughters & Lejuez (2005); autonomic arousal (Moodie & Finnigan, 2005); and antisocial personality disorder (Pietrzak & Petry, 2005).

Some adolescent research has been conducted examining correlates of problem gambling that are pertinent to the Pathways Model. For example, links between poor impulse-control and youth problem gambling have been identified in a couple of longitudinal investigations (Vitaro, Arseneault, & Tremblay, 1999; Vitaro, Ferland, Jacques, & Ladouceur, 1998). Similarly, a longitudinal study identified prospective links for behavioural disinhibition in the prediction of gambling problems, substance use, and delinquent behaviour (Wanner, Vitaro, Carbonneau, & Tremblay, 2009). The link between poor impulse-control and gambling behaviour, substance use, and criminal behaviour has also been found among adults (Carlton & Manowitz, 1992).

Cross-sectional research has identified a relationship between anxiety and youth problem gambling (Ste-Marie, Gupta, & Derevensky, 2006), with problem gamblers reporting higher levels of anxiety. However, this relationship is unclear. For example, Vitaro and colleagues (1996) reported that aggressiveness and low anxiety during childhood distinguished problem gamblers from non-problem gamblers in adolescence. There is also research to suggest that the way problem gamblers cope with stress and negative life events is less adaptive than among those not experiencing gambling problems (Bergevin, Gupta, Derevensky, & Kaufman, 2006).

The Pathways Model hypothesizes the presence of attention deficits in pathway 3, in addition to the impulsivity. While there is evidence to support a relationship between problem gambling and attention deficit disorder among adults (Carlton & Manowitz, 1992; Specker, Carlson, Christenson & Marcotte, 1995), little research to date has examined the true nature of this relationship, especially among youth. Nonetheless, a small body of research assessing affective decision making and sensitivity to reinforcement when performing on gambling-type tasks does reveal that youth who are diagnosed with ADHD are more prone to experience impaired decision-making and decreased sympathetic and parasympathetic activation (Bubier & Drabick, 2008), and are less sensitive to magnitude of penalty on gambling tasks as compared to controls (Luman, Oosterlaan, Knoll, & Sergeant, 2008).

Adolescents with gambling problems often report higher levels of depression, suicide ideation, and suicide attempts (Gupta & Derevensky, 1998b; Kaufman, 2004; Nower, Gupta, Blaszczynski, & Derevensky, 2004).

There is some evidence that peer modeling and social learning are involved in the onset of gambling problems (Gupta & Derevensky, 1997; Hardoon & Derevensky, 2001). Many adolescents report that they gamble because their friends engage in this behavior (Griffiths, 1990). As well, adolescents with gambling problems commonly replace old friends with individuals who share their interests in gambling (Gupta & Derevensky, 2000). Affiliation with deviant peers has been linked separately and concurrently with gambling, substance, and delinquency problems, with deviant peers being found to be a strong predictor of gambling (Browne & Brown, 1994), substance use (Dishion, Capaldi, Spracklen, & Li, 1995), and delinquency (Elliott & Menard, 1996).

Although each of these factors identified in adult and youth research play a role in the Pathways Model, no study to date has investigated the full range of variables nor distinguished among etiological subgroups of problem gamblers in the model. Only a few studies have explored the possibility of heterogeneous subtypes among problem gamblers, the theoretical basis for the Pathways Model. Using a measure of gambling experiences, Ledgerwood and Petry (2006) identified three subgroups of problem gamblers - those that gamble to escape negative emotions, individuals who gamble primarily as a means of avoidance and dissociation, and those who gamble excessively to seek attention for narcissistic reasons. In a cluster analysis of 110 male pathological gamblers in Spain, Gonzalez-Ibanez et al. (2003) evaluated gamblers on measures of

depression, psychoticism, somatization, impulsiveness, interpersonal sensitivity and phobic anxiety. They found three distinct clusters, each exhibiting progressively more severe symptoms of psychopathology on these variables, suggesting that subgroups differed by degree of psychopathology rather than merely the appearance of psychological symptoms. This finding is consistent with overlap hypothesized between Pathways 2 and 3 of the Pathways Model. The Gonzalez-Ibanez et al. study did not, however, measure the presence or absence of these symptoms in relation to the development of gambling problems. In a more recent study, Stewart et al. (2008) conducted a principal components analysis on subscales of the Inventory of Gambling Situations then submitted the factor scores to cluster analysis. Similar to other studies, they found three clusters of problem gamblers - those that gambled for “enhancement” and lacked negative emotional factors; individuals that reported low positive and negative emotional regulation; and a final group that reported very high negative and positive emotional factors in gambling situations along with more significant gambling and alcohol problems. Their findings also lend general support to the notion that distinct subgroups of problem gamblers exist, however, none of the studies to date fully examine the range of factors identified by the Pathways Model.

Research Goals and Hypotheses

The current study aims to assess whether or not clusters of symptoms and defining characteristics that form the classification of the three subtypes of disordered gamblers proposed in the Pathways Model applies to adolescents. While it is recognized that there are more comprehensive approaches that could be applied in this process, the intent is for this to be the first of several studies designed to test the applicability of the Pathways Model to adolescents, should the results of the present study warrant further investigation.

Specifically, the research addresses the following objectives:

(1) To explore and test the applicability of the Pathways Model to adolescent problem gamblers.

- a. To refine or modify (if necessary) the proposed model in order to more accurately differentiate among different subtypes of adolescent problem gamblers.
- b. To qualitatively and quantitatively explore pathway-specific constructs of the

model and to identify key features which serve to distinguish each subgroup.

(2) To explore the applicability of the Pathways Model to adolescents experiencing substance abuse and dependency, in the absence of gambling problems. This is an interesting approach as it is often argued that pathological gambling falls within the addiction spectrum even though it is currently classified as being an impulse control disorder. The fact that many youth experience co-morbidity with gambling and substance use dependency would support common etiological pathways. Furthermore, since the Pathways Model holds many implications for treatment, such a comparison would allow for a greater understanding as to how treatment centers currently dedicated to the treatment of adolescent substance abuse could serve as appropriate service providers for young problem gamblers dually addicted.

The study was challenging to accomplish due to significant difficulty gaining access to students in schools. As such, an extension in timeline by 1.5 years was required.

Method

Participants

A total of 1,133 adolescents from English-speaking High Schools in Quebec (994) (87.7%) and Ontario (139) (12.3%) participated in the study (Male=558, 49.5%; Female=569, 50.5%).

Approximately two-thirds of the participants were between the ages of 15 and 16 (see Table 1) and attended grades 9 through 12. Since High Schools in Quebec do not have grade 12, a significantly smaller representation of older adolescents were included in the overall sample.

Table 1. Age and grade distribution of sample

Age	Frequency	Percent	Grade	Frequency	Percent
14	157	13.9	9	254	22.6
15	356	31.6	10	433	38.5
16	385	34.1	11	372	33.1
17	178	15.8	12	65	5.8
18	49	4.2			
19-20	3	0.3			
Total	1128	100.0		1124	100.0
Missing data	5			9	

The unequal distribution of participants among the two provinces is reflective of the fact that fewer schools participated in Ontario, citing they had already granted access to other research groups studying gambling. The sensitive nature of the data collected most likely contributed to these high refusal rates.

In Ontario, a total of 7 School Boards were approached for this study, and 5 opted not to participate. Of those School Boards who participated in Ontario, 19 schools were approached and 2 participated. In Quebec, 6 English School Boards were approached and 3 declined participation. Overall, 17 schools were approached, and 4 participated. In both Ontario and Quebec, school boards were selected based on their proximity to major city centers (Toronto and Montreal).

Previous research conducted by our team has not revealed any meaningful differences between Quebec Anglophone and Ontario adolescents.

Procedure

Prior to commencement of the study, ethical approval was obtained from the McGill University Research Ethic Board. A detailed research proposal package was submitted to School Boards across Eastern Ontario and Southern Quebec. Individual High Schools were contacted once School Boards granted permission. All schools were requested to allocate 45 to 50 minutes of in-class testing time for completion of the instruments. Parental consent was obtained prior to participation.

Questionnaires were completed by students during the school day under the supervision of trained research assistants, who provided assistance with questions during administration. Participants were provided with the definition of gambling as “any activity that involved an element of risk where money is wagered and could be won or lost.” The questionnaire took, on average, less than 50 minutes to complete.

Youth were instructed that they were not obliged to participate, that all responses were anonymous, and that they were free to refuse to answer any questions and withdraw from the study at any time. They were briefed on the importance of thoughtful, accurate responding.

Once the data was collected, all scores were entered onto an SPSS template prepared for this study, using computerized scanning equipment. Items on all instruments were coded and scored according to the standardization procedures set forth in the test manuals.

Instruments

No previously constructed measure has been developed to test the postulated of the Pathways Model. Therefore, a combination of instruments were selected to assess the basic tenants of the proposed model.

DSM-IV-MR-J (Fisher, 2000). This measure of youth problem gambling includes 12-items (9-categories) used to screen for pathological gambling during adolescence. The items are modeled after the DSM-IV (American Psychiatric Association, 1994) criteria for diagnosis of adult pathological gambling and the original DSM-IV-J for adolescents.

The revised DSM-IV-MR-J (MR=multiple response, J=juvenile), was developed for use with adolescents that have gambled during the past year. To compensate for the lack of opportunity for probing, most of the questions in the revised instrument have been given four response options; 'never', 'once or twice', 'sometimes', or 'often'. The DSM-IV-MR-J represents a more conservative classification system of problem and pathological gambling groups in that various questions require an endorsement above a certain severity level to receive an endorsement rating (score of 1). Internal consistency reliability for this scale is adequate, with Cronbach's alpha = .75 (although slightly lower than .78 for the original DSM-IV-J screen) (Fisher, 2000). Employing the same criteria as Gupta and Derevensky (1998), a score of 4 or more was indicative of a *probable pathological gambler* (PPG). A respondent who scored a 2 or 3 was categorized as an *at-risk gambler* and a person who scored 0 or 1 was considered a *social gambler*.

Gambling Activities Questionnaire (GAQ; Gupta & Derevensky, 1996) provides information about frequency of participation in different forms of gambling (e.g., poker, lottery). Respondents answered on a three-point scale (never, less than once a week, and once a week or more). An individual who indicated never having participated in any form of gambling was considered a *non-gambler*. The GAQ is reported to have good face validity, questions are analyzed individually, and no cumulative scores are calculated.

Erroneous Gambling-Related Cognitions Questionnaire was devised for the present study. It consisted of 11 common misperceptions that people have about gambling, to which respondents answered yes or no. Two examples include: "I have lucky clothing, personal objects, or rituals that increase my chances of winning when gambling", and "I don't hesitate to place large bets when I gamble because I know that I will eventually win it back and more".

Millon Adolescent Clinical Inventory (MACI; Millon, Millon, Davis, & Grossman, 2006) is a widely used and standardized instrument for assessing adolescent personality characteristics and clinical syndromes among adolescents exhibiting a wide range of problems. Although originally designed for clinical use, the instrument make an appealing choice for the present study because it (1) was designed specifically for adolescents, (2) included 29 subscales, providing information on a broad range of clinical

problems and a holistic overview of the youth's personality, and (3) was comprised of 160 items geared to a sixth-grade reading level, and thus was easy for the user to complete. Additionally, scores are adjusted for gender and age. The scales are divided into three sections; personality, concerns, and syndromes. The theory on which the MACI is grounded reflects advances both in Millon's personality theory and recent developments in the DSM. The following provides operational definitions for each of the subscales.

Personality Patterns

1. *Introversive*: Quiet, unemotional, apathetic, listless, distant, and asocial. High scorers report few affectionate needs and feelings, and the lack of strong feelings.
2. *Inhibited*: Shy, ill at ease with others. These individuals prefer to be closer to others but fear rejection and feel safer maintaining a psychological distance. As a result, they fail to form close interpersonal relationships, feel lonely, and keep strong feelings to themselves.
3. *Doleful*: Sad, brooding, and pessimistic. High scorers demonstrate gloomy moods, and tend to feel guilty, remorseful, and worthless.
4. *Submissive*: Softhearted, sentimental, and kindly in relationship. Because they undervalue their potential, these individuals have trouble asserting themselves, taking initiative, and assuming leadership roles. Fearing separation, they tend to cling to others.
5. *Dramatizing*: Talkative, charming, exhibitionistic, and emotionally expressive. High scorers seek excitement and new experiences and become quickly bored with routines. They tend to form brief relationships.
6. *Egotistical*: Self-centered, narcissistic, self-assured, arrogant, and exploitative. These individuals are unconcerned with the needs of others.
7. *Unruly*: Antisocial and rebellious. High scorers tend to reject social norms and often clash with parents and authority figures.
8. *Forceful*: Strong-willed, tough-minded, and controlling. They tend to question the rights of others, act unkindly, and abhor displays of weakness. High scorers tend to be abusive and demeaning.
9. *Conforming*: Efficient, respectful, serious-minded, and orderly. These individuals place importance on social conventions and try to keep their emotions in check. They tend to be tense and avoid unpredictable situations.
10. *Oppositional*: Disconnected, sullen, and passive-aggressive. High scorers are unpredictable; they can be friendly one time, and irritable the next. Individuals feel confused and contrite about their moodiness, but seem unable to do anything about it.
11. *Self-demeaning*: High scorers tend to sabotage their own efforts to achieve success, and undermine the assistance of others. They do not allow themselves the possibility of feeling pleasure, and find security in their misery.
12. *Borderline tendency*: Unstable, erratic, capricious, and impulsive. They tend to fluctuate from one extreme to the other. For example, they might be extremely emotional one day, and apathetic the next. This scale is different from the others in that it represents an inability to form a coherent intra and interpersonal identity. High scorers are marked by conflicting thoughts, and display pathological

variants of all personality traits. It is usually indicative of a personality problem requiring treatment, and is associated with numerous clinical problems, including suicidality and self-mutilation.

Expressed Concerns (expression of feelings or attitudes that typically plague troubled adolescents)

1. *Identity diffusion*: An unsuccessful resolution of an adolescent's search for an identity. Unable to determine who they are and where they are going, the adolescent latches onto an incoherent, confusing and untenable definition of himself or herself. This makes it difficult for others to relate to them, and does not allow a successful transition to adulthood roles and responsibilities.
2. *Self-devaluation*: A broad dissatisfaction with one's self-image. High scorers have low self-esteem and tend to show a high need for social approval. Fairly high scores are common in adolescence, and many insecure youths demonstrate good self-acceptance by late adolescence.
3. *Body disapproval*: Dissatisfaction with perceived physical attractiveness, social appeal, and physical maturation. High scorers perceive themselves as having physical deficits and deviations that set them apart from others.
4. *Sexual discomfort*: Finding sexual thoughts and feeling uncomfortable and confusing. High scorers fear the expression of sexuality, and are troubled by the roles that it may require.
5. *Peer insecurity*: Feeling of being rejected and ignored by one's peers. High scorers report unsuccessful attempts to obtain approval, and being isolated.
6. *Social insensitivity*: Indifference to the welfare of others. High scorers are willing to breach the rights of others to obtain personal gains, they lack empathy, and they do not care for close interpersonal relationships.
7. *Family discord*: Feeling that the family is a source of tension and conflict. Individuals report little mutual support among family members and feeling estranged from their parents. This may be due to individual rebelliousness or parental rejection.
8. *Childhood abuse*: Perception of being the victim of emotional, verbal, physical, or sexual abuse by parents, siblings, relatives or family friends. High scorers also report feelings of shame or disgust as a result of their experiences.

Clinical Problems

1. *Eating dysfunctions*: Anorexia and bulimia, as characterized by self-starvation, binge eating, purging, misuse of laxatives and diuretics, and body preoccupation.
2. *Substance-abuse proneness*: Maladaptive patterns of drug and alcohol use, as characterized by impairments of their performance of day to day responsibilities, excessive energy and time spend procuring substances, socially unacceptable behaviour while under the influence, persistent use even though it is having a detrimental effect on their lives.
3. *Delinquency predisposition*: Participation in behaviour that has led to the violation of the rights of others. Behaviours include rule-breaking, threatening others, weapon use, frequent deceptiveness, and stealing. High scorers often act impulsively, show little concern for the consequences of their actions, and belong to a peer group that approves of certain illegal and antisocial acts.
4. *Impulsive propensity*: Tendency to act out feelings with minimal provocation. High scorers demonstrate little control over sexual and aggressive urges, get agitated over seemingly small matters, and act rashly.

5. *Anxious feelings*: Persistent feelings of stress, tenseness, indecisiveness, and restlessness, often accompanied by somatic complaints. High scorers are consumed by a sense of foreboding and apprehension that something bad will happen to them.
6. *Depressive affect*: Feelings of despair, guilt, fatigue. Symptoms of depression include an uncharacteristic decreased level of activity, social withdrawal, negativity about the future, and feeling worthless.
7. *Suicidal tendency*: Having suicidal thoughts and plans. High scorers are preoccupied with death, engage in self-injury, and feel that others would be better off without them.

The MACI is infrequently used for large-scale research projects as the calculation of scores requires considerable time and attention to detail. The scoring guidelines set forth in the manual (Millon et al., 2006) were followed. Each item consists of a statement to which the respondent answers true or false. The same item may be used to calculate several subscales. Subscales are assessed with 23 to 45 items, some of which are reverse recoded. Items are given different weight and totaled to form the raw scores, and these are converted to standardized scores (called BR scores) using age and gender adjusted transformation Tables. For the personality patterns, having a score above 60 indicates that the individual may possess a specific trait. For expressed concerns, scores of 61-74 suggest that the issue is slightly problematic, scores of 75-84 suggest an unresolved issue which is problematic, and scores above 85 suggest a major concern. For clinical syndrome scales, scores in the 61-75 range indicate that there is some similarity between the respondent and those who manifest the targeted syndrome, scores between 75 and 84 are indicative of moderate problems, and scores above 85 denote a high probability of a clinical problem that requires immediate attention. Test-retest reliability ranges between .57 and .91 for each of the subscales. Overall the test-retest reliability for the Personality Pattern subscales was .81; for the Expressed Concerns subscales .79; and for the Clinical Syndrome subscales .80.

Conners-Wells' Adolescent Self-Report Scale (Conners & Wells, 1997). Two subscales, ADHD and Inattentiveness scales, were included in the present study. The assessment of attention deficit hyperactivity disorder consists of 18 statements that are commonly endorsed by adolescents with ADHD. Two examples are: "Noises tend to put me off track when I am studying", and "I have trouble playing or doing leisure activities quietly". Respondents' answer on a scale ranging from 0 to 4: "not true at all," "just a

little true,” “pretty much true,” and “very much true.” The total of items constitutes the raw score which are converted into standardized scores (adjusted for age and gender). This scale contains rationally derived subscales that relate directly to DSM-IV criteria (APA, 1994). Reliability, internal consistency coefficients range between 0.75 and 0.90 and 6 to 8 week test-retest reliability ranges from 0.60 to 0.90 for the different subscales. Factor analysis on derivation and cross-validation samples was conducted. Convergent, divergent, and discriminant validity was strongly supported.

Personal Experience Screening Questionnaire (PESQ) (Winters, 2004) is a 40-item evaluation of problematic drug and alcohol use. Among other things, the screen includes questions concerning the frequency with which respondents used drugs and alcohol in various settings, hiding one’s usage from others, behaviors associated with a drug problem, and the frequency of use of different substances. The subscales for problem severity and history of admitted drug experience were calculated according to specifications provided by the author. An interpretation guide was included to help determine whether the youth had no problems (green flag), low to moderate severity problems (yellow flag), and a probable serious issue with alcohol and drug use (red flag).

The method derived by Winters for identifying potential problem drug and alcohol users (i.e., red flags) resulted in an unusually large problem group; 30% of the sample was categorized as potential problem drug and alcohol users. For the cluster analysis of problem substance users we decided not to use this scoring system as it would have included too many youth who were likely not at high risk of a problem given this was a general adolescent population. In accordance with prevalence estimates for substance use problems among adolescents, a coding scheme that identified 15% of the sample was devised. The following criteria were established:

- Regular user of drugs and alcohol = used alcohol, marijuana, or hard drugs 10 or more times.
- Problem severity score (range = 18-78) = Problem Score (using Winters’ scoring method) + age of first use (grade 6 or less = 2; grade 7-8 = 1, all other answers = 0) + age of first regular use (grade 6 or less = 4; grade 7-8 = 3, grade 9-10 = 2, grade 11 or later = 1, all other answers = 0).
- Problem drug user = regular drug use + problem severity score of ≥ 40 .

Individuals were removed from the analysis if they met one of the following three conditions: (1) failed to answer one of the three questions used to assess regular drug use, (2) omitted two or more questions used to calculate the problem severity measure, or (3) answered “once”, “sometimes”, or “often” on two of the three infrequent answer questions included in the PESQ to detect questionable response patterns.

Analytic Strategy

Scores were calculated for individuals who responded to 85% or more of the items. Missing DSM items were recoded as 0. The mean item scores were imputed for all other measures. Syntax files were created to calculate the MACI raw scores and trained research assistants performed the transformation to standardized scores. Syntax files were created to calculate the standardized scores of the Conners-Wells’ ADHD scale. Reliability checks on scores (every fifth to tenth) were calculated manually to ensure that these procedures were error-free.

Hierarchical cluster analyses were used to classify cases into clusters. Subsequently, discriminant analyses were used to test the predictive ability of the cluster model to discriminate between the groups based on linear combinations of the predictor variables. Cluster analysis is an algorithm that attempts to identify relatively homogenous groups of cases on the basis of similarities in terms of selected variables. It starts with each case as a separate cluster and then combines clusters until the specified number of clusters is left. It is a useful method for classifying a population into subgroups because techniques are available to explore how subjects are grouped, to establish parameters for predicting group membership, and validating the accuracy of the grouping strategy (Borgen & Barnett, 1987). This enables a judgement of whether the results are suggestive of what has been identified about the heterogeneity of a given population, the goal of the present investigation. Results have been obtained using cluster analytic techniques in a similar type of study on reactions to sexual abuse (Hébert et al., 2006). Discriminant analysis builds a predictive model for group membership. The discriminant function is based on a linear combination of the predictive variables that suggest the best discrimination between the known cluster memberships for the sample.

Based on the premises of the Pathways Model total of eight clustering variables were selected from the MACI scales; these include five clinical syndromes (i.e.,

depressive affect, anxious feelings, substance abuse proneness, impulse propensity, and suicidal tendency), one pathological personality pattern (i.e., self-demeaning), and two expressed concerns (i.e., family discord and child abuse). Cluster models that included a 9th variable (erroneous cognitions related to gambling) were tested as well. This was not done to distinguish the groupings but rather to confirm that all groupings possessed this trait, as predicted in the Pathways Model. Attention deficit was not used as a clustering variable because we wanted to examine how the resulting clusters compared on this construct, making use of three subscales. Had we used it as a cluster variable, this comparison between clusters would not have been possible.

The Ward's method was used as the clustering algorithm. All variables were standardized as z scores. Parameters were set to look for a minimum of 2 and a maximum of 4 clusters. Because the Pathways Model predicts a three-cluster solution, this strategy allowed for the possibility that the authors overlooked one type of problem gambler, or that one of the types was redundant. If one of these prospects is supported, the parameter is appropriately adjusted (i.e., the model will be set to look for 1 to 3 clusters or 3 to 5 clusters), and the cluster analysis rerun. To assess the reliability of the model, Borgen and Barnett (1987) recommend attempting an alternate clustering method to verify whether similar results would be obtained. To this end, the between-groups linkages method was chosen for the secondary cluster analysis. In addition, a two-step cluster analysis was carried out to examine the importance of individual variables within each of the resulting cluster and to examine the composition of the clusters.

To gain a better understanding of the clusters, scores on measures of personality traits, expressed concerns, and clinical syndromes (MACI), ADHD (Conners-Wells), and problematic substance use (PESQ), were compared to one another and to those of a normative group. Additionally, the different clusters of problem gamblers were compared with respect to their gambling behaviour (GAQ) and the items endorsed on the DSM-IV-MR-J. Discriminant Analyses were carried out to test the discriminative power of the variables in clustering individuals into distinct mutually exclusive groups.

The Pathways Model was also explored on a subset of the sample with substance abuse, excluding those experiencing gambling problems.

Results

Gambling Behaviour

According to the DSM-IV-MR-J scores and information from the GAQ, it was determined that approximately one fifth of youth were non-gamblers, over two-thirds of the sample gambled without experiencing significant problems, and 2.9% met criteria for probable problem gambling. These proportions are comparable to those found in prior studies using community samples. Consistent with other research, females are more likely to be non-gamblers, and males are more likely to have gambling-related problem (Table 2). These gender differences were statistically significant, $\chi^2(3, 1133) = 6.64, p < .005$.

Table 2. Distribution of sample according to gambling problem severity and gender

	Male		Female		Total	
	N	%	N	%	N	%
Non gambler	65	11.9%	149	26.9%	214	19.5%
Social gambler	395	72.4%	379	68.4%	774	70.3%
At-risk gambler	59	10.8%	21	3.8%	80	7.3%
PPG	27	4.9%	5	.9%	32	2.9%

The frequency of participation in several forms of gambling is presented in Table 3. The most popular form of gambling was card playing; it was the only activity in which a majority of youth participated. However, a large proportion of youth also partook in various sports-related gambling activities. The most popular forms of gambling were card playing (61%), sports pools (30%), and lottery playing (26%). While there is likely overlap between the various types of gambling on sporting events and as such the percentages are not necessarily cumulative, sports wagering, especially among males, is a

Table 3. Frequency of participation in various forms of gambling

Gambling activity	Frequency of participation (percentage)		
	Never	Less than once a week	Once a week or more
Cards	39	51	10
Sports Wager	68	26	6
Sports Lottery	93	6	2
Lottery Tickets	74	23	3
Video Games	84	13	4
VLTs	93	6	1
Bingo	65	33	3
Slots	95	4	1
Sports Pools	71	24	6
Racetrack	93	5	1
Casino	93	5	2
Internet	94	4	1
Other	87	10	4

Note. Row percentages do not always total 100% due to rounding.

popular activity. Card playing and wagering on sports are the types of gambling most frequently engaged in. It should also be noted that there are differences in accessibility to various forms of gambling between Ontario and Quebec (e.g., Ontario does not have VLTs in local liquor-licensed establishments) and that age differences also differ (in Quebec individuals 18 years old can gamble in any venue, while in Ontario the minimum age for casino gambling is 19).

Cluster Analysis

Since the Pathways Model pertains only to those experiencing gambling problems, individuals not reporting problem gambling were excluded from the cluster analyses. However, due to the low number of Probable Pathological Gamblers (PPGs), it was not feasible to conduct a cluster analysis using this group alone. Therefore, the cluster analyses included both at-risk gamblers and PPGs. There is ample research to suggest that adolescents in these two groups (at-risk and probable pathological gamblers) are actually more similar than dissimilar although a number will never reach the criterion for pathological gambling (Bergevin, Derevensky, Gupta, & Kaufman, 2006). Of the 112 youth who reported these levels of gambling problems, five individuals were removed because they had not completed a sufficient number of items on the MACI to calculate all

the scores required to perform the cluster analysis, thus leaving a final sample of 107 youth.

Consistent with the Pathways Model, a three-cluster solution was judged to provide the most useful solution. The two-cluster solution simply divided the gamblers in terms of their overall health (i.e., few problems and numerous problems). As such, this was deemed a relatively uninformative distinction. A four-cluster solution was found to be identical to the three-solution model, except that the least problematic group was divided into two groups, one that was more anxious than the other. Both groups were found to be very similar in every other respect. Other than establishing that some ‘otherwise normal’ problem gamblers are more nervous than others, this division provided little other information about the heterogeneity of the population, and was therefore deemed unnecessary, especially since it could not be determined whether anxiety precedes onset of gambling.

In the confirmation process, a nearly identical three-cluster solution was found using the between-group linkages solution. The only differences were very minor changes in the numbers of cases in each cluster. Otherwise, both cluster analyses categorized the sample of problem gamblers into three groups; one group with few problems, one group experiencing wide-ranging difficulties along with marked clinical depression, and, finally, one group with selected difficulties, namely issues with substance abuse, impulsivity, and family discord. This is strong confirmatory evidence of the cross-method stability of the clusters. Similarly, the two-step clustering procedure made minor adjustments to the number of cases in each cluster but provided almost identical variable composition and trends.

One-way ANOVAs were conducted to examine whether all selected clustering variables differentiated groups on the MACI and Conners ADHD scales; t-tests with Bonferroni adjustments were conducted to test the relative importance of each variable within each of the three clusters.

Consistent with the Pathways Model, the “erroneous cognitions” variable did not distinguish amongst the groups. This variable was subsequently removed from the model and the cluster analysis was recalculated. A three-cluster solution was once again obtained.

Subsequent one-way ANOVAs revealed a significant effect for all the selected grouping variables, suggesting that they all contribute to distinguishing cluster membership. The mean variable levels for each cluster are presented in Figure 1 and Table 4.

Table 4. Comparison of means for the MACI variables used to derive clusters across the three resulting clusters

Cluster	Cluster 1 (n=64)		Cluster 2 (n=16)		Cluster 3 (n=27)		Overall F
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
Depressive Affect	53.27	26.22	101.13	10.39	51.81	24.01	27.576*
Anxious Feelings	66.11	11.75	57.06	16.12	43.67	14.55	27.696*
Impulse Propensity	33.61	13.47	71.75	19.69	73.15	17.27	81.46*
Substance abuse proneness	23.67	13.04	73.75	25.76	72.41	18.84	108.498*
Childhood abuse	19.08	14.63	72.56	15.83	33.00	15.43	81.672*
Family discord	45.16	21.29	79.44	21.42	75.48	19.20	30.209*
Self-demeaning	36.38	24.12	91.00	12.43	46.11	20.77	39.606*
Suicidal tendency	18.95	15.03	78.88	14.70	25.70	17.88	93.797*

* significant at the $p < .05$ level

The Clusters

Cluster centroids for each of the variables are displayed in Figures 1 through 8. These centroids show the dimensional space each variable takes with respect to clusters and on average for all cases (combined).

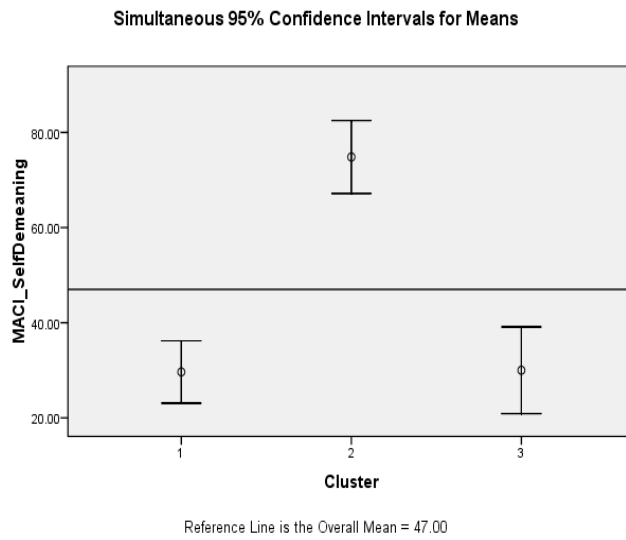


Figure 1. Cluster centroids for MACI self-demeaning variable

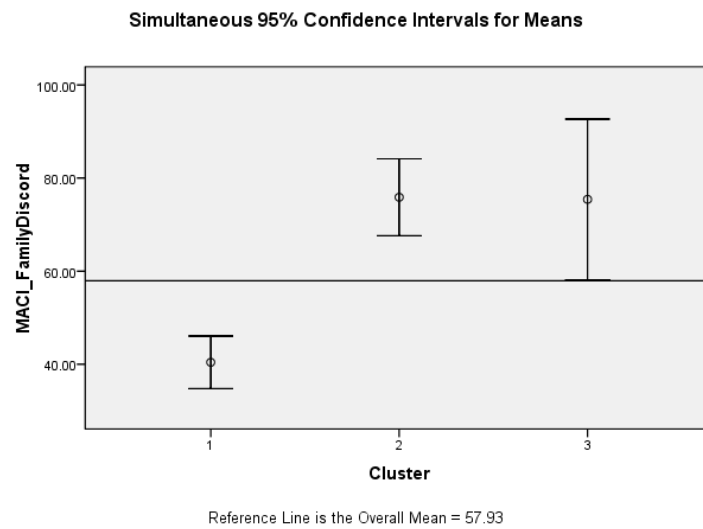


Figure 2. Cluster centroids for MACI family discord variable

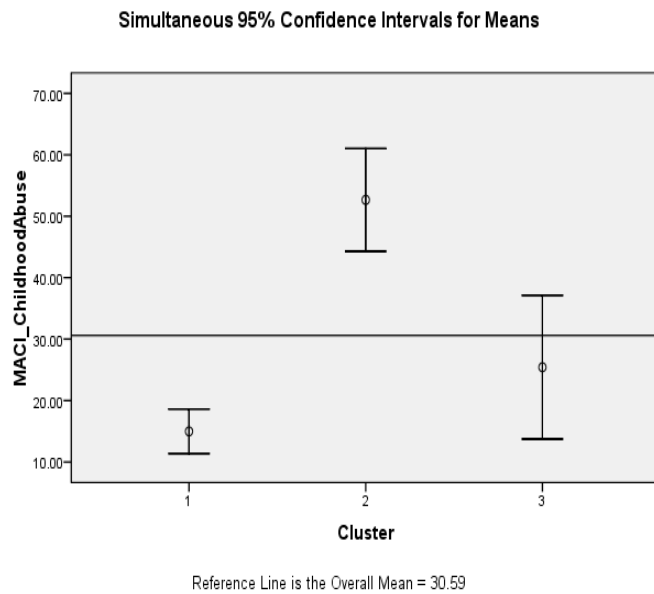


Figure 3. Cluster centroids for MACI childhood-abuse variable

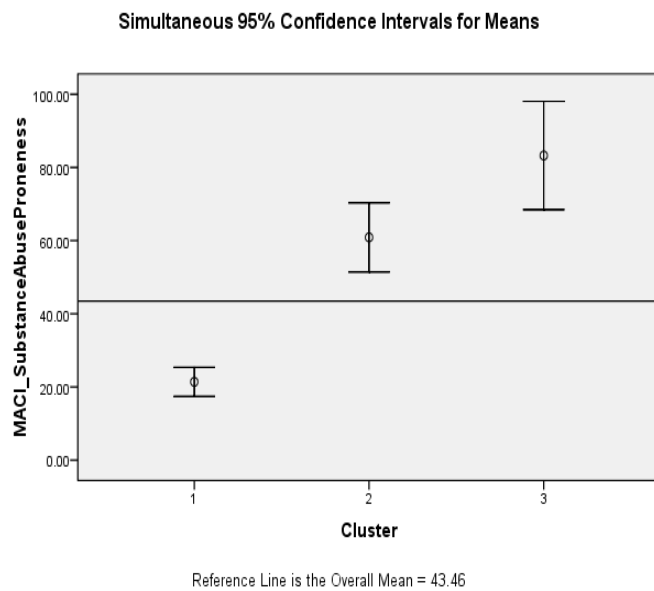


Figure 4. Cluster centroids for MACI substance abuse proneness variable

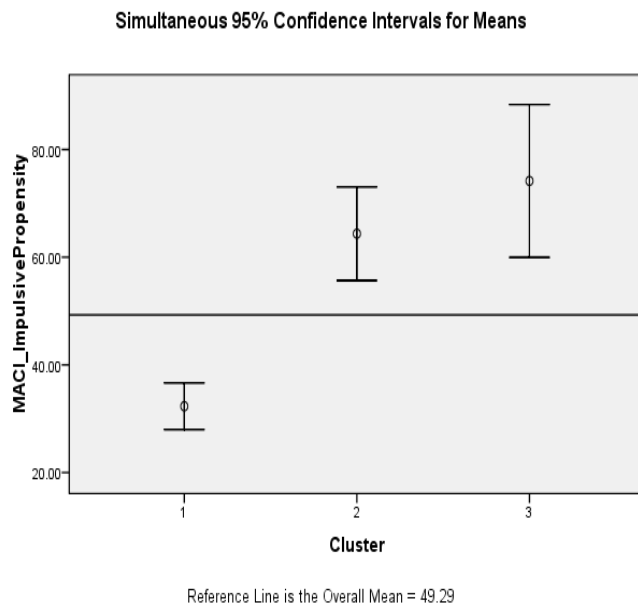


Figure 5. Cluster centroids for MACI impulsive personality variable

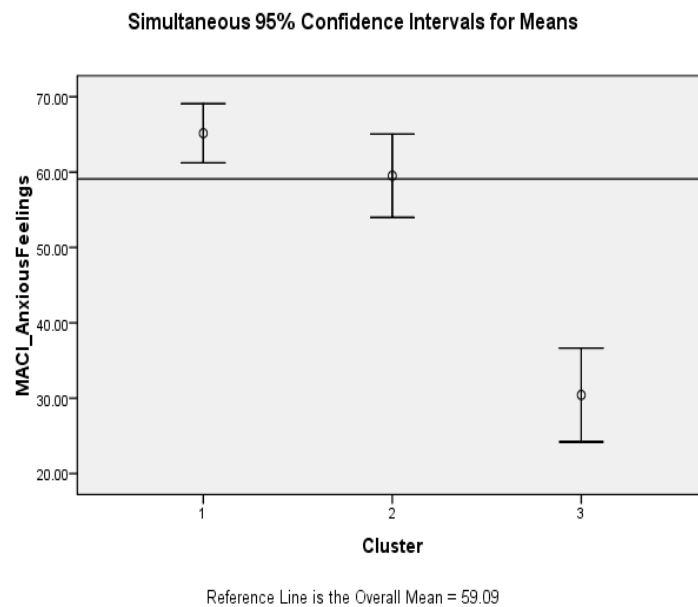


Figure 6. Cluster centroids for MACI anxious feelings variable

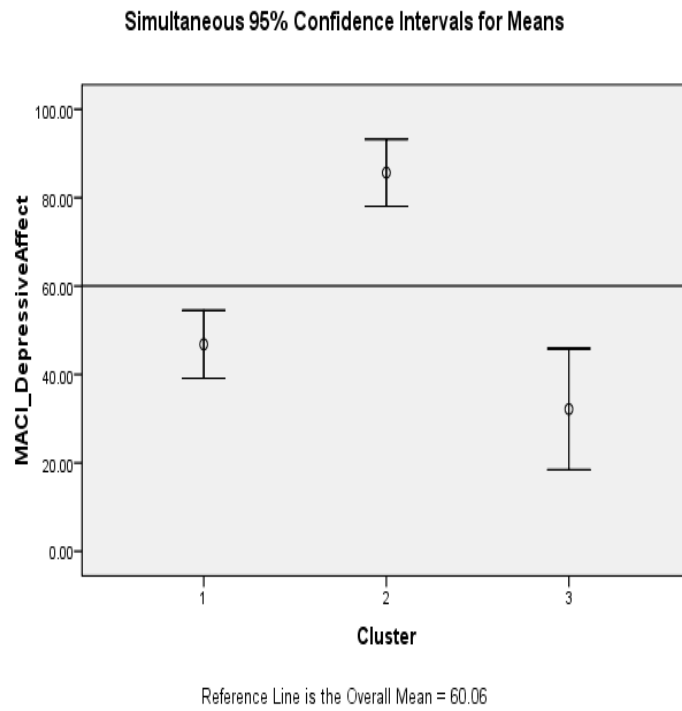


Figure 7. Cluster centroids for MACI depressive affect variable

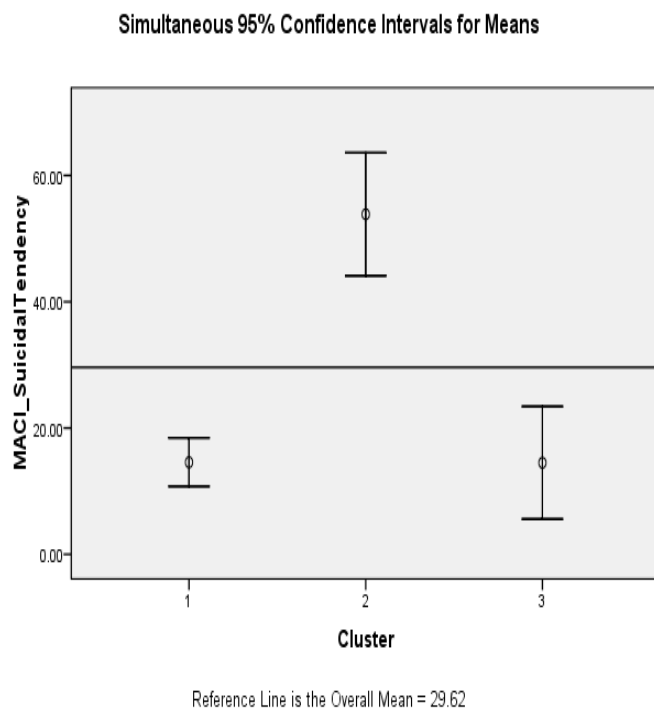


Figure 8. Cluster centroids for MACI suicidal tendency variable

The two-step clustering analyses provided plots for the means and confidence intervals for each of the variables for the three clusters. These plots allow for the simultaneous examination of the relative values of the eight different variables within each of the clusters. Note, the confidence intervals for the means of several groups are provided together. To account for the simultaneous comparisons, they are wider than the actual individual intervals.

The relative importance of the different variables in the formation of the three clusters are shown in Figures 9 through 11. Within each cluster, t-statistics were used to compare the mean of the variable in the cluster to the overall mean. The variables are shown in descending order of importance. The dashed vertical lines provide the t-critical values for determining the significance level at $\alpha=.025$. The negative t-values indicate the variables take on a smaller than average values within the cluster. These graphs show that the importance level of all variables cross the t-critical threshold. However, for Cluster 1 the anxious feelings are generally higher than average even though anxiety is the least important variable in the cluster formation. In Cluster 2, the importance of anxious feelings do not reach significant levels. In Cluster 3, family discord is higher than average but not significant in terms of its importance but childhood abuse is less than average and not significant in terms of its importance.

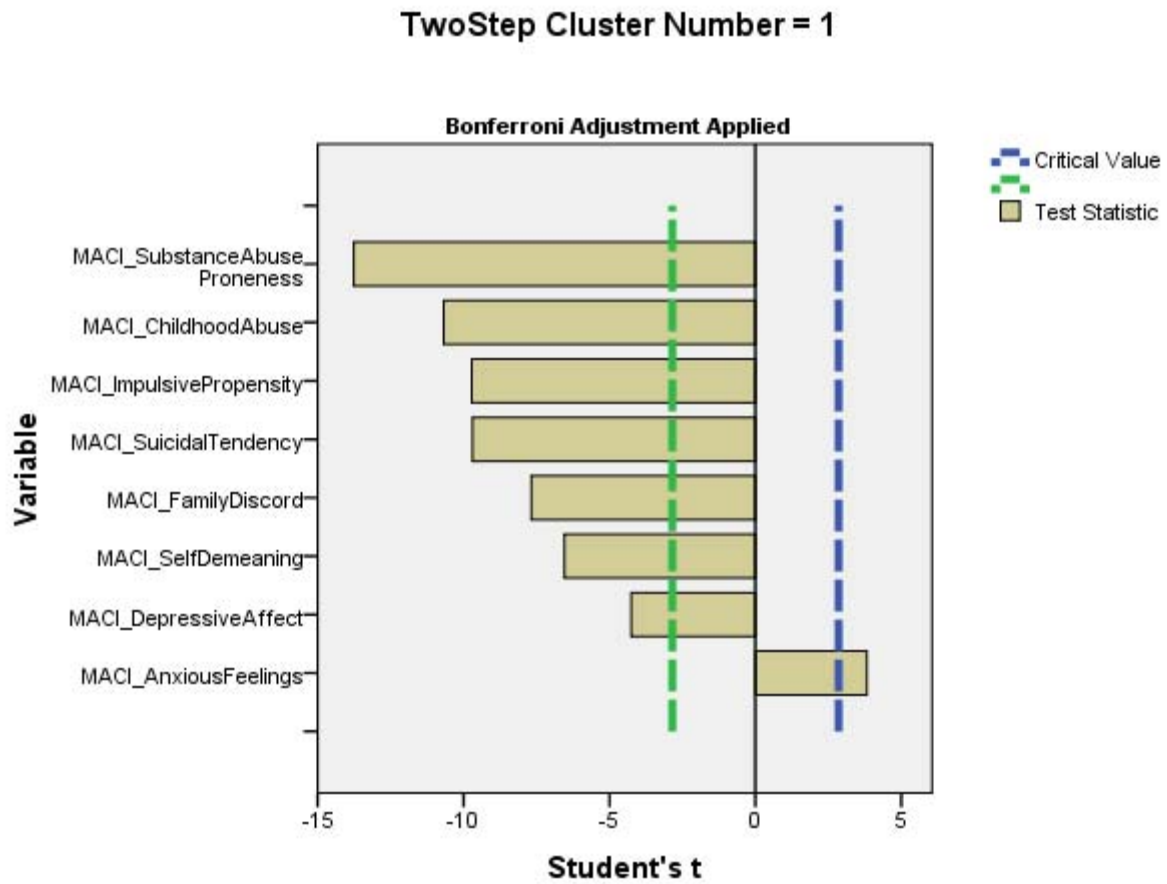


Figure 9. Variable importance chart for Cluster 1

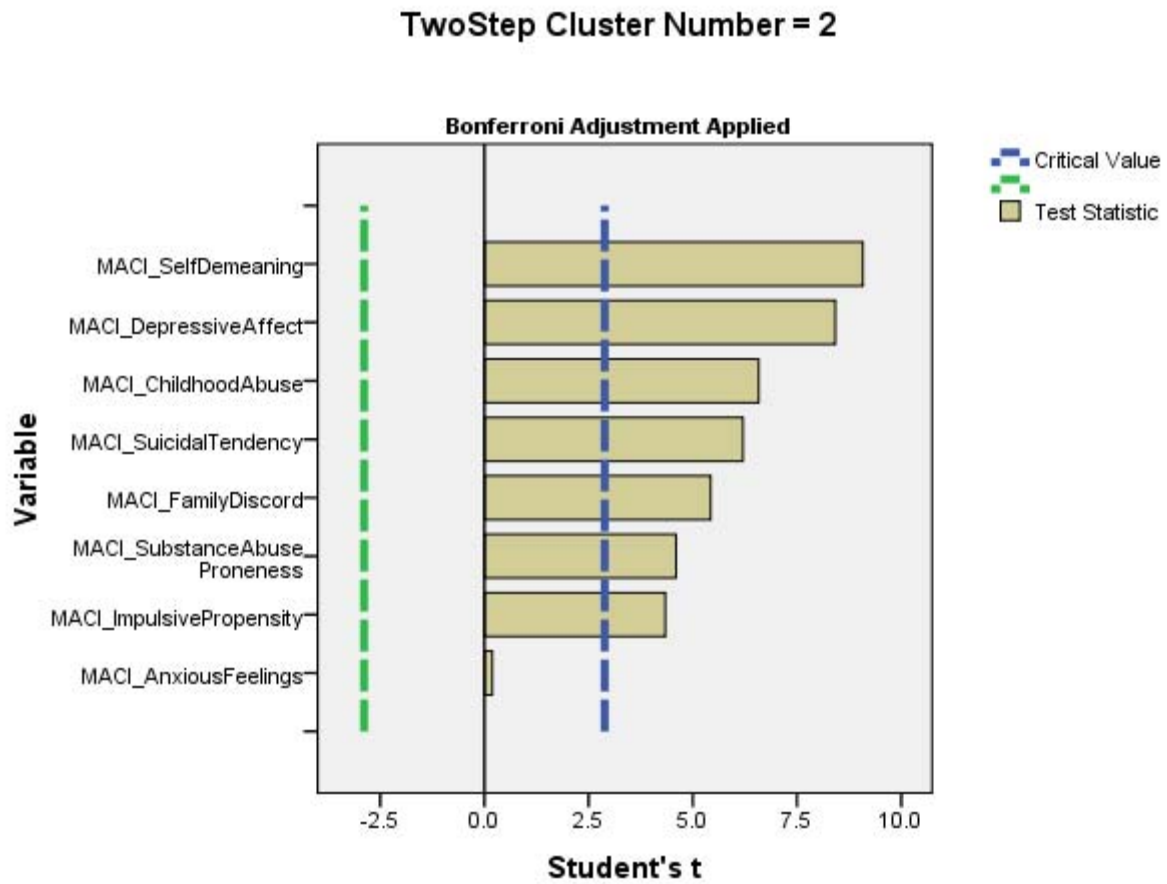


Figure 10. Variable importance chart for Cluster 2

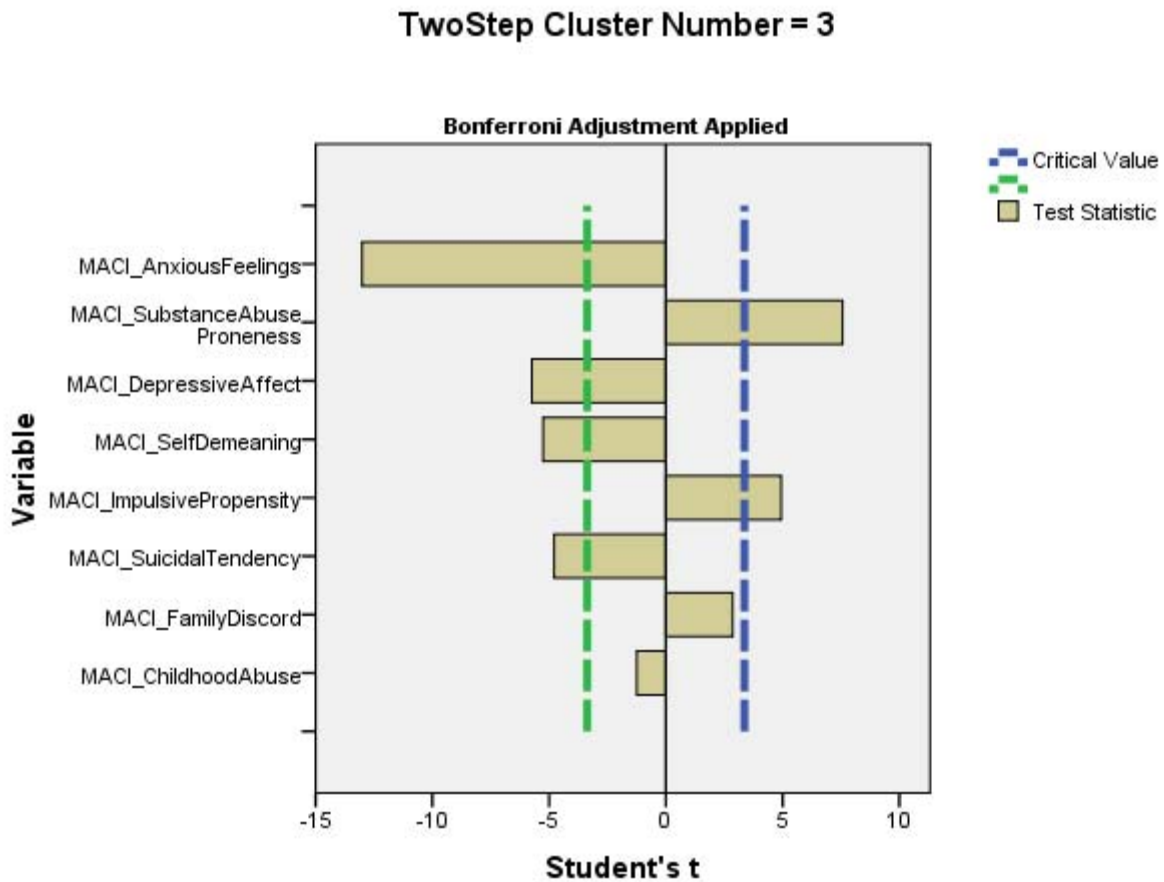


Figure 11. Variable importance chart for Cluster 3

Comparison to the rest of the gamblers in the sample: Normative group.

In order to determine how these clusters compare to normative youth, a group consisting of the social and non-gamblers was created. The three problem gambling clusters were compared to this group in a series of one-way ANOVAS. The differences between the groups on the MACI subscales, are illustrated in Figures 12, 13 and 14.

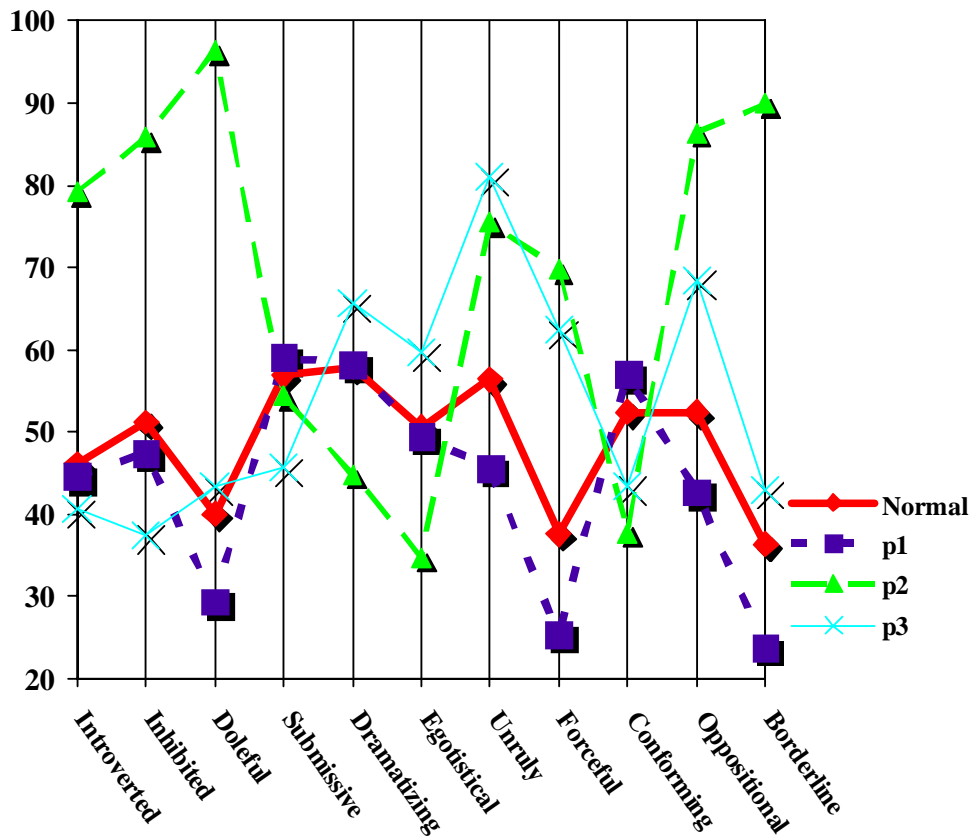


Figure 12. Mean BR scores on MACI Personality Patterns by cluster

A score of 60 or more indicates the presence of a personality pattern which is of clinical significance as compared to MACI normative means.

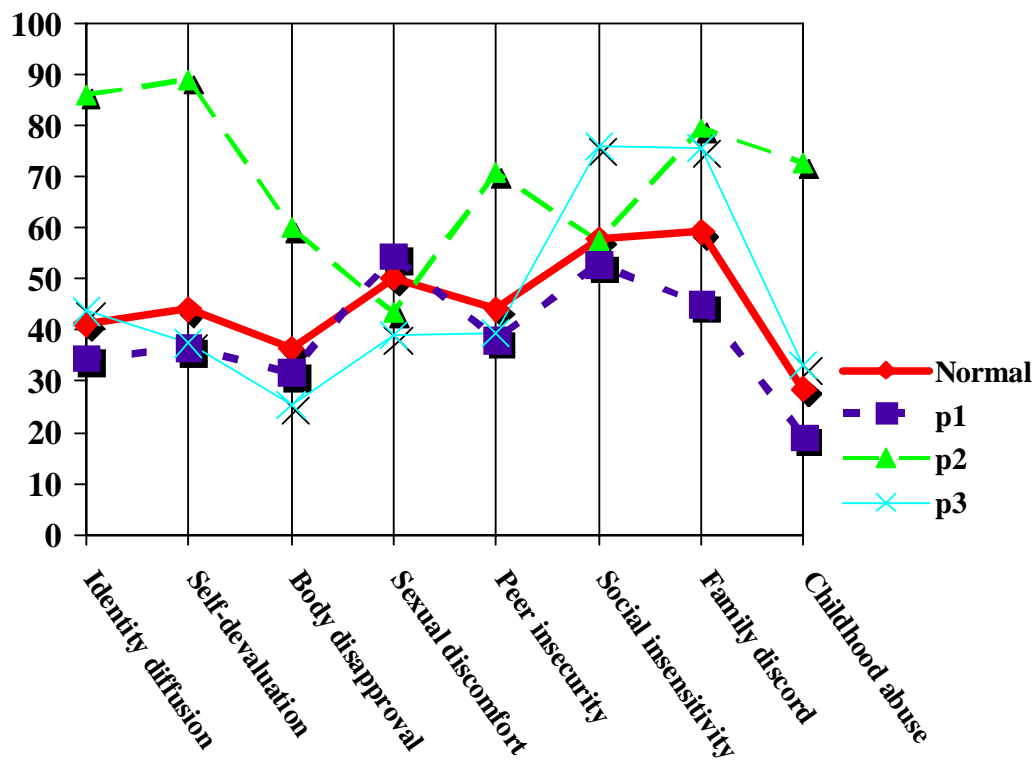


Figure 13 Mean MACI Expressed Concern levels by cluster

A score of 60 or more indicates the presence of an expressed concern which is of clinical significance as compared to MACI normative means

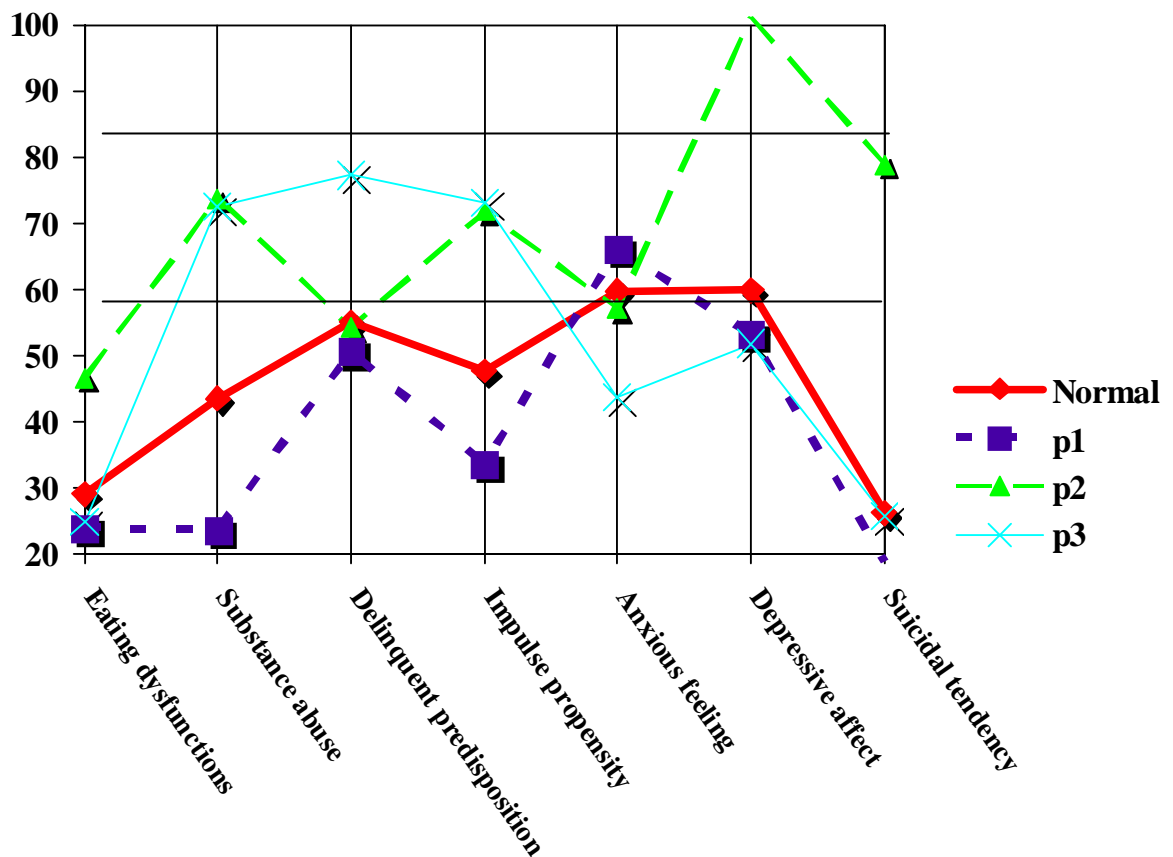


Figure 14. Mean MACI clinical syndrome levels by cluster

A score of 60 or more indicates the presence of a clinical syndrome which is of clinical significance as compared to MACI normative means.

The problem gamblers falling within the different clusters were compared on three subscales of the Conners-Wells' Adolescent Self-report Scale: Inattention, Hyperactivity and ADHD.

The Pathways Model specifies the presence of attention deficit with impulsivity in pathway 3. We tested cluster and group differences with respect to ADHD as well as the different components that contribute to ADHD, namely inattention and hyperactivity, in order to determine if one component is more dominant than the other. We also assessed for the presence of ADHD which consists of a combination of those two constructs as well as other factors such as cognitive and behavioural manifestations, as assessed by the Conners-Wells' scale. Significant differences were obtained when checking for differences between groups (the three clusters and normative group) (Table 4). The post

hoc group comparison (with Bernouli adjustments) showed no overall significant difference among the members of the three clusters on any of the three Conners-Wells' variables, but some differences were noted when comparing to the normative group from this sample. Specifically, Cluster 1 yielded higher scores on all three subscales as compared to the normative group. The multiple comparison results are shown in Tables 5, 6 and 7.

It is worth noting that the mean scores for the hyperactivity variable in any of the clusters do not meet clinical significance ($t = 60$), whereas all the mean scores for the inattention subscale do. This is interesting to note because the Pathways Model only hypothesizes about attention deficits and not the other two variables.

Table 4. Comparing groups on Conners-Well's ADHD, Inattention, and Hyperactivity

Conners		Mean T-Score	Std. Deviation	F
ADHD	Normative	52.3	12.32	17.443*
	Cluster 1	62.6	15.04	
	Cluster 2	61.5	18.03	
	Cluster 3	59.3	15.09	
DSM-Inattentive	Normative	55.9	14.22	14.721*
	Cluster 1	66.3	16.14	
	Cluster 2	67.6	15.97	
	Cluster 3	62.6	14.43	
DSM-Hyperactivity	Normative	46.8	0.3	11.634*
	Cluster 1	55.4	1.6	
	Cluster 2	57.1	3.3	
	Cluster 3	52.92	2.47	

- significant at $p < .001$
A T-Score of > 60 is indicative of problems falling within the clinical range.

Table 5. Multiple Comparison of Conners-Wells' Hyperactivity subscale for the Normative Group and the 3 Clusters

Connes-Wells' Hyperactive
Bonferroni

(I) Normative_an d_Clusters	(J) Normative_an d_Clusters	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Normative	Cluster 1	-5.6602*	1.10373	.000	-8.5773	-2.7431
	Cluster 2	-5.4658	2.14187	.065	-11.1267	.1951
	Cluster 3	-3.2542	1.68835	.325	-7.7165	1.2080
Cluster 1	Normative	5.6602*	1.10373	.000	2.7431	8.5773
	Cluster 2	.1944	2.37980	1.000	-6.0953	6.4842
	Cluster 3	2.4060	1.98151	1.000	-2.8311	7.6430
Cluster 2	Normative	5.4658	2.14187	.065	-.1951	11.1267
	Cluster 1	-.1944	2.37980	1.000	-6.4842	6.0953
	Cluster 3	2.2115	2.70107	1.000	-4.9273	9.3504
Cluster 3	Normative	3.2542	1.68835	.325	-1.2080	7.7165
	Cluster 1	-2.4060	1.98151	1.000	-7.6430	2.8311
	Cluster 2	-2.2115	2.70107	1.000	-9.3504	4.9273

Based on observed means.

The error term is Mean Square(Error) = 72.263.

*. The mean difference is significant at the .05 level.

Table 6. Multiple Comparison of Conners-Wells' Inattention subscale for the Normative Group and the 3 Clusters

Conners-Wells' Inattentive
Bonferroni

(I) Normative_an d_Clusters	(J) Normative_an d_Clusters	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Normative	Cluster 1	-10.3739*	1.87885	.000	-15.3396	-5.4082
	Cluster 2	-11.6461*	3.61883	.008	-21.2105	-2.0816
	Cluster 3	-6.6990	2.85255	.114	-14.2382	.8402
Cluster 1	Normative	10.3739*	1.87885	.000	5.4082	15.3396
	Cluster 2	-1.2722	4.02744	1.000	-11.9166	9.3722
	Cluster 3	3.6749	3.35581	1.000	-5.1943	12.5442
Cluster 2	Normative	11.6461*	3.61883	.008	2.0816	21.2105
	Cluster 1	1.2722	4.02744	1.000	-9.3722	11.9166
	Cluster 3	4.9471	4.56369	1.000	-7.1146	17.0088
Cluster 3	Normative	6.6990	2.85255	.114	-.8402	14.2382
	Cluster 1	-3.6749	3.35581	1.000	-12.5442	5.1943
	Cluster 2	-4.9471	4.56369	1.000	-17.0088	7.1146

Based on observed means.

The error term is Mean Square(Error) = 206.289.

*. The mean difference is significant at the .05 level.

Table 7. Multiple Comparison of Conners-Wells' ADHD subscale for the Normative Group and the 3 Clusters

ConnerADHD

Bonferroni

(I) Normative_an d_Clusters	(J) Normative_an d_Clusters	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Normative	Cluster 1	-10.2411*	1.64230	.000	-14.5816	-5.9005
	Cluster 2	-9.1696*	3.18694	.025	-17.5926	-.7466
	Cluster 3	-6.9773*	2.51215	.033	-13.6169	-.3378
Cluster 1	Normative	10.2411*	1.64230	.000	5.9005	14.5816
	Cluster 2	1.0714	3.54094	1.000	-8.2872	10.4300
	Cluster 3	3.2637	2.94831	1.000	-4.5286	11.0560
Cluster 2	Normative	9.1696*	3.18694	.025	.7466	17.5926
	Cluster 1	-1.0714	3.54094	1.000	-10.4300	8.2872
	Cluster 3	2.1923	4.01895	1.000	-8.4297	12.8143
Cluster 3	Normative	6.9773*	2.51215	.033	.3378	13.6169
	Cluster 1	-3.2637	2.94831	1.000	-11.0560	4.5286
	Cluster 2	-2.1923	4.01895	1.000	-12.8143	8.4297

Based on observed means.

The error term is Mean Square(Error) = 159.981.

*. The mean difference is significant at the .05 level.

Discriminant Analysis

Discriminant analyses were carried out to confirm the discriminative ability of the selected MACI variables to cluster cases. The tests of equality of group means measure shows that all eight variables contribute significantly to the model. The Wilk's Lambda suggests that the variables best placed to discriminate among clusters are substance-abuse propensity (smallest Lambda value), followed by childhood abuse and impulse propensity. Wilk's Lambda is the ratio of the within-group sum of squares to the total sum of squares. It is the proportion of the total variance in the discriminant scores not explained by differences among groups. The significance test examines whether a given variable contributes significantly to explaining variance in the dependent variable (See Table 8).

Table 8. Results of the tests of equality of group means for each of the selected MACI variable before model creation

Tests of Equality of Group Means					
	Wilks' Lambda	F	df1	df2	Sig.
MACI_Self-Demeaning	.568	39.606	2	104	.000
MACI_Family Discord	.633	30.209	2	104	.000
MACI_Childhood Abuse	.389	81.672	2	104	.000
MACI_Substance Abuse Proneness	.324	108.498	2	104	.000
MACI_ImpulsePropensity	.390	81.468	2	104	.000
MACI_Anxious Feelings	.652	27.696	2	104	.000
MACI_Depressive Affect	.653	27.576	2	104	.000
MACI_Suicidal Tendency	.357	93.797	2	104	.000

The Eigenvalues and percentage of variance accounted for are shown in Table 9.

Table 9. Eigenvalues and measures of importance as relative percentage of variance

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	3.525 ^a	79.2	79.2	.883
2	.923 ^a	20.8	100.0	.693

a. First 2 canonical discriminant functions were used in the analysis.

The test of functions of Wilks' Lambda's measure how well each function can separate cases into groups and the chi-square test investigates whether the mean values are equal across groups. The results show the model performs significantly better than chance (see Table 10). These results together suggest the first function contributes the most to the separation of the clusters and that the contribution of the second function is smaller but still significant.

Table 10. The overall and successive function test for equality of population means

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	.115	221.774	8	.000
2	.520	67.036	3	.000

The structure matrix is reported in Table 11. The variables that have the largest correlation with each of the functions are sorted and grouped together to show association with the appropriate function. These results show that substance abuse, childhood abuse, impulsive propensity, and self-demeaning variables are strongly and significantly correlated with the first function, whereas suicidal tendency, depressive affect, and anxious feelings are strongly and significantly associated with the second function. The results further suggest that both functions contribute to discriminating among the clusters. The relative importance of function 1 in discrimination is higher than that of function 2 (79.2% vs. 20.8%). The variables that are most correlated with function 1 are those that contribute the most to the discrimination. The remaining variables are most highly

correlated with function 2 and contribute to further discrimination among the clusters once the first set of variables have been used in the model.

Table 11. Function and variable correlations

Structure Matrix		
	Function	
	1	2
MACI_Substance Abuse Proneness	.726 [*]	-.499
MACI_Childhood Abuse	.625 [*]	.456
MACI_Impulse Propensity	.620 [*]	-.480
MACI_Self-Demeaning ^a	.536 [*]	.449
MACI_Family Discord ^a	.358 [*]	.048
MACI_Suicidal Tendency	.613	.721 [*]
MACI_Depressive Affect ^a	.378	.481 [*]
MACI_Anxious Feelings ^a	-.271	.456 [*]

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions

Variables ordered by absolute size of correlation within function.

*. Largest absolute correlation between each variable and any discriminant function

a. This variable not used in the analysis.

Narrative depiction of clusters

On the basis of the above analyses and comparisons, the following portrait of the different problem gambling subtypes was prepared for each of the three clusters.

Cluster 1

Anxiety was the only trait in which they scored higher than the other two clusters. As well, it is the only measure with average BR scores greater than 60 (the suggested cut-off score for considering a syndrome significant). Their levels on the depression, suicidal tendency, and self-demeaning scales all fell within normal limits. Actually, these individuals reported the lowest levels on all measures relative to the other problem gambling groups on all the MACI subscales. They did however obtain higher than average scores in indicators of attention deficit, hyperactivity and ADHD in that they differed significantly from the normative group but not from the other problem gambling clusters. Thus, this group appears to be normal in regards to their emotional well-being for the most part; their problems seem to revolve around problematic gambling and elevated levels of anxiety and attention/learning issues. As suggested in the Pathways Model, one might hypothesize that this group's higher than average levels of anxiety result from the excessive levels of gambling and associated consequences.

Cluster 2

The second cluster is represented by individuals reporting high levels on almost every indicator of pathology on the MACI. They clearly reported the highest levels of emotional instability (depressed, suicidal, and self-demeaning grouping), with most individuals reporting childhood abuse in this cluster. Moreover, many of these individuals are at-risk for substance abuse problems. Their familial environment and impulsivity are only two of the many concerns expressed by these youth. Youth in this cluster also reported scores suggesting a high probability of clinical issues related to identity diffusion, self-devaluation and signs of peer insecurity. In regards to personality style, the data suggests they tend to be introverted, inhibited, and doleful at times, though also both unruly and forceful at others. This subgroup clearly distinguishes itself from both clusters 1 and 3 on dimensions of emotional instability and history of abuse. In regards to attention deficits, hyperactivity and ADHD, while not significantly

distinguished from the other two on these three dimensions, an examination of the means suggests that they tend to be more inattentive and less hyperactive than individuals in the other two clusters.

Cluster 3

The third cluster is primarily defined by their tendency towards impulsivity, social insensitivity, substance abuse proneness, and delinquent predisposition, as well as a reported history of family discord. Analyses revealed that individuals in this cluster differ from the other two clusters mostly as a result of their antisocial nature. While they share similar degrees of impulsivity with the Cluster 2 subgroup, they are primarily defined by their impulsive-antisocial nature and do not manifest other forms of emotional instability such as depression or anxiety. Thus, for these individuals, problem gambling may be an expression of their impulsive, acting-out, and oppositional nature. The three most salient personality traits of this cluster are dramatizing, unruly, and oppositional behaviours, all which fit an impulsive/acting –out profile. In regards to attention deficits, hyperactivity and ADHD, these youth tend to have more issues with inattention than anything else; and despite differing from the normative group, the mean scores for hyperactivity and ADHD for this cluster fall short of clinical significance.

Demographic Characteristics of the Clusters

Gender

Consistent with prior research, problem gambling affects males more than females (15.8% and 4.7%, respectively). Dividing the sample into problem gambling subtype (as defined by clusters), one notices that the Cluster 2 subtype is represented by a fairly equal proportion of males and females, whereas there is a higher proportion of males in both the Cluster 1 and Cluster 3 subgroups of problem gamblers (Table 12).

Table 12. Gender distribution within problem gambler subtypes

	Cluster n= 63 (m=53; f=10)	Cluster 2 n= 16 (m=9; f=7)	Cluster 3 n= 27 (m=20; f=7)
Male	84.1%	56.2%	74.1%
Female	15.9%	43.8%	25.9%
Total	100	100	100

Age

There were no differences in the mean age of the youth falling within each cluster, nor did their mean ages differ from the normative group. Their mean ages were: Normative 15.66; Cluster 1 15.64; Cluster 2 16.06; and Cluster 3 15.50.

Cultural Factors

Quebec and Ontario students were evenly distributed among the three clusters; therefore, no clustering can be attributed to cultural discrepancies. In each of the clusters, approximately 85% came from Quebec and 15% from Ontario which is reflective of the overall sample distribution.

Familial Gambling Problems and Personal Problems

When examining the following demographics, two comparisons were made using chi-square analyses. One compared problem gamblers to non-problem gamblers. The other compared the problem gamblers within the different clusters to one-another. Due to small group sizes, the results from the comparisons between individuals falling within the different clusters should be taken as exploratory.

As in previous research, most of the items in the GAQ distinguished problem gamblers from other youth. They are more likely to have a family member with gambling problems, to be involved in illegal activities, and to have reported a previous suicide attempt suicide (Table 13). Unusually, they were not more likely to contemplate suicide.

Of the three problem gambling subgroups, the Emotionally vulnerable individuals reported more suicide attempts (as would be expected given the classification criteria). Also, they seemed to have more family members with gambling problems; however only one difference neared statistical significance.

Table 13. Prevalence of family and personal risk factors

	Normative	Cluster 1	Cluster 2	Cluster 3	Problem gamblers vs Normative	Between subtypes
					(χ^2)	(χ^2)
Parent separation/loss	25.5%	32.8%	50.0%	37.0%	6.5*	
Legal problems*	5.3%	18.8%	31.2%	11.1%	30.6**	
Suicidal thoughts	22.3%	20.6%	43.8%	22.2%		
Attempted suicide	6.1%	3.1%	31.2%	14.8%	3.4 ^M	11.8**
Steal for gambling	3.0%	23.4%	31.2%	34.6%	109**	
Presence of problem gamblers in social network						
Mother	4.3%	9.4%	18.8%	14.8%	10.8**	
Father	4.9%	12.5%	18.8%	11.1%	15.1**	
Sister	.4%	3.1%	18.8%	7.4%	34.5**	5.2 ^M
Brother	3.5%	7.8%	12.5%	3.7%	5.6*	
Other relative	19.1%	34.4%	31.2%	25.9%	8.6**	
Friend	9.1%	21.9%	43.8%	33.3%	39.7**	
Classmate	5.9%	15.6%	31.2%	22.2%	24.8**	
Other person†	8.8%	22.6%	31.2%	11.5%	8.8**	

^M marginal significance (p<. 5 - .01)

* significant at p<.05

** significant at p<.001

†When asked to specify other person, responses include: grandparents (21), step-brother (2) uncle or aunts (21), cousin (4), grandparent and uncle/aunt (4), cousins and uncle (1), parent's new partner (3), parent/family friend (14), godfather (2), (ex)boyfriend (2), workmate (3), friend of friend (1), father of friend (1), father of friend and boyfriend (1), Jon (1), acquaintance (4) n/a (1).

Description of Gambling Severity within the Cluster Subgroups

There were no significant differences in the distribution of At-risk gamblers and PPGs within each of the three subgroups. This was somewhat surprising as we would have expected to see a greater distribution of PPGs in the Cluster 2 subgroup, considering their reported levels of emotional instability and other clinical markers (Table 14). This finding further adds support to our decision to include the At-risk gamblers in our clustering process. Theoretically, it may have clinical implication as well, suggesting the Pathways Model may apply to those experiencing excessive gambling whether they meet the overall criteria for pathological gambling.

Table 14. Severity of gambling problems by problem gambling subgroup

Problem gambling severity	Cluster 1	Cluster 2	Cluster 3
At-risk gambler	67.2%	75%	77.8%
Probable pathological gambler	32.8%	25%	22.2%
Total	100%	100%	100%

Endorsement of items on the problem gambling screen

An examination of endorsed items on the DSM-IV-MR-J revealed no significant differences between the subgroups. For each, the most commonly endorsed symptoms related to preoccupation, tolerance (needing to gamble for more and more money to maintain same excitement level), concealment (lying to family about gambling), stealing/misappropriating money for gambling, and negative impact upon family and school. Also, youth belonging to a given problem gambling subgroup did not more or less regularly engage in any particular form of gambling (Table 15). Finally, there was no indication that youth belonging to a given subgroup gambled more or less frequently than youth in other subgroups (Table 16). As such, it is concluded that individuals falling within the different subgroups of problem gamblers can not be differentiated according to behavioural markers or by the reported consequences associated with their gambling behaviour.

Table 15. Weekly participation in different gambling games by cluster subgroup.

Weekly gambling	Cluster 1 %	Cluster 2 %	Cluster 3 %
Cards	34	25	26
Sports Wager	21	7	27
Sports Lottery*	5	7	4
Lottery Tickets*	7	27	12
Video Games*	13	33	8
VLTs*	5	7	4
Bingo*	9	13	15
Slots*	2	7	8
Sports Pools	25	20	19
Racetrack*	8	20	8
Casino*	6	13	8
Internet*	9	13	8
Other*	16	31	11

* Significant testing was not possible because the expected count was less than 5 in more than one cell. No significant differences were found in the other comparisons.

Table 16. Gambling frequency by cluster subtype.

Gambling frequency	Cluster 1 %	Cluster 2 %	Cluster 3 %
Less than once a week	42.2	56.2	40.7
Weekly or more frequently	57.8	43.8	59.3
Total	100	100	100

Reasons for gambling

Regarding reasons for gambling, the problem gamblers endorsed far more items than the non-problem gamblers. The Cluster 1 subgroup seems to be more likely to gamble for simple reasons of enjoyment, while Cluster 2 problem gamblers were more likely to endorse the “other” category. A review of the reasons that were written in this category revealed themes relating to sexuality, relieving boredom, socializing, winning, thrill-seeking, and risk-taking. See Table 17.

Table 17. Reported reasons for gambling by problem gambler subtype

	Normative	Cluster 1	Cluster 2	Cluster 3	Problem gamblers vs Normative	Between subtypes
					(χ^2)	(χ^2)
Enjoyment	45.0%	87.5%	68.8%	70.4%	48.2**	5.1 ^M
Relaxation	6.0%	17.2%	31.2%	14.8%	22.8**	
Excitement	30.9%	70.3%	56.2%	59.3%	50.3**	
Make friends	16.9%	34.4%	37.5%	33.3%	22.7**	
Escape depression	1.3%	7.8%	18.8%	11.1%	36.2**	
Escape home or school	2.2%	10.9%	18.8%	14.8%	33.4**	
Escape loneliness	1.4%	7.8%	18.8%	18.5%	45.9	
To feel older	2.6%	9.4%	18.8%	11.1%	19.1	
Make money	31.9%	76.6%	81.2%	66.7%	8.3*	
Other †	12.6%	8.1%	31.2%	7.7%		7.2*

^M marginal significance ($p < .5 - .01$)

* significant at $p < .05$

** significant at $p < .001$

† When asked to specify, responses include: to test luck (2), sexual purposes/gratification, (3), get girls (1), see boys naked (1), get naked (1), bored (6), nothing else to do (1), pass time (1), feel like it (1), someone asked/game was happening (2), have loose change (1), bored and because I'm good (1), for fun (10), it's cool (1), be with family (4), be with friends (1), fun with friends (2), revenge or beat a friend again (2), bragging rights (2), to compete, make sports interesting (2), because I'm drunk (4), I like risks (1), thrill (1), to drink (1), candy and food (1), for the heck of it (1), to experience myself (1), it's a moment thing (1), enjoyment and money (1), hockey tradition (1), prove a point/fact (2), because I/my team will win (2), as a joke (1), to win (1), win prizes (1).

Self-Perceptions and Self-Awareness

All problem gamblers, regardless of subtype, perceive themselves to be “good gamblers”, rating themselves as above average in ability. On a Likert scale (1 – 7) concerning gambling abilities, with a midpoint of 4, the Cluster 1, Cluster 2, and Cluster 3 subgroups rated themselves as 5.31, 5.56, and 5.19 respectively. The mean ratings for normative youth were 3.61.

Comparing their self-ratings of their own gambling severity to the categorization based on the DSM-IV-MR-J screen, most problems gamblers did not perceive themselves as having a gambling problem. The sample size was too small to permit between group comparisons.

Table 18. Concordance rates between self-rating and DSM-IV-MR-J screen categorization

	Self-rating: What kind of gambler are you?		
	Non-problem gambler	At-risk	Problem gambler
Problem gambler type			
Normative	98.0%	1.4%	.6%
Cluster 1	74.6%	17.5%	7.9%
Cluster 2	81.2%	6.2%	12.5%
Cluster 3	84.0%	12.0%	4.0%

Problem Alcohol and Drug Use

The three subgroups were compared with respect to their severity scores on the PESQ. The mean drug and alcohol use severity score for all Cluster 1, Cluster 2, and Cluster 3 problem gamblers ($M = 37.9, 39.5$ and 36.9 respectively) was significantly higher than that of the normative sample ($M = 27.7$; $F(3, 1077) = 27.56, p < .0005$). According to Winters' scoring system, the average problem gambler, independent of subtype, would be categorized as a "red flag" (i.e., highly suggestive of abusive or dependant use of substances). However, the PESQ may overestimate the severity of drug problems, as the average youth in the normative sample would be situated in the yellow flag category (i.e., suggests that the individual has mild to moderate problems).

Problem use of a specific substance was defined by Winters as 10 or more lifetime uses. The prevalence rate of problem usage for three problem gambling subgroups and the normative sample is presented in Table 19. As anticipated, problem gamblers were more likely to regularly use drugs and alcohol as compared to the normative sample. The Cluster 1 subgroup reported a particularly high rate of alcohol use, and self-reported rates of hard drugs use were highest among the Cluster 2 subtype of problem gambler.

Table 19. Regular usage of substances by problem gambler subtype

Ten or more lifetime uses	Normative	Cluster 1	Cluster 2	Cluster 3
Alcohol	35.8%	71.9%	56.2%	63.0%
Marijuana	19.9%	48.4%	46.7%	40.7%
Hard drugs	4.5%	9.4%	26.7%	14.8%
Multiple drugs	17.3%	43.8%	46.7%	37.0%

These findings conflict with those found on the MACI substance use proneness scale in which it was determined that Cluster 1 problem gamblers had a significantly lower proneness to substance dependency problems. In trying to understand the reasons for this divergence, it should be noted that the MACI assesses the type of person who is at increased risk for using substances excessively. In addition to statements related to substance use, it contains items that do not pertain specifically to drug or alcohol use (e.g., I usually act quickly, without thinking) and past drug use (e.g., I used to get so stoned that I did not know what I was doing). In contrast, the PESQ is heavily weighted on behavioral indices (amounts of substances consumed), the number of settings and reasons substances are consumed (e.g., with friends, at school, to enjoy music or to feel creative), and associated behavior problems. Therefore, it may be that the Cluster 1 problem gamblers consume more drugs and alcohol than the average youth, but they do not fit the typical profile of a substance abuser in that they do not develop a dependency.

Applying the Pathways Model to Problem Substance Users

Many researchers argue that gambling dependency shares similarities with other forms of addiction. Because the Pathways Model is a theoretical model that could hypothetically also apply to substance dependency, we conducted another cluster analysis on a subset of the sample made up of heavy substance users. The aim of this analysis was to determine whether the typologies generated from a cluster analysis of problem drug and alcohol users would resemble the results obtained from the analysis of problem gambler typologies. A sample of problem drug and alcohol users was identified from which any people experiencing gambling problems were excluded. The cluster analysis (n=215) used the same variables as those used to cluster the problem gamblers but we excluded the variable “substance-abuse- proneness” to avoid confounding issues. The variable means for each cluster and the standard deviations are shown in Table 20. The

clusters centroids with their means and 95% confidence intervals are shown in Figures 15 through 21.

In general, problem substance users were also grouped into three remarkably similar clusters, although the ordering of the clusters differed. The clusters obtained will be referred to as Substance abuse 1 (SA1), Substance abuse 2 (SA2), and Substance abuse 3 (SA3).

SA1 is very similar to problem gambling Cluster 2, and was distinguished by particularly high levels of depression, anxiety, suicidality, self-demeaning tendencies, and reported history of abuse. SA2 is very similar to problem gambling Cluster 3 and is distinguished by particularly high levels of impulsivity and reported family discord. SA3 is very similar to problem gambling Cluster1 in which individuals are devoid of psychopathology and only showed slightly elevated levels of anxiety. The similarities obtained with the clusters of problem gamblers and the clusters of substance abusers were striking. The primary difference between the two sets of typologies pertains to the issue of impulsivity, whereby it is only present (higher than average levels) in the SA2 subtype (similar to Pathway 3).

Table 20. Comparing groups on MACI variables selected for clustering

MACI Variables		N	Mean	Std. Deviation
SA1	MACI_SelfDemeaning	60	73.8000	19.20081
	MACI_FamilyDiscord	60	62.5000	22.89216
	MACI_ChildhoodAbuse	60	46.1167	20.75367
	MACI_ImpulsivePropensity	60	43.8333	18.97917
	MACI_AnxiousFeelings	60	71.6167	14.74080
	MACI_DepressiveAffect	60	88.2000	15.84009
	MACI_SuicidalTendency	60	46.7667	23.37779
	Valid N (listwise)	60		
SA2	MACI_SelfDemeaning	80	50.6375	22.75363
	MACI_FamilyDiscord	80	79.9500	18.34611
	MACI_ChildhoodAbuse	80	30.6500	16.35299
	MACI_ImpulsivePropensity	80	70.9375	19.46002
	MACI_AnxiousFeelings	80	44.2250	14.61227
	MACI_DepressiveAffect	80	55.0125	23.45774
	MACI_SuicidalTendency	80	23.6875	15.36278
	Valid N (listwise)	80		
SA3	MACI_SelfDemeaning	57	19.0526	12.10581
	MACI_FamilyDiscord	57	40.7018	15.24674
	MACI_ChildhoodAbuse	57	11.6316	8.72523
	MACI_ImpulsivePropensity	57	28.5965	12.53546
	MACI_AnxiousFeelings	57	62.2281	10.68714
	MACI_DepressiveAffect	57	38.2632	18.41828
	MACI_SuicidalTendency	57	8.4737	6.45619

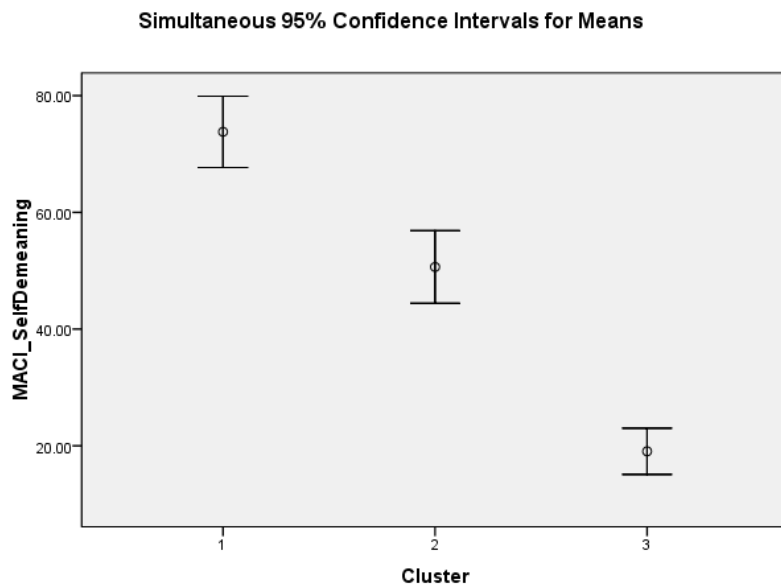


Figure 15. Cluster centroids for MACI self-demeaning variable for the substance abuse subsample

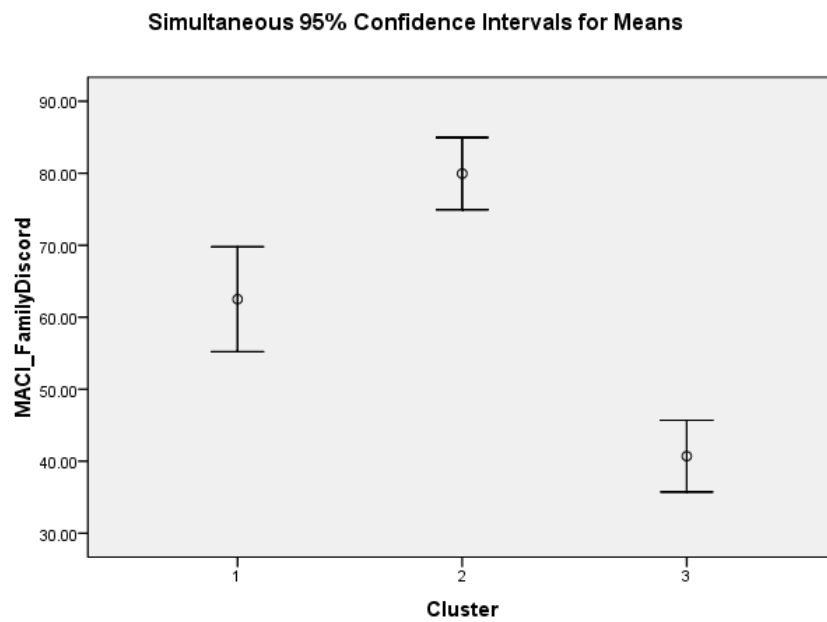


Figure 16. Cluster centroids for MACI family discord variable for the substance abuse subsample

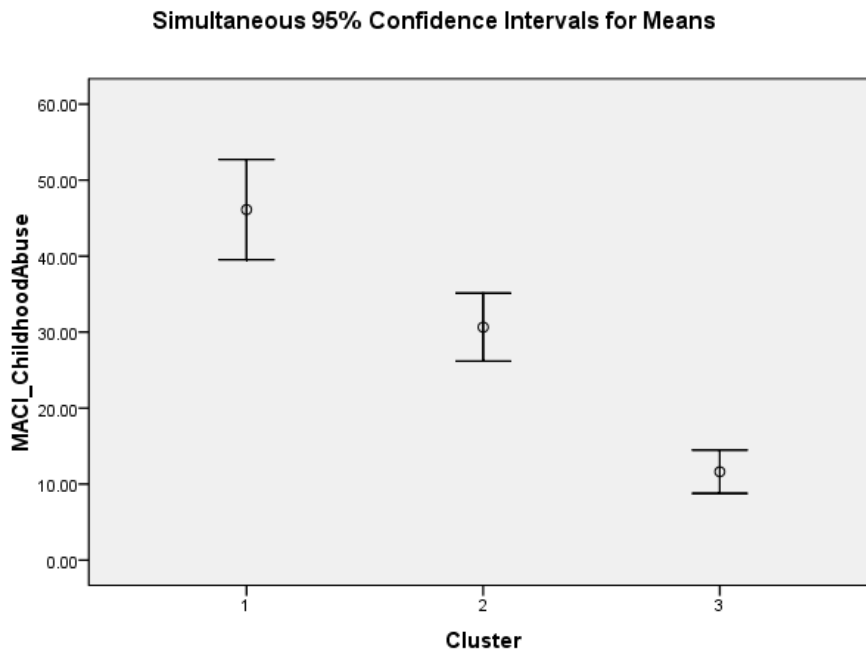


Figure 17. Cluster centroids for MACI childhood-abuse variable for the substance abuse subsample

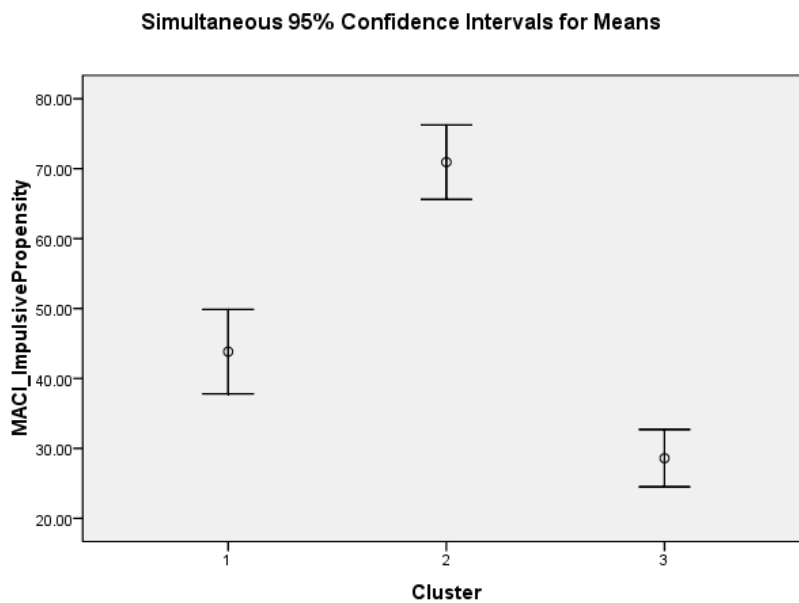


Figure 18. Cluster centroids for MACI impulsive propensity variable for the substance abuse subsample

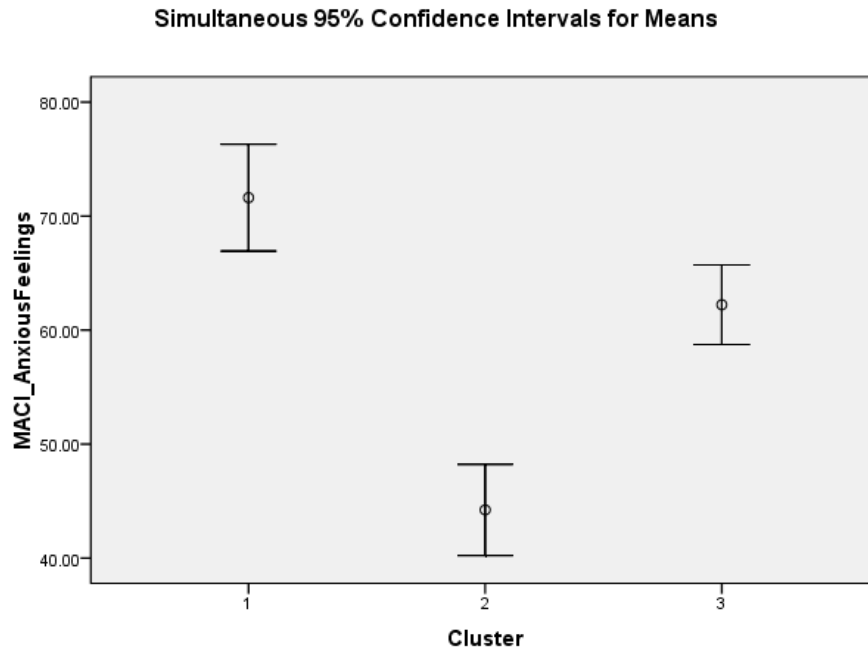


Figure 19. Cluster centroids for MACI anxious feelings variable for the substance abuse subsample

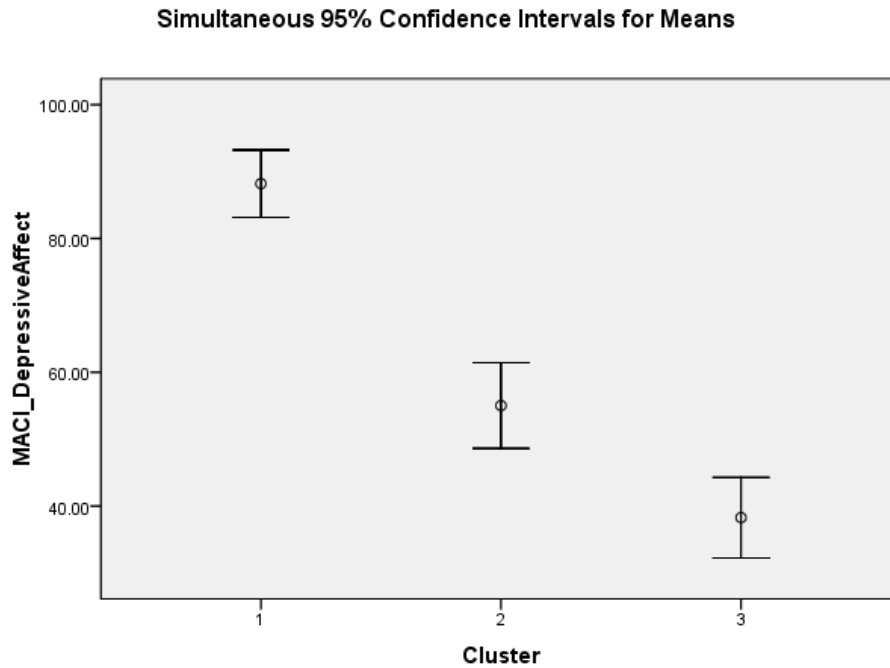


Figure 20. Cluster centroids for MACI depressive affect variable for the substance abuse subsample

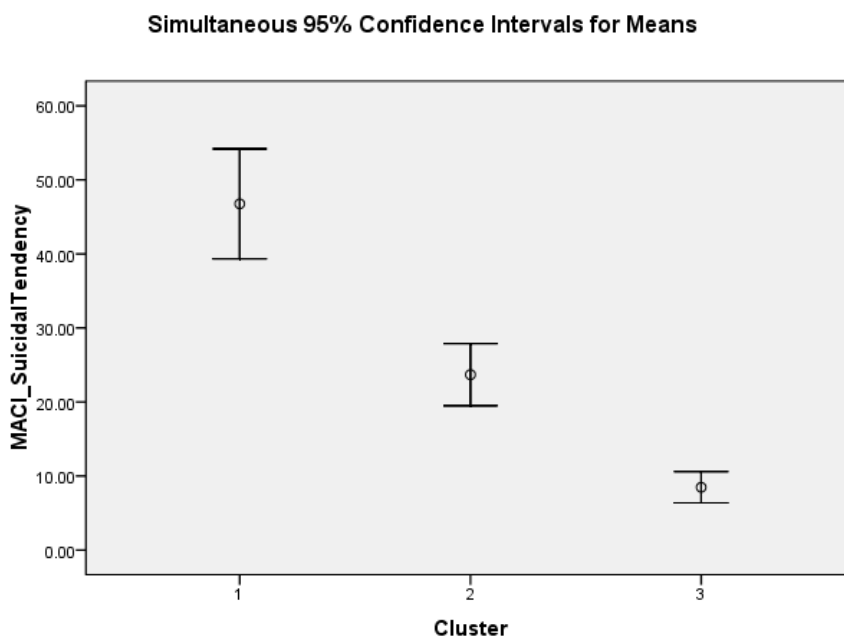


Figure 21. Cluster centroids for MACI suicidal tendency variable for the substance abuse subsample

Distribution of Gender among Substance Abuse Subtypes

Males and females are fairly equally distributed within the SA1, SA2, and SA3 subtypes of substance users, and chi-square analyses revealed no significant differences in gender distribution between the clusters.

Table 21. Gender distribution within the substance abuse clusters

	SA1 n= 79 (m=35; f=44)	SA2 n= 56 (m=24; f=32)	SA3 n= 60 (m=27; f= 33)
Male	44.3%	42.9%	45.0%
Female	55.7%	57.1%	55.0%
Total	100	100	100

Qualitative Data: Semi-Structured Interviews

Five adolescents were approached and all 5 volunteered to participate in an individual 90 minute, semi-structured interview with the principal investigator. All participants were undergoing treatment at an inpatient facility and all had a history of excessive substance use and gambling participation. The selection basis for these youth was decided upon by the coordinator of the treatment center. Youth new to the program (within the first month of treatment) were considered to be vulnerable and were not included. Only those youth who reported problematic and excessive previous gambling behaviours were approached to partake in the interviews. Three males and two females ranging in age from 16 to 19 were interviewed.

While each interview was unique, a specific protocol was followed. The objective of these interviews was to investigate whether the problem-gambler subtypes proposed in the Pathways Model provided an accurate fit with the explained etiologies of these teenagers experiencing serious addiction. As such, questions pertained to family history, abuse, environmental factors, emotional indicators, self-described traits, co-morbid disorders, learning disabilities and school-related problems, and perceived reasons for engaging in substance use and gambling.

A summary portrait of each adolescent is presented below:

“Michael” 16 years old

Michael’s father is a minister in the army and reports he was raised in a strict family environment. He describes his childhood as happy but felt very controlled by his overprotective mother. He indicated having a poor relationship with his parents. At age 12, his family relocated and the move was very traumatic for him.

“I did not know how to cope and I was attracted to anything that made me forget. First it was weed, and then a year later the gambling started”.

He self-described himself as being very depressed after the move. He felt alone, rejected and isolated and seemed to best fit in with the drug crowd. The loss of friendships was significant for him and he felt he could not overcome the loneliness. Delinquent behaviors followed quickly after starting to use marijuana including skipping school and stealing although he reports few delinquent behaviors prior to this time.

Michael reported no history of learning problems but nevertheless described himself as always having a low-self-esteem and low confidence.

“Cara” 18 years old

Cara indicated a turbulent family history. Her brother experienced developmental delays and was very aggressive. Her parents took two other children into their home because they were abused; both of these adopted siblings were drug users.

Cara reports being a great student and always received good grades. She described herself as a socially awkward child and was bullied from grades 3 through the end of High School.

“I think this is another big reason why I used ‘cause I felt really socially awkward and socially unaccepted”.

Her childhood was described as “hell, very difficult.” She reports that her parents neglected her because the other kids were needier.

“My parents really paid so much attention to my brother, I don’t think they knew what was going on with me enough to know that something was going wrong, like the neglect they subjected me to.” “That’s like one of my biggest hurts is not having, not feeling like my parents were there.”

At age 15 she left home for a life on the street because she felt that her parents did not care about her. She always felt lonely. At 15 she started using crystal meth and cocaine. At 16 she reportedly “died” from a cocaine overdose but was resuscitated. Shortly after that, she witnessed her boyfriend die from a drug overdose. She ended up in jail for a period of 6 months for armed robbery.

“It’s like I always say, I used and gambled because I didn’t want to feel anymore. My obsession is scratch cards when using crystal meth. It’s like really bad and I had it for 5

years. It's like crystal meth and scratch and wins go hand in hand. Gambling with drugs... its instant gratification."

When asked to describe an addiction, she responded *"There is no geographical cure for your addiction. No matter where you go you'll face temptation because your demons, your history, your weaknesses are always with you until you resolve them from within and make peace with them"*.

"Lindsay"- 17 years

Lindsay's childhood is best described as unstable. Her parents are divorced but lived apart and reconciled numerous times during her childhood. Her father reportedly abused her mother and at age 5/6 she and her mother were forced to stay in a shelter for abused women. Lindsay has no relationship with her father, and lived with her mother after their divorce when she was age 12.

Lindsay is an only child and she always recalls feeling alone. "I always felt that others didn't understand me and I carried that throughout my life."

Lindsay was diagnosed with depression, anxiety, and PTSD at age 13. She was also recently diagnosed with pre-menstrual dysmorphic disorder. At age 14 she was institutionalized as a result of making several suicide attempts. She describes herself as being impulsive, unable to manage feelings, and often perceives herself as a victim. She is a "cutter" and was told that by her psychiatrist that she has borderline tendencies.

Lindsay believes that her depression is a result of her unstable childhood and the fact that she was made to move multiple times during her early years. She attended 7 different elementary schools where she experienced attention problems but managed to get good grades. She reportedly was bullied by other children in school and was repeatedly told that she was ugly and/or was the victim of their jokes.

When asked why she used drugs and gambled excessively, she responded *"For a lot of adolescents that are using or going through experimentation with gambling, they go in with a different attitude- mostly for experimentation or for fun. But for me, it was more of an escape because I couldn't deal with life. It was either death or using for me. I was too depressed to do anything else."* *"If I look at it, I had a pretty unstable and sort of traumatic life."*

"Simon" age 19

Simon was raised in an affluent, high profile family that "looked perfect from the outside." His parents often had significant disagreements but then resolved their issues. He describes his father as overly controlling and his mother as overprotective. His primary issue revolves around his relationship with his father, *"My dad was one of three boys and his dad was like my way or the highway and that's exactly like my father...All I have to say is that in 19 years I have never heard my father say I'm sorry or I apologize."*

Simon started drinking alcohol before the age of 10, usually in the presence of family members during social gatherings. By age 12 he was smoking marijuana, and did both all

through high-school even during short breaks between classes. At age 15, he started using cocaine and at age 16 he began gambling excessively. He reported earning considerable money promoting bars and clubs and the cocaine and gambling were easily and readily available. He was introduced to poker in bars, but carried on playing poker online. As well, he became very involved in sports wagering through bookies. He noted that all his friends were gambling so it seemed normal to him.

Neither co-morbid issues nor a history of learning problems were reported. Of particular importance was that Simon experienced a significant loss several years ago, *“... my girlfriend was hit by a bus and killed and that was the first girl I ever really liked and had a long relationship with and after that I was like – I’m never going to be the one to get hurt. All my women issues that came after that though, I would often use after a relationship or treating a girl like shit and not wanting to look at myself. For sure I tried to numb those feeling of how much of a dick I was and any guilt or any remorse. I did it with drugs, alcohol, and gambling - usually all at once.”*

“Jack” age 18

Jack’s father was into drugs and gambling and abandoned him and his mother when he was only one year old. His father resurfaced when he was 9 years of age and introduced him to alcohol. He disappeared again shortly thereafter and once again has recently resurfaced. Jack reports his father still has issues with addiction. In contrast to his father, Jack reports that his mother did the best she could. However, he also felt untended to at times, *“I felt like no one really cared, my mom was always making sure my brother was okay. She always looked at me like the adult in the house. I was allowed out at all hours by the age of 10”*.

By the age of 10 or 11 Jack was drinking regularly and by the age of 12 he was gambling. He would often do acid or cocaine and gamble heavily and drink at the same time, *“I find that it just went together, if I was gambling I was drinking, smoking, and doing drugs”*

“I wasn’t only gambling with cards, I was gambling with friends about what women I could get, about what store I could steal from, it became about anything I could gamble, even gambling my life... it wasn’t about the money anymore it was about the rush”.

Jack has a long history of delinquency, even prior to serious substance abuse or his excessive gambling. He would skip school, lie, steal, and be engaged in fights and altercations on a regular basis. He reportedly was “angry with the world”.

Jack related how difficult his rehabilitation has been and how difficult it is to face certain issues. He realized the parallels between his life and that of his father, *“I was lying about my past because I didn’t want to look at it, I didn’t want to look at the hurt that I caused my mom and my brother and my family through and I didn’t want to look at the fact that I had become my father”*.

Synopsis

The information obtained from each participant is presented in Table 22 in a comparative manner. Most individuals reported very difficult childhoods, issues of

significant loss, feelings of neglect and unimportance, and co-morbid depression. Escape from emotional pain was the most often reported reason for engaging in drug use and abuse or gambling. Emotional pain was present with or without co-morbid depression. Only Jack reported engaging in these addictive behaviours for the adrenaline rush, and coincidentally, he is the only one representative of the Pathway 3 gambler subtype having reported impulsive and delinquent behaviours in the absence of other co-morbid disorders.

Table 22. A comparison of reported problems and aetiologies

Participant	Childhood difficulties, neglect or abuse	Loss	Feeling lonely, sad, unimportant	Reason for use or gambling	Co-morbid issues	Impulsivity, anti-social	Pathway or cluster
Michael		X (relocation)	X	escape	X	X	2
Cara	X X	X	X	escape	X	X	2
Lindsay	X		X	escape	XXX		2
Simon		X	X	escape			1
Jack	XX	X	X	rush		X	3

Overall, the Pathways Model or our Cluster subtypes seem to apply to these adolescents. However, contrary to our empirical findings, none of the adolescents reported a history of anxiety, ADHD, and only one reported inattention problems in school. Whether these individuals did in fact have symptoms associated with ADHD and inattentiveness, and elevated anxiety was difficult to ascertain. These syndromes may have been absent, not assessed, or not viewed as a primary concern during their childhood.

Discussion

The notion of typologies amongst problem gamblers has great appeal to clinicians and prevention specialists. Helping target specific groups of problem gamblers and better understanding their etiologies is certainly important in establishing better treatment protocols. The Pathways Model proposed by Blaszczynski and Nower (2002) for adults, and later refined for adolescents (Nower & Blaszczynski, 2004), provides a fairly comprehensive overarching framework for understanding and differentiating among

pathological and problem gamblers. The current study sought to empirically test the model's constructs for understanding adolescent problem gambling. Overall, the findings provide evidence for identifiable subgroups of adolescents experiencing gambling related problems. While the sample size precluded only using those adolescents with the most severe gambling problems (probable pathological gamblers), the inclusion of those experiencing a number of gambling-related problems (i.e., at-risk gamblers endorsing 2-3 items on the DSM-IV-MR-J) allowed for an examination of identifying distinguishing characteristics of those adolescents experiencing gambling-related problems.

The original Pathways Model proposes that accessibility, availability and acceptability of gambling, combined with operant conditioning patterns and erroneous gambling-related cognitions, are prerequisites for all problem gamblers. Pathway 1 gamblers are devoid of any psychopathology, and the level and degree of pathology then helps distinguish between Pathway 2 and Pathway 3 gamblers, with impulsivity and antisocial traits being predominant to the 3rd Pathway. The current study did not investigate the first two conditions (ecological factors and operant conditioning) but, consistent with the model, failed to find significant differences in erroneous cognitions between groups.

Through exploratory and confirmatory analyses the current research suggests three different typologies of adolescent problem gamblers fairly similar to the three pathways proposed in the Pathway Model.

Most interestingly, while not the primary aim of the current study, the clusterings obtained appear to also apply to substance abusers. The findings of the current study suggest that the Pathways Model and the current cluster groupings can be applied to other areas of addiction such that the etiology leading to substance abuse may not be all that different from that leading to pathological gambling. The semi-structured interviews conducted with adolescents in treatment, in general, support a common etiology, as they were all recovering from both substance and gambling dependencies. The implications of common etiologies are meaningful, as it suggests that prevention programs and treatment paradigms can be very similar for multiple types of dependencies and abuse.

Comparing the current findings to the Pathways Model

The distinguishing factors of adolescents in the Cluster 1 subgroup was a lack of premorbid family dysfunction or childhood abuse, lack of indicators of emotional

instability, and high scores on measures of anxiety. While the Pathways Model specifies this group to be devoid of psychopathology it does suggest that the presence of anxiety is likely to be present as a consequence of the gambling problem. Unlike the next two subgroups, these youth exhibit no other acting-out behaviours or impulse control tendencies. While they do exhibit signs of ADHD and elevated inattentive scores, their risk-taking behaviour appears to be gambling specific. It may be that this group engages in excessive gambling as a way to moderate their anxiety, or, more likely, their anxiety results from their excessive gambling. However, in this study, there was no definitive way to determine whether anxiety caused, accompanied, or was escalated by their gambling behavior and losses. Findings from this study and those by Ste-Marie and her colleagues (Ste-Marie, Gupta, & Derevensky, 2002; 2006) suggest that intake assessments should clearly screen for both state and trait anxiety, and tap into temporal factors relating to the onset of both the gambling and anxiety. Treatment with this group should fully explore these issues and the relationship of anxiety to the ecological, conditioning, and cognitive factors that lead to subsequent gambling problems. It will be important to evaluate the interrelationship of anxiety and these other variables to determine whether heightened states of anxiety correlate with heightened levels of arousal while gambling, which can foster rumination on gambling-related cognitions and continued play; or, in contrast, whether the physical act of gambling with its attendant stimulation serves to dampen the hyper-vigilance and overall unpleasant nature of anxiety much like an anxiolytic drug, ultimately leading to dissociation, longer play, and mounting losses. The interrelationship between anxiety and ADHD and inattentiveness merits further investigation.

Adolescent problem gamblers in the Cluster 2 subgroup had significant indications of emotional instability, impulsivity, oppositional behavior, and suicidality. They also reported poor familial environments and abuse. In many ways this group parallels Blaszczynski and Nower's Pathways 3 population as it represents the subgroup of gamblers experiencing the greatest amount of problems and clinical concerns. However, it could also be argued that Cluster 2 is a combination of both Pathway 2 and Pathway 3 individuals in the Pathways Model. As suggested by the model, youth in Pathway 2 report significant levels of psychopathology, most notably mood disorders, suicidality, and substance abuse problems and come from abusive/discordant family backgrounds, all of which were found in the current study. However, the current results

also include impulsivity for Cluster 2 as well as some acting-out/ antisocial behavior which are supposed to be characteristic of Pathway 3. Since the gender distribution is even in this cluster, it could be argued that the impulsive acting-out is a manifestation of the emotional distress, and not the result of a true impulsivity trait. The current results further enhance our understanding of these adolescents (in Cluster 2) by identifying common personality traits and expressed concerns (syndromes) – factors that were not expressly stated in the Pathways Model. The picture that emerges is complex and at first glance, a seemingly contradictory one. On a personality level, these individuals are introverted, inhibited, and doleful, suggesting they do not stand out in a crowd. On the other hand, behaviourally, they are represented by unruliness, forcefulness, oppositional behaviours and borderline tendency. It is possible that this cluster regroups youth with two different personality profiles. However, it is more likely that internalized distress causes them to be introverted and inhibited in certain environments (i.e., school) and then externalized at other times in their risk-taking and delinquent behaviours. The high levels of identity diffusion reported by this group would support this supposition.

The third cluster of adolescent problem gamblers, Cluster 3, is primarily consistent with pathway 3 in the original model, defined by indicators of antisocial personality traits, impulsivity, delinquent predisposition, and family discord. Consistent with the model, youth in this pathway come from troubled home environments and it appears that gambling is just one of a host of maladaptive behaviours. While also very similar to pathway 3 gamblers, depression and other co-morbid disorders proposed in the model are absent. With respect to personality traits, they differ from the Cluster 2 subgroup in that they are extroverted and dramatizing. It seems that while gambling provides an escape from aversive mood states and internal thought processes for the more introverted in the Cluster 2 subgroup, it likely functions as an additional form of stimulation and an arousal generator for extroverted youth in the Cluster 3 group. This was supported by the youth interviewed in this study, and provides support for the escape vs. the action seeking gambler.

Though individuals in both the Cluster 2 and Cluster 3 subgroups report discordant family situations, it is unknown whether these groups differ with regard to the nature and severity of family problems. Future investigations should explore the specific problems of abuse (sexual, physical, emotional), neglect, parental addiction, domestic violence etc. that may be more predictive for one group than the other.

Distinctions between the current findings and the Pathways Model

While the study lends strong support for the Pathways Model, important differences were found. Primarily, impulsivity as well as attention issues/ ADHD play a non-defining role in the current findings whereas their severity and intensity is hypothesized to differentiate subgroups in the model. While impulse propensity was not a factor for those in Cluster 1, it did not serve to differentiate those in Cluster 2 and Cluster 3 (see figure 21). Attention deficits, hyperactivity, and/or ADHD were not statistically distinguishable from one cluster to the next. Growing support for this relationship between impulsivity, inattention and ADHD among young problem gamblers comes from work by Breyer et al. (in press), Hardoon, Gupta and Derevensky (2004), and Vitaro et al. (2003). Another important difference is noted in the absence of depression, suicidality, and other co-morbidity within the Cluster 3 subgroup. This however could serve to make a stronger argument for the biological nature of the impulsivity since they are not acting out emotional issues. Figure 21 best depicts the findings of the current study. Simply put, the clusters obtained in the current study are represented by sharper distinction between the clusters 2 and 3 in regards to measures of emotional instability. Cluster 2 could be characterized as those gambling and acting out as a way of dealing with and escaping emotional problems whereas Cluster 3 would be best described as those who gamble for the thrill and rush that comes from being impulsive and taking risks.

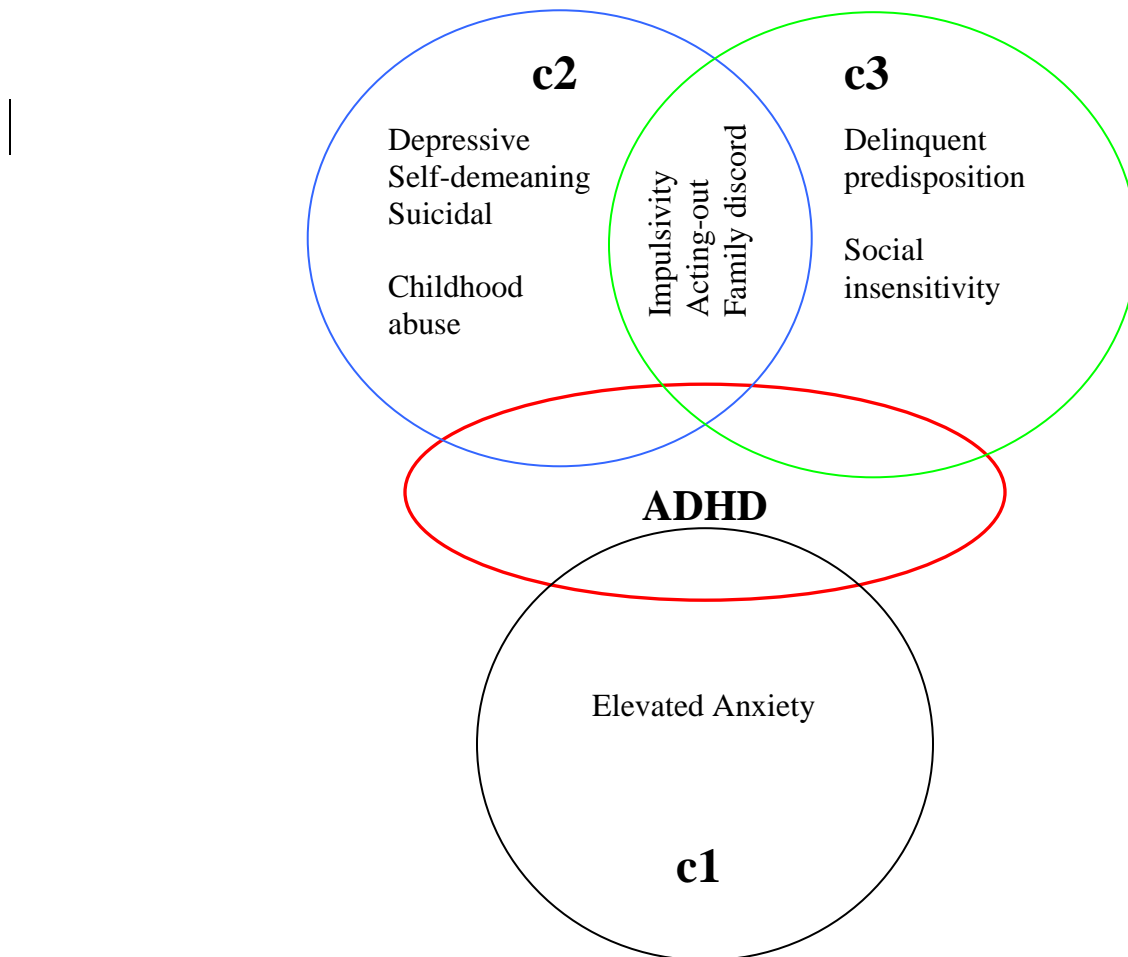


Figure 21. Depiction of current cluster findings

Additional considerations

The qualitative data obtained in this study sheds additional light on the etiology of dependent behaviours. While differences exist in regards to family history, abuse, co-morbid disorders and delinquency, some strong common themes emerged that are not elaborated in the Pathways Model; feelings of loneliness, low self-worth, anger, and loss. Addiction as a passed on trait from parents (through modeling or genetics) was also brought to the forefront by these teenagers in treatment. Possibly, a more comprehensive

model would not only elaborate on what differentiates subtypes, but also assess common threads as well. Reasons for gambling (escape vs. adrenaline rush) also appeared to be an important factor in distinguishing subtypes and could be integrated into a refined model.

Caution is necessary as adolescents interviewed are very small in number and may also not be representative of those experiencing gambling problems only. Substance use may be more strongly associated with needing to numb the pain of abuse or neglect in childhood, or resulting from significant loss. Future research can determine if *pure gamblers* are different in their etiological pathways from those experiencing dual addictions.

While future studies should be conducted to further test the applicability of the Pathways Model, and/or test refinements to the model, there are sufficient findings in the current study to argue for the need to differentially screen young problem gamblers.

Limitations

As in most behavioral research there are a number of limitations to any study and the current study is no exception. While the study employed 1,133 adolescents, they represented a convenience sample and as such the generalizability of the findings may be somewhat limited. While this is a considerable sample size the number of severe pathological gamblers (DSM-IV-MR-J scores ≥ 4) were limited. This is particularly problematic when attempting to analyze gender or age differences across groupings. Limitations of self-report measures, including respondent bias have been widely noted. Pathway 3 youth may be less likely to be attending school due to high drop-out rates and therefore may be under-represented in the total sample. As in most studies, instrumentation issues remain a problem. Trying to include multiple instruments assessing similar (or dissimilar) constructs remains a challenge as students are only available for limited amounts of time and are only willing to complete a limited number of instruments.

A notable limitation to the current study is represented by an inability to differentiate between biological impulsivity and emotional acting-out. Since Cluster 2 and Cluster 3 individuals were not differentiated by the intensity of their impulsive behavior, the different explanations for their impulsive behaviours can only be assumed and remain theoretical. Future research would benefit from including a biological marker of impulsivity.

Since the Pathways Model has some temporal assumptions (i.e., defining characteristics precede onset of gambling problem), future research should include a methodology sensitive to assessing temporal factors; a longitudinal design would be the ideal approach. For example, in the current study, it is not possible to say whether anxiety contributed to or is a reaction to the gambling problem.

Despite these limitations, the current study provides some interesting insights into different typologies for adolescent problem gamblers. The current research supplements and validates the Pathways Model. Future studies should explore these variables further to provide additional insight regarding the factors that should be differentially addressed in treatments designed for individual subgroups of young problem gamblers.

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