Journal of Gambling Issues
Issue 40, December 2018
http://igi.camh.net/doi/pdf/10.4309/jgi.2018.40.1
DOI: http://dx.doi.org/10.4309/jgi.2018.40.1

Fold, Check, Hit Me! Impact of Lifestyle on the Trajectories of Problem Gamblers

Frédéric Ouellet[1] & Balthazar Queloz[1]

[1] School of Criminology, Université de Montréal, Montréal, QC, Canada

Abstract

Several studies have demonstrated the intermittent nature of problematic gambling behaviours. Despite the upsurge in research in this area, few studies have examined the dynamics of gambling behaviour or the factors influencing gambling trajectories. Using a retrospective self-report gambler survey inspired by the life history calendar method, the current study sheds light on the intermittency of gambling and the static and dynamic factors that may modulate gambling trajectories. Attention was paid to deviant life circumstances, especially criminal offending, and their effects on gambling parameters. The multilevel analyses results, conducted with data gathered from a sample of one hundred problem gamblers, revealed the impact of life circumstances on these trajectories. On the one hand, sources of social control—hours worked, participation in therapy—create the effect of alleviating gambling problems. On the other hand, deviant life circumstances—commission of lucrative crimes, consumption of psychoactive substances, paying gambling debt—exacerbated gambling. The dynamic factors that predict changes in gambling behaviour and identified in this research support the development of intervention policies based around them.

Keywords: gambling problems, life-course, life circumstances, deviant behaviours, relapse, abstinence, relative losses

Résumé

Plusieurs études ont démontré la nature intermittente des comportements de jeu problématique. Malgré la recrudescence de la recherche dans ce domaine, peu d'études ont examiné la dynamique du comportement de jeu ou les facteurs influençant les trajectoires de jeu. À l'aide d'une enquête rétrospective sur les joueurs compulsifs autodéclarés, inspirée de la méthode du calendrier sur l'historique de vie, cette étude met en lumière l'intermittence du jeu et les facteurs statiques et dynamiques qui peuvent moduler les trajectoires de jeu. L'attention a été portée sur les conditions de vie déviantes, en particulier les infractions criminelles et leurs effets sur les paramètres de jeu. Les résultats des analyses à plusieurs niveaux, réalisés à partir de

données recueillies auprès d'un échantillon de cent joueurs compulsifs, ont révélé l'impact des circonstances de la vie sur ces trajectoires. D'une part, les structures de contrôle social, p. ex., les heures travaillées, la participation à une thérapie, ont pour effet d'atténuer les problèmes de jeu. D'autre part, les circonstances de vie déviantes, comme la perpétration de crimes lucratifs, la consommation de substances psychoactives, le remboursement des dettes de jeu, aggravent le jeu. Les facteurs dynamiques qui prédisent les changements dans le comportement de jeu et qui ont été répertoriés dans cette recherche appuient l'élaboration de politiques d'intervention fondées sur ces facteurs.

Introduction

Over the years, studies have reported variations in the prevalence of problem gambling (Lesieur, 1991; Shaffer, Hall, & Vander Bilt, 1999; Villella et al., 2011; Williams, Volberg, & Stevens, 2012). Despite the upsurge in research concerning this recurring phenomenon, few studies have examined the dynamics of gambling behaviour or the specific factors influencing gambling trajectories. Research on recovery and relapse suggests that the problems problem gamblers face are transient and episodic, rather than chronic and continuous (Hodgins & el-Guebaly, 2004; Ledgerwood & Petry, 2006; Oei & Gordon, 2007; Thygesen & Hodgins, 2003; Viets & Miller, 1997; Walker, 1993), which hints at the impact of factors varying over time. However, no longitudinal studies have been conducted concerning the relationship between life events (e.g., work, intimate relationships, suicide attempts) and gambling, in contrast to the respective parallel situations regarding other deviant behaviours.

On the other hand, many studies executed over the last twenty years have demonstrated that gambling co-occurs and shares aetiological similarities with a variety of deviant behaviours, particularly criminality and substance abuse (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2004). Despite the existence of numerous plausible hypotheses, the nature of the relationship between these behaviours still remains largely unresolved. Given the great instability of problematic gambling behaviours, this study examines changes in the trajectories of problem gamblers through the life-course perspective, an approach which provides a theoretical framework for analyzing the synchronicity of life events and gambling behaviours. Based on interviews conducted with 100 problem gamblers using a retrospective self-report gambler survey inspired by the life-course calendar method, the current study sheds light on the intermittency of gambling, and the static (antecedent and stable) and dynamic (varying over time) factors that may modulate gambling trajectories. Attention was paid to deviant life circumstances, especially criminal offending, and their effects on gambling parameters.

Problematic Gambling Behaviours

Although scarce, certain studies have indeed examined the stability of gambling problems. For instance, LaPlante, Nelson, LaBrie, and Shaffer (2008) found that pathological gambling is not progressive and enduring. Likewise, the few existing longitudinal studies on problem gambling address the fact that, although prevalence at the aggregate level might seem relatively stable, it is nevertheless more episodic and transitory at the individual level (Abbott, Williams, & Volberg, 2004; Slutske, Jackson, & Sher, 2003). Relating to those findings, several studies of recovery, abstinence, and relapse have demonstrated the intermittent nature of problematic gambling behaviours (Hodgins & el-Guebaly, 2004; Ledgerwood & Petry, 2006; Oei & Gordon, 2007; Thygesen & Hodgins, 2003; Viets & Miller, 1997; Walker, 1993). Of particular interest, Walker (1993) reported that a high proportion of gamblers in therapy returned to gambling again after a few years of abstinence (71% after one year and 85% after two years). Similar results were reported by Hodgins and el-Guebaly (2004), who found that 92% of a sample of 100 problem gamblers who had recently stopped gambling relapsed over the 12-month window period. Two-thirds of the relapses lasted more than one day, indicating a high inter-subject variability and the difficulty of precisely determining the duration of problem gamblers' trajectories.

The poor long-term prognosis of recovery from gambling problems has been attributed to both the factors that predict starting to gamble and those that exacerbate gambling. Although many studies have investigated the factors that predict starting to gamble, no consensus has been reached concerning the impact of sociodemographic factors such as age, sex, and socioeconomic status. Indeed, where certain studies attest of a correlation between gambling problems and sociodemographic elements, others do not find any compelling association regarding those factors (Barnes, Welte, Hoffman, & Dintcheff, 2005; Raylu & Oei, 2002; Welte, 2001; Welte et al., 2004; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). Regarding personality traits, thrill seeking appears to increase the probability of engaging in high-risk behaviours, such as gambling and criminality (Blaszczynski, Wilson, & McConaghy, 1986; Coventry & Brown, 1993). Leblond, Ladouceur, and Blaszczynski (2003) demonstrated that impulsivity - which can be defined as inadequate self-control over the expression of behaviours - is associated with treatment failure among gamblers. More generally, problem gambling has been repeatedly reported to be strongly associated with impulsivity (Barnes, Welte, Hoffman, & Dintcheff, 1999; Carlton & Manowitz, 1994; Dussault, Brendgen, Vitaro, Wanner, & Tremblay , 2011 Steel & Blaszczynski, 1998; Vitaro, Arsenault, & Tremblay, 1997; 1999). These results are consistent with those of other studies of risk factors, and suggest that a pattern of deviant behaviour underlies a life of criminality or problem gambling (Barnes et al., 2005). Thus, impulsivity and thrill seeking, which are often regarded as dimensions of the larger concept of low self-control (Gottfredson & Hirschi, 1990), are thought to be antecedents of deviant behaviours (Vitaro, Brendgen, Ladouceur, & Tremblay, 2001). It should be noted that poor or low self-control (LSC) is not specific to criminal offending, but is also observed in a variety of self-centred, reckless, "uncontrolled" or "unregulated" behaviours, including problem gambling. Gottfredson and Hirschi

(1990) consider criminal offending to be analogous to many other behaviours, including smoking, drinking, using drugs, gambling, having illegitimate children, and illicit sex. However, while the common-antecedents framework sheds light on problem gamblers' sociodemographic characteristics and personality traits, this knowledge is essentially based on cross-sectional studies which provides a static and therefore truncated model of problem gambling, one that fails to take into account all of the phenomenon's complexity.

Few studies have been published concerning the dynamic factors that modulate gambling behaviours, and no longitudinal studies of how gambling behaviour is affected by life events or other circumstances. However, certain studies have noted the importance of gambling behaviours in the appearance and persistence of problem gambling. Thus, Goudriaan, Slutske, Krull, & Sher (2009) have reported that the risk and severity of gambling problems is partially determined by the number and types of games that gamblers indulge in. On the other hand, a prominent school of thought, possibly reflecting the psychological foundation of the diagnosis of gambling problems, considers pathological gambling to be an addiction comparable to substance abuse. It may be noted that changes in the DSM-V follow this perspective by classifying problematic gambling under *Addiction* and *Related Disorders*. Furthermore, many studies of co-dependence have established a strong association between substance abuse and pathological gambling (Barnes et al., 1999, 2005; French, Maclean, & Ettner, 2008). Certain authors have gone as far as to consider alcohol abuse and pathological gambling to be complementary phenomena (Elia & Jacobs, 1993; French et al., 2008). In this view, the two behaviours are reciprocal risk factors (Grant, Kushner, & Kim, 2002; Maccallum & Blaszczynski, 2002; Welte et al., 2004), presumably because the disinhibition caused by substance abuse is partially responsible for the intensification of gambling behaviours or reduced income and other financial problems because of the possibility that gambling might increase drinking habits.

Another relationship is observed, albeit much less extensively studied, between pathological gambling and criminality (Lesieur, 1977; Lesieur & Rosenthal, 1991; Livingston, 1974). Barnes et al. (1999) reported that certain crimes were strongly associated with the frequency of gambling. Studies of members of Gamblers Anonymous have reported that 20–85% of these individuals had committed crimes, and that 23% had an actual criminal record (Blaszczynski & McConaghy, 1994; Meyer & Fabian, 1992; Templer, Kaiser, & Siscoe, 1993). The nature of the association between pathological gambling and criminality remains largely obscure, but the most widespread hypothesis is that gambling problems predict acting out. In this view, pathological gamblers first finance their gambling from legal sources, but when these are exhausted, certain gamblers —depending on opportunity, perceived risk, and their value systems—turn to crime (Lesieur, 1977; Meyer & Fabian, 1992; Rozon, 1987). When legal sources of income become inadequate, gamblers become despondent; many authors have suggested that is the tipping point at which certain gamblers are driven to their final resort—illegal income (American Psychiatric Association, 1994; Blaszczynski, 1994; Doley, 2000; Fulcher, 1979; Lesieur & Blume, 1991; Taber, McCormick, Russo, Adkins, & Ramirez, 1987; Wellford, 2001).

Although this explanation is plausible and certainly describes many cases, no longitudinal study has clearly established gambling as a universal aetiological factor for criminality (Barnes et al., 2005). However, in a study by Wanner, Vitaro, Carbonneau, & Tremblay (2009) examining cross-lagged links among various deviant behaviours, the authors note that gambling problems at age 16 were linked to later theft, but only for adolescents with deviant peers, a finding which suggests a prior delinquent context.

To further our understanding of the factors that determine gambling trajectories, it is necessary to analyze these trajectories from a dynamic perspective, and adopt a paradigm which emphasizes the importance of temporality.

Theoretical Framework of Criminal Career

In general, studies of criminal careers have focused on the development and evolution of criminal and antisocial behaviours, and on risk factors and lifestyles that influence these trajectories (Farrington, 2003). Blumstein et al. (1986) define an individual's "criminal career" as the longitudinal sequence of crimes they commit. A criminal or deviant career is thus temporally bounded: it includes both a beginning and an end. The trajectory from the beginning to the end of the career can be described in terms of variables related to acts of interest (e.g., frequency of offending). Blumstein, Cohen, and Farrington (1988) point out that the criminal career paradigm is not strictly speaking a theory of crime but rather a way of structuring and organizing knowledge about key determinants of acting out. In this paradigm, individuals begin offending at a specific age, commit a variety of crimes at a rate that is specific to them, and stop offending at some point (Piquero, Farrington, & Blumstein 2003, 2007). Studies of criminal careers have clearly demonstrated the dynamic nature of offending, over both the short and the long terms (Griffin & Armstrong, 2003; Horney, Osgood, & Marshall, 1995; Laub & Sampson, 1993, 2003; Ouellet & Tremblay, 2014; Sampson & Laub, 1990, 1993).

Life Course Perspective

The life course perspective is based on two central concepts: trajectories and transitions. The concept of trajectory, as defined by Elder (1985), offers a long-term view of the life course, a perspective, for example, from which to examine careers. Each life course has many interlocking trajectories (e.g., employment, criminal career, etc.). Transitions, on the other hand, are specific, relatively short-term, life events (first marriage, first job, etc.) that modulate trajectories and are to be viewed in respect to their temporal context "and the resources people bring to it" (a divorce experienced by a person in his or her 20s versus in that person's 50s, as for the example Elder provides). Finally, incongruences between trajectories and transitions generate turning points or changes in an individual's life course (Farrington, 2005; Griffin & Armstrong, 2003; Horney et al., 1995; Laub & Sampson, 2003; Sampson & Laub, 1993). In Sampson & Laub's (1990, 1993; Laub & Sampson, 2003) view, criminal career is modulated by informal forms of social control, that is, significant

events in offenders' social lives. Adopting the life course perspective and relying on individual trajectories from childhood to late adulthood (participants were last met when they were 70), Laub and Sampson (2003) conclude that desistance from crime is especially influenced by work and marriage.

Application of this paradigm has not been limited to classic forms of social control, but has also extended to circumstances more closely related to offenders' deviant lifestyles. For example, Horney et al. (1995) reported offenders were more likely to offend in the months in which they increased their consumption of alcohol and drugs. Uggen and Thompson (2003) and McGloin, Sullivan, Piquero, and Pratt (2007) have reported that increased drug consumption is associated with increased illegal income and diversity of criminal activities. In addition, the risks of arrest and incarceration are known to be higher during periods of penal surveillance. Probation has been variously reported to have no effect on criminal activities (Horney et al., 1995) and to reduce, but not eliminate such activities (McGloin et al., 2007; Ouellet & Tremblay, 2014). In summary, circumstances related to deviant lifestyles have been shown to influence the dynamics of criminal trajectories over both the short and long terms.

The features of the criminal-career paradigm suggest that it may be reasonably applied in research on deviant careers, such as those of problem gamblers. Concretely, the life-course perspective provides a theoretical framework for analyzing the synchronicity of life events and gambling behaviours in studies of problem gamblers' trajectories. It thus helps fill a fundamental knowledge gap on gambling problems and sheds light on the dynamic factors linked to gambling trajectories.

Current Study

Recent studies have suggested the career of gamblers resembles that of hardened criminals, is punctuated by dramatic turns of events, and alternates between relatively intense periods of activities and periods of calm. The possibility that life events influence gambling trajectories, just as they do criminal careers, cannot therefore be excluded from a dynamic point of view. The objective of this study was to shed light on the interaction between conventional (employment, intimate relationships, therapy) and deviant (lucrative criminality, alcohol and drug expenditures, loan shark loans) life circumstances and three indicators of gambling: amounts spent on gambling, interruptions in gambling, and relapse. The theoretical framework for the study was inspired by the concept of criminal career generally, and the life course perspective. To ensure optimal analysis of our diversified sample of gamblers, linear hierarchical models were used.

Method

Participants

The data were obtained through interviews of 100 problem gamblers recruited from several therapeutic resources in the Montreal region over a three-year period (2006–2008).

Participants were recruited essentially on the basis of their score on the Canadian Problem Gambling Index (CPGI), developed by Ferris and Wynne (2001). In the present study, the mean score of the gamblers to the CPGI was 17.6 (SD = 4.9). The gamblers interviewed for this study scored between 8 and 27, indicating that they were problem gamblers. The majority of the participants were male (64.0%) and relatively uneducated (51.0% had no more than a high school diploma), and the mean age was 46 years. All the participants were in therapy for their gambling problem, which had started, on average, 10.5 years prior to their entry into therapy.

Most of the participants (53.0%) had only pursued one form of gambling during the window period, and 92.0% had concentrated on video poker (deduced from the amounts gambled). Although many of these characteristics are similar to those reported in the literature (Chevalier & Allard, 2001; Custer, 1982; Wellford, 2001), this sample was not representative of problem gamblers.

The interviews covered the 36 months preceding the participant's entry into therapy, and there were thus 3,600 distinct months of observations (100 participants x 36 months). The interviews lasted approximately two hours and were conducted face-to-face. The questionnaire was inspired by the one administered to federal inmates to characterize their financial situation in the three years preceding their incarceration (Morselli & Tremblay, 2010). It comprises a large section devoted to the chronological collection of information on a variety of subjects, including life events, legal income, gambling, borrowing strategies, and criminal offending. Life history calendar method was developed by Freedman, Thornton, Camburn, Alwin, and Young-DeMarco (1988) for use in the study of criminal careers, and has proven to be reliable (Ahn, Blumstein, & Schervish, 1990; Bradburn, Rips, & Shevell, 1987; Caspi et al., 1996; Griffin & Armstrong, 2003; Horney et al., 1995; Horney & Marshall, 1991; MacKenzie & Li, 2002; McGloin et al., 2007; Ouellet, 2018; Ouellet & Bouchard, 2017; Ouellet & Tremblay, 2014; Sutton et al., 2011; Sutton, Bellair, Kowalski, Light, & Hutcherson, 2011; Uggen & Thompson, 2003). The method not only improves the quality of retrospective data, especially by allowing synchronization of events, but also facilitates the identification of likely sequences of events and changes (for more details on life history calendars, see Freedman et al., 1988).

Money issues are a constant preoccupation of gamblers, and the amounts bet are a function of winnings and losses. This "money management" holds multiple consequences, and is associated with life events that tend to reinforce the credibility of the self-reports.

Measures

Relative losses, periods of abstinence, and relapses. The behavioural dynamics of the participants' gambling—more specifically, changes in actual gambling—were evaluated in terms of three measures: relative losses, periods of abstinence, and relapses.

Relative loss. Relative loss is the ratio of gambling losses to legal income in each month. This ratio is a measure of the extent to which life circumstances increase or decrease monthly gambling activities. Moreover, it to some extent contextualizes the losses, because while losing $10,000 is a hardship in absolute terms, it is even more problematic if one's income is $20,000 rather than $200,000. Relative losses were calculated only for the months in which participants actually gambled—that is, months in which the participants abstained were excluded. As only the months in which gambling occurred were analyzed, the number of months of observation varied from individual to individual. This is not problematic, given the flexibility of linear hierarchical models (Willett, Singer, & Martin, 1998). Dupéré, Lacourse, Vitaro, and Tremblay (2007) noted that these types of measures do not require that participants be measured simultaneously, at a fixed rate, or the same number of times. The results thus reflect changes in gambling behaviour in the months the participants gambled. A strong majority of the participants were considerably in debt during the window period: the median relative loss was 53.1%, and the mean relative loss was 124.3%. The significant discrepancy gap between the mean and the median relative loss is, to some extent, a reflection of the volatility of gambling behaviour.

Periods of abstinence. Given this variability, it was thought useful to specifically investigate periods of abstinence and identify predictors of abstinence of at least one month. Half of the participants (50%) abstained for at least one month during the window period, and the mean duration of their abstinence was 8.5 months. The data set used to examine the dynamics of abstinence consisted of 3,600 observations (100 participants x 36 months).

Relapse. Relapse was considered to occur in the first month of gambling following abstinence for at least one month. The analysis of relapses thus examined the experience of individuals who had undergone one period of abstinence during the window period (because the analysis of changes in developmental trajectories require an observation period of at least 3 months (Dupéré et al., 2007), this was the minimal observation period for each participant in this study), since to relapse one must have previously abstained. In fact, half of the participants had not abstained during the window period. The data set for the analysis of relapse consisted of the observations for the months of abstinence, and where applicable, the months in which relapse occurred (50 participants x 9.88 months).

Life Circumstances – Dynamic Factors. Life circumstances were divided into groups: conventional and deviant (see Table 1 for descriptive statistics). Conventional life circumstances included living with an intimate partner and the number of hours worked. A significant proportion (46%) of participants remained single throughout the window period. Among participants who maintained an intimate relationship for at least one month, the mean duration of the relationship was 27.1 months. Most (86.7%) of the participants were employed during the window period, and the mean duration of employment 29.8 months. As relative loss is based on legal income, it also appeared useful to compare the number of hours each

Table 1
Descriptive Statistics

Predictor	Mean *(SD)*
Level 1 - Dynamic Predictors (n = 3600)	
Living with an intimate partner (1=yes; 0=no)	41.1%
Hours spent at work	1.67 (1.21)
Does not work	29.2%
Less than the window period (WP) average	7.3%
Equal to the WP average	31.0%
Greater than the WP average	32.5%
Therapy (1=yes; 0=no)	12%
Alcohol and drug consumption ($)	1.40 (1.12)
Paying off a loan shark (1=yes; 0=no)	18.3%
Lucrative crimes (1=yes; 0=no)	12.5%
Level 2 – Static Predictors (n = 100)	
Sex (0=female; 1=male)	64.0%
Age (years)	46.38 (10.53)
Level of education	2.71 (1.39)
Without high school diploma	25%
High school diploma	26%
Vocational studies diploma	15%
College	21%
University	13%
ICJE (9-item scale)	17.41 (4.88)
LSC (24-item scale)	81.62 (17.14)

participant worked in each month to their mean monthly hours over the entire window period. In addition, the effect of being in or out of therapy during the window period was analyzed. Most (67.3%) of the participants had been in therapy, and the mean duration of therapy was 4.5 months.

To evaluate the intensity of participants' deviant lifestyles, we used three measures: (1) total monthly expenditures on alcohol and drugs[1] (2) loan shark loans, and (3) involvement in lucrative crime. The mean monthly expenditure on psychoactive substances was CAN $244. Loan shark loans—more specifically, the months a participant was indebted to a loan shark—were also analyzed. Almost 38% of participants had borrowed money from a loan shark during the window period, and the mean duration of indebtedness was 16.8 months. Crimes directly related to gambling—e.g., to finance gambling, defray daily expenses, or pay off gambling debts—were committed by 35% of participants. This result is consistent with literature reports (Doley, 2000). The monthly illegal income (for the months in which crimes were committed) was considerable: geometric mean = $5,197, *Mdn* = $2,500.

[1]Specifically, alcohol, marijuana/hashish, cocaine, crack/freebase, heroin/methadone, barbiturates/depressants, hallucinogens, amphetamines, and Valium™/tranquilizers/morphine. It should be noted that the actual variable analyzed was the logarithm of the monthly expenditures.

The mean duration of offending among participants who had committed lucrative crimes was 12.6 months. These data were used to analyze the effect of the commission of lucrative crimes (yes/no) on the participants' monthly gambling habits.

Personal characteristics of participants – static factors. Evidence on the impact of sex, age and education on the prevalence of pathological gambling has been demonstrated in several studies. It indicates that, more often than not, the most severely pathological gamblers tend to be male (the reported proportion of men varies from 60% to 80%) (Chevalier & Allard, 2001; Custer, 1982; Wellford, 2001), older (tending to be overrepresented in age groups older than 30 years) (Chevalier & Allard, 2001), and less educated (Chevalier & Allard, 2001). Accordingly, the effect of sex, age, and education was controlled for, to understand better the effect of life circumstances on relative losses, periods of abstinence, and relapses. To measure propensity to gamble, both the CPGI and the self-control scale developed by Grasmick, Tittle, Bursik Jr., and Arneklev (1993) based on Gottfredson and Hirschi's (1990) model were used.

Analytical Strategy

It was considered useful to distinguish between the effects of the participants' dynamic and static characteristics. The first level (Level 1) comprises dynamic characteristics, i.e., conventional or deviant life events, which may vary from month to month for each participant; data on these characteristics were collected from the participants' calendars. The second level (Level 2) comprises static characteristics, i.e., characteristics that did not change during the window period. The association between monthly participant characteristics (Level 2) and life events (Level 1) on variations in gambling behaviour was analyzed using linear hierarchical models. Van Der Leeden (1998) notes that one of the most interesting uses of multi-level models is their application to repeated-measure data. Multi-level models allow flexible manipulation of hierarchical data while preserving the independence of the error terms, and have been demonstrated to be better suited to the analysis of this type data than are traditional single-level models (Raudenbush, & Byrk, 2002; Goldstein, 1987; Van Der Leeden, 1998; Wooldredge, Griffin, & Pratt, 2001).

To measure the intensity of gambling activity, two models were used, depending on the dependent variables in question. A linear hierarchical model (LHM) was used to analyze relative losses (ratio of gambling losses to income). LHMs are a variant of multiple regression models for nested or hierarchical data (Horney et al., 1995), and measure the variance explained by each level of analysis. A second type of model was used for the analysis of periods of abstinence, and relapses. As abstinence and relapse are binary variables (no = 0, yes = 1), and the error terms of a binary variable are not normally distributed, a generalized linear hierarchical model (GLHM) was used. GLHMs are variations of logistic regression models for nested data, and predict the likelihood that an event occurs or does not occur given the presence of selected independent variables. Raudenbush and Byrk (2002) note that GLHMs provide an integrated framework for the analysis of the structure and predictors of life events.

Table 2
Linear Hierarchical Model (LHM) of Relative Losses (monthly gambling losses: income)

Relative Losses	MODEL 1 γ	MODEL 2 γ
Level 1 (n = 3180)		
Living with an intimate partner	- 0.04 (0.13)	- 0.02 (0.13)
Hours spent at work	- 0.20 (0.03)**	- 0.21 (0.03)**
Therapy	- 0.29 (0.12)*	- 0.29 (0.13)*
Alcohol & drug consumption ($)		- 0.13 (0.11)
Paying off a loan shark		0.15 (0.14)
Lucrative crimes		0.73 (0.18)**
Level 2 (n = 100)		
Sex	1.25 (0.54)*	1.16 (0.52)*
Age	- 0.02 (0.03)	- 0.03 (0.03)
Level of education	0.05 (0.20)	0.04 (0.19)
CPGI	0.01 (0.05)	0.01 (0.05)
LCS	0.01 (0.02)	0.01 (0.02)
Abstinence during WP (months)	0.16 (0.51)	0.16 (0.49)

Note: Non-standardized regression coefficients presented, standard errors in parentheses. *$p < .05$. **$p < .001$.

However, unlike LHMs, GLHMs provide no information on the variance explained by each of the levels, because of the heteroscedasticity of the first-degree error terms.

The structure of the two models used, and the explanatory variables analyzed in each model, were the same. In light of the research questions, and to facilitate interpretation of the constant, grand mean centering was used with variables that could not have a value of 0 (age, level of education, scores on the two scales). Because of the possible interaction between participant characteristics and life circumstances, it was assumed that the constant and the slope varied from individual to individual (Hox, 2002; Luke, 2004). The restricted maximum likelihood method was used for estimation, as this method is better suited to the simpler model (Gelman & Hill, 2007; Hox, 2002; Luke, 2004; Raudenbush & Bryk, 2002). The statistical analyses were performed used the HLM software package, version 6.06.

Results

The "unconditional" model presented in Table 2 provides information on the distribution of the variance at two levels of analysis: variance because of life events (Level 1) and variance because of participant characteristics (Level 2). The interclass correlation coefficient (for more details, see Luke, 2004) indicates that 38% of the explained variation in relative losses is because of participant characteristics and 62% by life circumstances.

Model 1 (Table 2) examined the effect of participants' demographic characteristics and conventional life circumstances on monthly gambling losses over a 36-month

period. Once accounting for deviant life events (Model 2), only the sex of the participants discriminates between the size of their relative losses, with men exhibiting greater relative losses ($B = 1.16$, $p \leqslant .05$). Addition of conventional life circumstances revealed that participants better controlled their gambling in months in which they worked a greater number of hours. In other words, relative losses decreased as the number of hours worked increased, and vice versa ($B = -0.21$, $p \leqslant .001$). For example, relative losses were almost 21% lower among participants whose monthly hours worked exceeded their average over the window period. Be aware that we could not completely set the tautological aspect of this relationship aside (aspect that had already driven us to use the hours worked per month instead of the monthly incomes to represent the employment concept). A higher number of hours worked raises legal income and therefore reduces the ratio and the measure of relative losses. However, research has shown that more income generally means more gambling among pathological gamblers, which tends to balance this bias in part.

Given the conventional and deviant events in participants' lives, it is interesting to note the effect of voluntary therapy, and Model 1 incorporates the number of months participants were in therapy. Once accounting for deviant life events, being in therapy was associated with a significantly reduction in the relative losses of gambling ($B = -0.29$; $p \leqslant .05$). Enrolment in therapy was associated with a monthly reduction of relative losses of more than 29%, regardless of the details of the therapy (frequency, approach).

Model 2 of analyzes the impact of participants' deviant behaviours (monthly expenditures on alcohol or drugs, number of months in which loan shark loans were resorted to, number of months in which participants committed lucrative crimes). The first finding was the absence of an effect for loan shark loans and alcohol and drug expenditures on indebtedness. Second result observed in Model 2, the commission of lucrative crimes was strongly associated with relative losses ($B = .73$, $p \leqslant .001$). The illegal income earned through lucrative crimes ($M = \$5{,}197$ in months in which participants offended) not only allows gamblers to continue gambling unabated but also incites them to overinvest. In months in which participants committed at least one lucrative crime, the ratio of their relative losses increased by 73%.

Periods of Abstinence

It is known that the intensity of problem gambling varies over time and that certain events may disrupt gambling behaviour. The analyses described above not only convincingly confirmed this, but also stimulated reflection on certain aspects of the participants' trajectories, including the factors that favour abstinence and relapse.

An overview of the impact of the factors that are linked with abstinence is presented in Table 3. Controlling for individual characteristics, conventional and deviant life circumstances, there was a significant effect for education ($OR = 1.65$, $p \leqslant .05$). Thus, the more educated the participant, the more likely he or she was to abstain over the 36-month window period. With each increment in educational level, the

Table 3
General Linear Hierarchical Model (GLHM) of Periods of Abstinence: Logistic Coefficients (γ) and Odds Ratios

Abstinence	MODEL 3		MODEL 4	
	γ	Odds Ratio [95% CI]	γ	Odds Ratio [95% CI]
Level 1 (n = 3600)				
Living with an intimate partner	- 0.26	0.771 [0.346-1.720]	- 0.23	0.791 [0.526-1.191]
Hours spent at work	- 0.22**	0.805 [0.661-0.982]	- 0.24*	0.886 [0.800-1.003]
Therapy	1.62**	5.081 [2.735-9.440]	1.53**	4.639 [3.378-6.371]
Alcohol & drug consumption ($)			- 0.84**	0.432 [0.233-0.574]
Paying off a loan shark			- 0.73*	0.481 [0.271-0.855]
Lucrative crimes			- 2.45**	0.086 [0.036-0.205]
Level 2 (n = 100)				
Sex	- 0.71	0.489 [0.156-1.531]	- 0.16	0.856 [0.228-3.211]
Age	- 0.01	0.992 [0.940-1.047]	- 0.05	0.954 [0.895-1.018]
Level of education	0.30*	1.350 [1.015-1.794]	0.50*	1.648 [1.036-2.626]
CPGI	0.00	1.000 [0.896-1.117]	0.02	1.017 [0.896-1.117]
LCS	- 0.01	0.988 [0.954-1.022]	0.02	1.015 [0.975-1.058]
Average relative loss	0.05	1.050 [0.864-1.276]	0.25	1.180 [1.001-1.421]

Note: Standard errors in parentheses. *$p < .05$. **$p < .001$.

chances of abstaining increased by a factor 1.65: thus, a participant who had attended university was 6.5 times more likely to interrupt his or her gambling than was a participant who had not completed high school.

The time devoted to work each month was also associated with abstinence from gambling (Model 2 - OR = 0.886, $p \leqslant .01$). The greater the number of hours participants worked, the less likely they were to abstain (by a factor of 1.13 for each increment of time devoted to work).

The analysis of gambling losses reveals the role of therapeutic intervention: being in therapy was associated with a substantially reduction in gambling. A reasonable question is therefore whether therapy can influence total abstinence. As Model 4 (Table 3) indicates, there was a significant association between months in therapy and periods of abstinence ($p \leqslant .01$), with participants in therapy being 4.64 times more likely to stop gambling.

Model 4 incorporates deviant life events. There was a clear negative association between a deviant lifestyle and the probability of abstaining during the window period. Thus, abstinence was negatively associated with monthly alcohol and drug expenditures (OR = 0.432, $p \leqslant .01$). Loan shark loans exhibited a similar effect: participants who paid off a loan shark loan were less likely to interrupt their gambling (OR = 0.481, $p \leqslant .01$). Loan shark loans allow gamblers to continue gambling once legitimate sources of income become inadequate, and, in this study, participants who paid off a loan shark loan were 2.08 times less likely to abstain from

gambling in the month in question. Finally, and not surprisingly, an association was found between lucrative crime and abstinence: participants who committed lucrative crimes were 11.63 less likely to abstain in the month in which they offended (OR = 0.086, $p \leqslant .01$). All these results suggest a strong link between deviant behaviours and the probability of abstinence.

Relapses

For relapse, analysis was limited to participants who had abstained during the window period (regardless of whether they had relapsed or not) (N = 50), and the months of abstinence and relapse. For example, if a participant had two four-month periods of abstinence, the total number of months analyzed was 10. For this analysis, the mean observation period was 9.88 months (SD = 7.61). Participants who relapsed following abstinence differed from participants who did not abstain in only one way: they were more likely to have enrolled in therapy (78% vs. 56%, $p \leqslant .05$).

Controlling for individual characteristics, and conventional and deviant life circumstances (Model 6), relapse was more common among men (OR = 1.781, $p \leqslant .05$) and less-educated participants (OR = 0.802, $p \leqslant 0.05$). Men were 1.8 more likely to relapse than were women. The level of education predicted the occurrence and maintenance of abstinence (absence of relapse). Concretely, education exerted a significant effect, with participants with a university education being 5 times less likely to relapse than were participants who had not completed high school.

There was no association between any of conventional life circumstances, hours worked, and months in an intimate relationship, on the one hand, and the probability of relapse, on the other. This result may be related to the effect of therapy, as the risk of relapse was lower in the months in which a participant was in therapy (Model 6 - OR = 0.364, $p \leqslant .05$). In other words, participants who were not in therapy were 2.7 times as likely to relapse as those participants who were.

The analysis of deviant life circumstances (Model 6), like that of other factors related to the dynamics of gambling, sheds light on the context of relapses. Expenditure of alcohol and drug was associated with a greater likelihood of relapse in the month in question (OR = 1.717, $p \leqslant .01$). A similar relationship was observed for paying off a loan shark loan: paying off a loan shark loan was associated with a 2.2-fold increase of the likelihood of relapse (OR = 2.252, $p \leqslant .05$). In addition, participants were 11.1 more likely to relapse in months in which they committed lucrative crimes (OR = 11.068, $p \leqslant 0.01$).

Discussion

This research looked at the short-term dynamics of gambling behaviour. The demonstration highlights the contribution of the criminal career paradigm in understanding other types of deviant trajectories. Moreover, results show that the life course perspective gives access to a better understanding of the changes that may occur in gambling trajectory. This theoretical perspective allows us to make the link

Table 4
General Linear Hierarchical Model (GLHM) of Relapses: Logistic Coefficients (γ) and Odds Ratios

Relapse	MODEL 5		MODEL 6	
	γ	Odds Ratio [95% CI]	γ	Odds Ratio [95% CI]
Level 1 (n = 494)				
Living with an intimate partner	0.02	1.023 [0.598-1.751]	- 0.05	0.922 [0.576-1.476]
Hours spent at work	0.07	1.072 [0.814-1.411]	- 0.02	0.982 [0.788-1.225]
Therapy	- 1.04*	.353 [0.130-0.922]	- 1.01*	0.364 [0.129-1.029]
Alcohol and drug consumption ($)			0.54**	1.717 [1.236-2.387]
Paying off a loan shark			0.81*	2.252 [1.062-4.774]
Lucrative crimes			2.40**	11.068 [3.854-17.789]
Level 2 (n = 50)				
Sex	0.70*	2.006 [1.094-3.681]	0.57*	1.781 [0.949-3.341]
Age	0.01	0.990 [0.957-1.024]	0.02	1.019 [0.982-1.057]
Level of education	- 0.17	0.847 [0.692-1.037]	- 0.22*	0.802 [0.660-0.974]
CPGI	0.02	1.023 [0.977-1.072]	0.01	1.001 [0.956-1.049]
LCS	- 0.01	0.982 [0.967-1.139]	- 0.02	0.965 [0.947-1.136]
Average relative loss	0.05	1.056 [0.952-1.172]	- 0.02	0.978 [0.843-1.133]

Note: Standard errors in parentheses.*$p < .05$. **$p < .001$.

between the individual and his or her environment. The life course perspective places more emphasis on the decision-making process and the events that occur in life to identify changes in individual paths. Studies on life trajectories and transitions are directly inspired by the sociology of change, a concept which has shown that individuals experience several transitions in their lives, moving from one state to another on several occasions. The adoption of this framework (conceptual, theoretical and analytical) has proved fruitful in understanding changes in the trajectories of excessive gamblers.

The exploratory nature and short observation period of this retrospective study notwithstanding, the portrait of problem gamblers observed is quite different from that reported in conventional cross-sectional studies. Uggen and Thompson (2007) explain this difference in terms of the relative strengths of the two types of design: cross-sectional (or inter-individual) studies identify correlates and produce a static portrait, while longitudinal or retrospective (intra-individual) studies identify synchronicities of life circumstances and behaviours, and produce a dynamic portrait. Analyzes performed in this study combine the strengths of these two research designs. It justifies the use of multi-level analysis: on the one hand, it is important to control for participants' static characteristics (attributes) in order to identify the effect of life circumstances; on the other hand, it is important to demonstrate that static characteristics may modify the effect of life circumstances.

This study examined the relationship between life circumstances (both conventional and deviant) and gambling behaviour in a sample of problem gamblers. Conventional

life circumstances have been reported to exert a marked effect on criminal trajectories (Griffin & Armstrong, 2003; Horney et al., 1995; Laub & Sampson, 2003; Ouellet, 2018; Ouellet & Bouchard, 2017; Ouellet & Tremblay, 2014), and in this study were found to exert a marked effect on indebtedness, abstinence, and relapses. As problem gambling is the net result of natural inclination, facilitating factors, and inhibitory factors, it is hardly surprising that the participation in, and intensity of, gambling is influenced by a variety of factors and situations.

One of the contributions of this research was to demonstrate the importance of considering the dynamics of deviant circumstances in the understanding of gamblers' paths. However, based on the literature consulted the prediction of the effects of deviant life events could be ambiguous, as both positive and negative effects are conceivable. For example, do gamblers use illegal income to intensify their gambling, pay off gambling debts, or simply continue in their ways? Most authors agree it is despair that generally drives gamblers to crime (Blaszczynski, 1994; Fulcher, 1979; Taber et al., 1987; Wellford, 2001). But this form of essentially expressive crime can only be expected to earn trivial rewards, as the perpetrators act impulsively rather than out of rational consideration of the available opportunities. For this reason, criminal offending is not thought to enjoy any effect on gambling behaviour. This observation is also relevant to alcohol and drug expenditures. Consumption of these products may, to some extent, exacerbate problem gambling—by lowering inhibitions, for example: the more a gambler is intoxicated the easier it is for him or her to spend the money set aside for that person's rent or child's tuition. On the other hand, it is also necessary to consider the hypothesis that two vices or two passions cannot be maintained simultaneously. In fact, addiction transference is a well-known therapeutic concept. Finally, loans from loan sharks may also have positive or negative effects. Are these loans used to pay off creditors, or to continue gambling once other types of loans are unavailable? The first scenario would lead to a decrease in relative losses while the second would lead to either a stabilization or an increase.

Findings show a strong association between the deviant circumstances and monthly variations in gambling activities. The circumstances exacerbate the intensity of gambling activities, encourage continuity and precipitate relapse. The illegal income earned through lucrative crimes (M = \$5,197 in months in which participants offended) incites gamblers to overinvest. In months in which participants committed at least one lucrative crime, the ratio of their relative losses increased by 73%. Temporary abstinence is less likely during months when participants are active in crime, when their alcohol and drug expenditures increases and they are also less likely to abstain during months of repayment of a loan shark loan. Finally, committing lucrative crimes, paying off a loan shark loan and increasing expenditure of alcohol and drug were all associated with a greater likelihood of relapse during these months. Our results thus show the close relationship between these deviant circumstances and the gaming habits. Although we cannot establish the causal order of the apparition of these behaviours, we observe these factors are closely associated with gambling activities.

Our results also highlight the impact of hours worked and being in therapy on gambling parameters examined. It has been shown that indebtedness decreased as the number of hours worked increased, but that the greater the number of hours worked also decreases the likelihood that participants will abstain. Regarding the intensity of gambling, our results may reflect the fact that when participants worked an above-average number of hours they spent more time at work and thus had less time to gamble. Conversely, when they worked a below-average number of hours, they may have worked less or lost their job, and thus had more time to gamble. This result supports the idea that participants better controlled their relative losses in months in which they worked more. To interpret the effect on abstinence we presume that more hours spent at work leads to higher income and thus gives the participants a financial cushion granting a false sense of security, which may lessen the pressure to abstain. To summarize, the amount of time spent at work establishes a distinction between gambling and abstinence. However, it also determines the intensity of the gambling habit for those gamblers who do not abstain during a given month. There was a strong association between months in therapy, on the one hand, and the intensity of gambling (relative losses), the probability of abstinence and the probability of relapse, on the other. This result is consistent with those findings reported elsewhere of the effectiveness of therapy among gamblers, specifically, a reduction in gambling following treatment (Lesieur & Blume, 1991; Russo, McCormick, Ramirez, & Taber, 1984; Taber et al., 1987). Considering the results, it is possible to revisit certain assumptions surrounding problem gambling. Certain authors have developed clinically-inspired theoretical models that posit an invariable sequence of phases through which pathological gamblers must progress (Doley, 2000; Lesieur & Blume, 1991). Typically, the sequence begins with a period of winnings, and continues with a progressive intensification (in terms of both frequency and amounts bet) of gambling. The progression is thought to be accelerated by gamblers' impulsivity and the consumption of alcohol and drugs (Browne, 1989). Ultimately, as a result of crushing indebtedness and the inadequacy of legal income, the gambler becomes despondent. It is at this point that the most serious consequences appear: job loss, loan shark loans, criminality, attempted suicide, etc. In the final stage, the gambler recognizes the irrational nature of his or her passion and takes steps to free himself or herself from it.

Although logical and plausible, this vision of problem gambling is not a good fit to our results. It is true that our window period cannot be considered to be representative of the participants' entire gambling career, as the mean duration of gambling career was 10.5 years, and the window period was limited to the 36 months preceding therapy—a period the classic model suggests may be the most intense and tragic stages. Nevertheless, while our results are preliminary and subject to the usual caveats, based on the qualitative observation of the individual trajectories of sample participants (these graphics are not shown), nothing indicates that the participants' gambling behaviour steadily progressed. Our analyses in fact suggest that the amounts bet every month were influenced by a variety of factors. It should also be added that occurrence of numerous periods of abstinence and relapse, observed both in this study and many others (Ledgerwood & Petry, 2006; Oei & Gordon, 2008), argues

against continuous progression. Instead, gambling behaviour appears to be volatile, and this volatility appears to be analogous to that repeatedly reported for criminal offending (Glaser, 1969; Horney et al., 1995; Laub & Sampson, 2003; Matza, 1964; Ouellet, 2018; Ouellet & Tremblay, 2014).

Although the details of this relationship remain unclear, and it is difficult to establish causal relationships (which, in any event, was not the objective of this study), it must be borne in mind many participants did not commit crimes: slightly more than one third (35%) committed crimes during the window period, with this proportion rising to 43% over entire gambling careers. Therefore, certain participants, even when heavily in debt, refrained from offending. Our participants did not therefore behave as would be expected if offending is indeed gamblers' last, despairing attempt to compensate for the inadequacy of legal income (American Psychiatric Association, 1994; Blaszczynski, 1994; Doley, 2000; Fulcher, 1979; Lesieur & Blume, 1991; Taber et al., 1987; Wellford, 2001). In fact, criminal offending appears to have been more a question of opportunity, which is consistent with the results of Rozon's (1987) qualitative studies. Rozon emphasized that while gamblers' offending is a last resort, it is also an opportunistic act that depends on the opportunities available in the gambler's environment. In summary, the detailed analysis of illegal income strongly suggests that participants who committed crimes did so because offending was something they were familiar with and proficient at. In fact, many participants justified their failure to offend in terms of ignorance of how to do so (absence of criminal opportunity) or moral considerations (as one participant said, "I may have a lot of faults, but I'm not a crook.").

Our results provide no support for the existence of a single career or single developmental profile. In this, they concord with those of Blaszczynski and Nower (2002), who demonstrated that gamblers constitute a heterogeneous population. It would be particularly interesting to continue the reflection in the light of pathways model advance by Blaszczynski and Nower. One could, for example, examine the effect of life circumstances (conventional and deviant) according to the different types of gamblers identified, but also the prevalence of certain behaviours (such as crime) within each of these types. In the end, there appears to be many profiles. Are the consequences of problem gambling the same for all gamblers? It is quite possible that the answer is no. This is not to underestimate the psychological suffering caused by gambling, but it does legitimate the hypothesis that life circumstances may modulate the repercussions of this passion.

The approach taken in this study is not without limits. One limitation of the hierarchical approach is that it does not allow the consideration of rare life circumstances. Deaths, divorces or suicide attempts are too rare events in most of life paths (especially in a short-term perspective) to lend themselves to such an analysis. Another limitation of this study is its inability to capture the duration of the identified effects. Does the duration of the effect that accompanies therapies fade after a certain time? Furthermore, retrospective designs can be riddled with threats to validity. The quality of the data collected depends on the memory of the

participants and when relying on individual recall, recall may be inaccurate and subject to biases.

Our results are exploratory and we also cannot claim that our sample is representative of individuals with gambling problems. The recruitment process imposed certain limitations: for example, it is quite plausible that the gamblers who are most criminally active are to be found behind prison bars, rather than in therapists' offices. On the other hand, the selection process did have certain advantages: therapy leads individuals to be more open and realistic about their experiences, and to explain their behaviours more honestly. Although our results cannot be generalized, the sample was nevertheless adequate for the analysis of the impact of selected life events on the intensity of gambling.

Conclusion

This study revealed the importance of analyzing the dynamics of gambling behaviour. Using three parameters (relative losses, periods of abstinence, relapses) that describe gambling behaviour over a 36-month period, it demonstrated that problems gamblers' individual trajectories are volatile and intermittent. Moreover, the results revealed the impact of life circumstances on these trajectories. On the one hand, sources of social control—hours worked, participation in therapy— create the effect of alleviating gambling problems. On the other hand, deviant life circumstances—commission of lucrative crimes, consumption of psychoactive substances, paying of gambling debts—exacerbated gambling. These latter results suggest a strong and ongoing association between gambling behaviour and other deviant behaviours.

This research has practical implications, as its identification of factors that predict changes in gambling behaviour supports the development of intervention policies. For example, interventions that favour a return to school, discontinuation of loan shark loans, and detoxification therapy should have indirect benefits. Our diagnosis is, of course, provisional, and subject to the usual caveats, especially because the participants in this study were all in therapy. Therefore, may have been better adapted, more "recoverable," and more committed to turning their lives around, and may have more resources at their disposal.

The results of this study provide yet more support for the position that exploration of dynamic factors is the most promising approach to understanding problem gambling. A further step would be to analyze gambling trajectories as a function of another deviant trajectory—criminality. In fact, it is a fair bet (if the choice of words can be excused) that an examination of the interrelation of these two trajectories will shed light on the evolution of both types of deviant behaviour. It would be interesting to establish which factors distinguish criminal offending from non-criminal offending within problem gamblers, to assess the impact of conventional and deviant lifestyle circumstances on criminal offending. Finally, it could be compelling to seek to uncover the sequential logic linking pathological gambling and criminal offending to determine which behaviour precedes the other.

References

Abbott, M. W., Williams, M. M., & Volberg, R. A. (2004). A prospective study of problem and regular nonproblem gamblers living in the community. *Substance Use and Misuse*, *39*, 855–884. doi:10.1081/JA-120030891. Retrieved from: https://www.researchgate.net/publication/8491465_A_Prospective_Study_of_Problem_and_Regular_Nonproblem_Gamblers_Living_in_the_Community

Aho, C. W., Blumstein, A., & Schervish, M. (1990). Estimation of arrest careers using hierarchical stochastic models. *Journal of Quantitative Criminology*, *6*, 131–152. doi:10.1007/BF01065848

American Psychiatric Association. (1994). Diagnostic and Statistical Manual of Mental Disorders (4th ed.). Washington, DC: Author.

Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (1999). Gambling and alcohol use among youth: Influences of demographic, socialization, and individual factors. *Addictive Behaviors*, *24*, 749–767. doi:10.1016/S0306-4603(99)00048-9

Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (2005). Shared predictors of youthful gambling, substance use, and delinquency. *Psychology of Addictive Behaviors*, *19*, 165–74. doi:10.1037/0893-164X.19.2.165. Retrieved from: https://pdfs.semanticscholar.org/cbd1/c146725f6c3a75481571c199ce84e9c2a6f8.pdf

Blaszczynski, A. (1994). Criminal offences in pathological gamblers. *Psychiatry, Psychology and Law*, *1*, 129–138. doi:10.1080/13218719409524836

Blaszczynski, A. P., & McConaghy, N. (1994). Criminal offenses in Gamblers Anonymous and hospital treated pathological gamblers. *Journal of Gambling Studies*, *10*, 99–127. doi:10.1007/BF02109935

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*, 487–499. doi:10.1046/j.1360-0443.2002.00015.x. Retrieved from: https://www.uv.es/~choliz/ModeloJuego.pdf

Blaszczynski, A. P., Wilson, A., & McConaghy, N. (1986). Sensation seeking and pathological gambling. *Addiction*, *81*, 113–117. doi:10.1111/j.1360-0443.1986.tb00301.x

Blumstein, A. (1986). *Criminal Careers and "Career Criminals"* (Vol. 2). Washington, DC: National Academies.

Blumstein, A., Cohen, J., & Farrington, D. P. (1988). Criminal career research: Its value for criminology. *Criminology*, *26*, 1–35. doi:10.1111/j.1745-9125.1988.tb00829.x

Bradburn, N. M., Rips, L. J., & Shevell, S. K. (1987). Answering autobiographical questions: The impact of memory and inference on surveys. *Science*, *236*, 157–161. Retrieved from: https://pdfs.semanticscholar.org/f5ca/0550e8baba3644da46212af9103156f4ee55.pdf

Browne, B. R. (1989). Going on tilt: Frequent poker players and control. *Journal of Gambling Studies*, *5*, 3–21. doi:10.1007/BF01022134

Carlton, P. L., & Manowitz, P. (1992). Behavioral restraint and symptoms of attention deficit disorder in alcoholics and pathological gamblers. *Neuropsychobiology*, *25*, 44–48. doi:10.1159/000118808

Caspi, A., Moffitt, T. E., Thornton, A., Freedman, D., Amell, J. W., Harrington, H., … Silva, P. A. (1996). The life history calendar: A research and clinical assessment method for collecting retrospective event-history data. *International Journal of Methods in Psychiatric Research*, 6, 101–114. doi:10.1002/(SICI)1234-988X(199607)6:2⩽101:AID-MPR156>3.3.CO;2-E

Chevalier, S., & Allard, D. (2001). *Jeu pathologique et joueurs problématiques: Le jeu à Montréal*. Montreal, QC: Régie régionale de la santé et des services sociaux de Montréal, Direction de la santé publique.

Coventry, K. R., & Brown, R. (1993). Sensation seeking, gambling and gambling addictions. *Addiction*, *88*, 541–554. doi:10.1111/j.1360-0443.1993.tb02061.x

Custer, R. L. (1982). *A profile of pathological gamblers*. Washington, DC: The National Foundation for Study and Treatment of Pathological Gambling.

Doley, R. M. (2000). *Want to make a bet?: Gambling and crime in Australasia*. Payneham, Australia: Australasian Centre for Policing Research.

Dupéré, V., Lacourse, É., Vitaro, F., & Tremblay, R. E. (2007). Méthodes d'analyse du changement fondées sur les trajectoires de développement individuelle: Modèles de régression mixtes paramétriques et non paramétriques. *Bulletin de méthodologie sociologique*, *95*, 26–57. doi:10.1177/075910630709500104. Retrieved from: https://www.researchgate.net/publication/254079156_Methodes_d%27analyse_du_changement_fondees_sur_les_trajectoires_de_developpement_individuelle_Modeles_de_regression_mixtes_parametriques_et_non_parametriques1

Dussault, F., Brendgen, M., Vitaro, F., Wanner, B., & Tremblay, R. E. (2011). Longitudinal links between impulsivity, gambling problems and depressive symptoms: A transactional model from adolescence to early adulthood. *Journal of Child Psychology and Psychiatry*, *52*, 130–138. doi:10.1111/j.1469-7610.2010.02313.x. Retrieved from: citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.718.6019&rep=rep1&type=pdf

Elder G. H., Jr. (1985). *Life course dynamics: Trajectories and transitions: 1968–1980*. Ithaca, NY: Cornell University Press.

Elia, C., & Jacobs, D. F. (1993). The incidence of pathological gambling among Native Americans treated for alcohol dependence. *International Journal of the Addictions*, *28*, 659–666. doi:10.3109/10826089309039654

Farrington, D. P. (2003). Developmental and life-course criminology: Key theoretical and empirical issues: The 2002 Sutherland Award Address. *Criminology*, *41*, 221–225. doi:10.1111/j.1745-9125.2003.tb00987.x

Farrington, D. P. (2005). Conclusions about developmental and life-course theories. In D. P. Farrington (Ed.), *Integrated developmental and life course theories of offending* (pp. 247–256). Advances in Criminological Theory (Vol. 14). New York, NY: Routledge.

Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index: Final report*. Ottawa, ON: Canadian Centre on Substance Abuse.

Freedman, D., Thornton, A., Camburn, D., Alwin, D., & Young-DeMarco, L. (1988). The life history calendar: A technique for collecting retrospective data. *Sociological Methodology*, 37–68. doi:10.2307/271044

French, M. T., Maclean, J. C., & Ettner, S. L. (2008). Drinkers and bettors: Investigating the complementarity of alcohol consumption and problem gambling. *Drug and Alcohol Dependence*, *96*, 155–164. doi:10.1016/j.drugalcdep.2008.02.011

Fulcher, G. (1979). Modern gambling mania and the psychological disease of compulsive gambling. *Police Product News*, *3*(11), 37–41.

Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge, England: Cambridge University Press.

Glaser, D. (1969). *The effectiveness of a prison and parole system* (abridged ed.). Indianapolis, IN: Bobb-Merrill.

Goldstein, H. (1987). *Multilevel models in educational and social research*. London, England: Griffin.

Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Standord, CA: Stanford University Press.

Goudriaan, A. E., Slutske, W. S., Krull, J. L., & Sher, K. J. (2009). Longitudinal patterns of gambling activities and associated risk factors in college students. *Addiction*, *104*, 1219–1232. doi:10.1111/j.1360-0443.2009.02573.x

Grant, J. E., Kushner, M. G., & Kim, S. W. (2002). Pathological gambling and alcohol use disorder. *Alcohol Research and Health*, *26*, 143–150. Retrieved from: https://pubs.niaaa.nih.gov/publications/arh26-2/143-150.htm

Grasmick, H. G., Tittle, C. R., Bursik Jr, R. J., & Arneklev, B. J. (1993). Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. *Journal of research in crime and delinquency*, *30*, 5–29. doi:10.1177/0022427893030001002

Griffin, M. L., & Armstrong, G. S. (2003). The effect of local life circumstances on female probationers' offending. *Justice Quarterly*, *20*, 213–239. doi:10.1080/07418820300095511

Hodgins, D. C., & el-Guebaly, N. (2004). Retrospective and prospective reports of precipitants to relapse in pathological gambling. *Journal of Consulting and Clinical Psychology*, *72*, 72–80. doi:10.1037/0022-006X.72.1.72

Horney, J., & Marshall, I. H. (1991). Measuring lambda through self-reports. *Criminology*, *29*, 471–495. doi:10.1111/j.1745-9125.1991.tb01075.x

Horney, J., Osgood, D. W., & Marshall, I. H. (1995). Criminal careers in the short-term: Intra-individual variability in crime and its relation to local life circumstances. *American Sociological Review*, 655–673. doi:10.2307/2096316

Hox, J. (2002). *Multilevel analysis: Techniques and applications*. (*Quantitative Methodology Series.*) Mahwah, NJ: Lawrence Erlbaum.

LaPlante, D. A., Nelson, S. E., LaBrie, R. A., & Shaffer, H. J. (2008). Stability and progression of disordered gambling: Lessons from longitudinal studies. *Canadian Journal of Psychiatry*, *53*, 52–60. doi:10.1177/070674370805300108

Laub, J. H. et R. J. Sampson (2003). *Shared Beginnings, Divergent Lives: Delinquent Boys to Age 70*. Cambridge: Harvard University Press.

Laub, J. H., & Sampson, R. J. (1993). Turning points in the life course: Why change matters to the study of crime. *Criminology*, *31*, 301–325. doi:10.1111/j.1745-9125.1993.tb01132.x

Leblond, J., Ladouceur, R., & Blaszczynski, A. (2003). Which pathological gamblers will complete treatment? *British Journal of Clinical Psychology*, *42*, 205–209. doi:10.1348/014466503321903607

Ledgerwood, D. M., & Petry, N. M. (2006). What do we know about relapse in pathological gambling? *Clinical Psychology Review*, *26*, 216–228. doi:10.1016/j.cpr.2005.11.008

Lesieur, H. R. (1977). *The chase: Career of the compulsive gambler*. Oxford, England: Anchor.

Lesieur, H. R., & Blume, S. B. (1991). Evaluation of patients treated for pathological gambling in a combined alcohol, substance abuse and pathological gambling treatment unit using the Addiction Severity Index. *Addiction*, *86*, 1017–1028. doi:10.1111/j.1360-0443.1991.tb01863.x

Lesieur, H. R., & Rosenthal, R. J. (1991). Pathological gambling: A review of the literature (prepared for the American Psychiatric Association task force on DSM-IV committee on disorders of impulse control not elsewhere classified). *Journal of Gambling Studies*, *7*, 5–39.

Livingston, J. (1974). *Compulsive gamblers: Observations on action and abstinence*. New York, NY: Harper Torchbooks.

Luke, D. A. (2004). *Multilevel modeling*. (*Quantitative applications in the social sciences*, Vol. 143). Thousand Oaks, CA: Sage.

Maccallum, F., & Blaszczynski, A. (2002). Pathological gambling and comorbid substance use. *Australian & New Zealand Journal of Psychiatry*, *36*(3), 411-415. doi:10.1046/j.1440-1614.2002.01005.x

MacKenzie, D. L., & Li, S. D. (2002). The impact of formal and informal social controls on the criminal activities of probationers. *Journal of Research in Crime and Delinquency*, *39*, 243–276.

Matza, D. (1964). *Delinquency and drift*. New York, NY: Wiley.

McGloin, J. M., Sullivan, C. J., Piquero, A. R., & Pratt, T. C. (2007). Explaining qualitative change in offending: revisiting specialization in the short-term. *Journal of Research in Crime and Delinquency*, *44*, 321–346. doi:10.1177/0022427802039003O1

Meyer, G., & Fabian, T. (1992). Delinquency among pathological gamblers: A causal approach. *Journal of Gambling Studies*, *8*, 61–77. doi:10.1007/BF01881469

Morselli, C., & Tremblay, P. (2010). Interviewing and validity issues in self-report research with incarcerated offenders: The Quebec inmate survey. In W. Bernasco, *Offenders on offending: Learning about crime from criminals* (pp. 68–83). Cullompton, England: Willan.

Oei, T. P., & Gordon, L. M. (2008). Psychosocial factors related to gambling abstinence and relapse in members of gamblers anonymous. *Journal of Gambling Studies*, *24*, 91–105. doi:10.1007/s10899-007-9071-7

Ouellet, F. (2018). Stop and go: Explaining the timing of intermittency in criminal careers. *Crime & Delinquency*, 1–27. doi:10.1177/0011128717753114

Ouellet, F., & Bouchard, M. (2017). Only a matter of time? The role of criminal competence in avoiding arrest. *Justice Quarterly*, *34*, 699–726. doi:10.1080/07418825.2016.1219761

Ouellet, F., & Tremblay, P. (2014). Épisodes d'inactivité et revenus criminels dans une trajectoire de délinquance. *Canadian Journal of Criminology and Criminal Justice*, *56*, 527–562. doi:10.3138/CJCCJ.2013.F02

Piquero, A. R., Farrington, D. P., & Blumstein, A. (2003). The criminal career paradigm. *Crime and Justice*, *30*, 359–506. Retrieved from: http://users.soc.umn.edu/∼uggen/Piquero_CJ_03%20(rec%20only).pdf

Piquero, A. R., Farrington, D. P., & Blumstein, A. (2007). *Key issues in criminal career research: New analyses of the Cambridge Study in Delinquent Development*: Cambridge, England: Cambridge University Press.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods: Vol 1*. 2nd ed. Thousand Oaks, CA: Sage.

Raylu, N., & Oei, T. P. (2002). Pathological gambling: A comprehensive review. *Clinical Psychology Review*, *22*, 1009–1061. doi:10.1016/j.neubiorev.2004.03.001

Rozon, L. (1987). *Les joueurs compulsifs et leurs moyens de financement* (Master's thesis). Montreal: École de criminologie, Université de Montréal.

Russo, A. M., McCormick, R. A., Ramirez, L. F., & Taber, J. I. (1984). An outcome study of an inpatient treatment program for pathological gamblers. *Psychiatric Services*, *35*, 823–827. doi:10.1176/ps.35.8.823

Sampson, R. J., & Laub, J. H. (1990). Crime and deviance over the life course: The salience of adult social bonds. *American Sociological Review*, 609-627. doi:10.2307/2095859

Sampson, R. J., & Laub, J. H. (1995). *Crime in the making: Pathways and turning points through life*. Cambridge, MA: Harvard University Press.

Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *American Journal of Public Health*, *89*, 1369–1376. doi: 10.2105/AJPH.89.9.1369. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1508762/

Slutske, W. S., Jackson, K. M., & Sher, K. J. (2003). The natural history of problem gambling from age 18 to 29. *Journal of Abnormal Psychology*, *112*, 263. doi:10.1037/0021-843X.112.2.263

Steel, Z., & Blaszczynski, A. (1998). Impulsivity, personality disorders and pathological gambling severity. *Addiction*, *93*, 895–905. doi:10.1046/j.1360-0443.1998.93689511.x

Sutton, J. E., Bellair, P. E., Kowalski, B. R., Light, R., & Hutcherson, D. T. (2011). Reliability and validity of prisoner self-reports gathered using the life event calendar method. *Journal of Quantitative Criminology*, *27*,151–171. doi:10.1007/s10940-010-9101-y

Taber, J. I., McCormick, R. A., Russo, A. M., Adkins, B. J., & Ramirez, L. F. (1987). Follow-up of pathological gamblers after treatment. *The American Journal of Psychiatry*, *144*, 757–61. doi:10.1176/ajp.144.6.757

Templer, D. I., Kaiser, G., & Siscoe, K. (1993). Correlates of pathological gambling propensity in prison inmates. *Comprehensive Psychiatry*, *34*, 347–351. doi:10.1016/0010-440X(93)90022-V

Thygesen, K. L., & Hodgins, D. C. (2003). Quitting again: Motivations and strategies for terminating gambling relapses. *Journal of Gambling Issues*, *9*. doi:10.4309/jgi.2003.9.11. Retrieved from: http://jgi.camh.net/index.php/jgi/article/view/3634/3594

Uggen, C., & Thompson, M. (2003). The socioeconomic determinants of ill-gotten gains: Within-person changes in drug use and illegal earnings 1. *American Journal of Sociology*, *109*, 146–185. doi:10.1086/378036

Van Der Leeden, R. (1998). Multilevel analysis of repeated measures data. *Quality and Quantity*, *32*, 15–29. doi:10.1023/A:100423322

Viets, V. L., & Miller, W. (1997). Treatment approaches for pathological gamblers. *Clinical Psychology Review*, *17*, 689–702. doi:10.1016/S0272-7358(97)00031-7

Villella, C., Martinotti, G., Di Nicola, M., Cassano, M., La Torre, G., Gliubizzi, M. D., … & Conte, G. (2011). Behavioural addictions in adolescents and young adults: Results from a prevalence study. *Journal of Gambling Studies*, *27*, 203–214. doi:10.1007/s10899-010-9206-0

Vitaro, F., Arseneault, L., & Tremblay, R. E. (1997). Dispositional predictors of problem gambling in male adolescents. *American Journal of Psychiatry*, *154*(12), 1769-1770.

Vitaro, F., Arseneault, L., & Tremblay, R. E. (1999). Impulsivity predicts problem gambling in low SES adolescent males. *Addiction*, *94*, 565–575. doi:10.1046/j.1360-0443.1999.94456511.x

Vitaro, F., Brendgen, M., Ladouceur, R., & Tremblay, R. E. (2001). Gambling, delinquency, and drug use during adolescence: Mutual influences and common risk factors. *Journal of Gambling Studies*, *17*, 171–190. doi:10.1023/A:1012201221601

Walker, M. B. (1993). Treatment strategies for problem gambling: A review of effectiveness. *Gambling behavior and problem gambling*, 533-566.

Wanner, B., Vitaro, F., Carbonneau, R., & Tremblay, R. E. (2009). Cross-lagged links among gambling, substance use, and delinquency from midadolescence to young adulthood: Additive and moderating effects of common risk factors. *Psychology of addictive behaviors*, *23*, 91–104.

Wellford, C. (2001). When it's no longer a game: Pathological gambling in the United States. *National Institute of Justice Journal*, 14–18. doi:10.1037/a0013182

Welte, J., Barnes, G., Wieczorek, W., Tidwell, M.-C., & Parker, J. (2001). Alcohol and gambling pathology among US adults: Prevalence, demographic patterns and comorbidity. *Journal of Studies on Alcohol*, *62*, 706–712. doi:10.15288/jsa.2001.62.706

Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M.-C. O., & Parker, J. C. (2004). Risk factors for pathological gambling. *Addictive Behaviors*, *29*, 323–335. doi:10.1016/j.addbeh.2003.08.007

Willett, J. B., Singer, J. D., & Martin, N. C. (1998). The design and analysis of longitudinal studies of development and psychopathology in context: Statistical models and methodological recommendations. *Development and Psychopathology*, *10*, 395–426. Retrieved from: http://gseacademic.harvard.edu/~willetjo/pdf%20files/Willett%20Singer%20&%20Martin%201998.pdf

Williams, R. J., Volberg, R. A., & Stevens, R. M. G. (2012). *The population prevalence of problem gambling: Methodological influences, standardized rates, jurisdictional differences, and worldwide trends.* Report prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. Retrieved from: https://www.uleth.ca/dspace/bitstream/handle/10133/3068/2012-PREVALENCE-OPGRC%20(2).pdf?sequence=3 e

Wooldredge, J., Griffin, T., & Pratt, T. (2001). Considering hierarchical models for research on inmate behavior: Predicting misconduct with multilevel data. *Justice Quarterly*, *18*, 203–231. doi:10.1080/07418820100094871

****

Submitted August 26, 2017; accepted June 19, 2018. This article was peer reviewed. All URLs were available at the time of submission.

For correspondence: Frédéric Ouellet, Ph.D., School of Criminology, Université de Montréal, C.P. 6128, succursale Centre-ville, Montréal, QC Canada: E-mail: frederic.ouellet.1@umontreal.ca

Competing interests: None declared (all authors).

Ethics approval: Université de Montréal – Comité d'éthique de la recherche en arts et en sciences (CÉRAS) / Ethics Committee for Research in Arts and Sciences (CÉRAS) during the academic year 2005-2006, the research project "Étude sur la délinquance des joueurs pathologiques et leur propension à participer aux activités de jeux et de paris illégaux."(56006).

Acknowledgements: The authors wish to acknowledge the anonymous reviewers for their very helpful comments.