

Does Early Emotional Distress Predict Later Child Involvement in Gambling?

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Objective: Younger people are engaging in gambling, with some showing excessive involvement. Although a consequence of gambling could be anxiety and depression, emotional distress could be a precursor to gambling involvement. This could reflect developmental proneness toward problem behaviour. We assessed whether early emotional distress directly influences later gambling or if it operates through an indirect pathway.

Methods: Using a prospective longitudinal design, an intentional subsample of children from the 1999 kindergarten cohort of the Montreal Longitudinal Preschool Study (Quebec) from intact families were retraced in 2005 for follow-up in Grade 6. Consenting parents and children were separately interviewed. Key child variables and sources included kindergarten teacher ratings of emotional distress and impulsivity and self-reported parent and child gambling.

Results: Higher levels of teacher-rated emotional distress in kindergarten significantly predicted a higher propensity toward later gambling behaviour. Impulsivity, a factor often comorbidly present with emotional distress, completely explained this predictive relation above and beyond potential child- and family-related confounds, including parental gambling.

Conclusions: Children with higher levels of emotional distress at kindergarten were more inclined toward child gambling behaviour in Grade 6. The influence of early emotional distress completely vanished when behaviours reflecting impulsivity were considered when predicting later child gambling behaviour. The relation between emotional distress and child gambling involvement in children was thus explained by its comorbidity with early impulsivity. This study does not rule out the possibility that emotional distress could become a correlate or consequence of excessive involvement in gambling activities at a later developmental period.

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Clinical Implications

- Although early childhood emotional distress might have consequences, it was not found to be a risk factor for later child gambling involvement.
- Given the relation between youthful gambling and adult affliction, our study suggests how teacher-identified problematic child behaviours such as inattention, distractibility, and restlessness can potentially unravel into an important public health issue.
- Our findings add gambling involvement to the list of outcomes associated with childhood behaviour problems which include high school dropout, substance use problems, and delinquency.

Limitations

- The extent to which attrition, which is common in longitudinal designs, affects the findings is unknown.
- The clinical significance of the key measures in our study might also be limited. With the exception of the gambling outcome, the impulsivity and emotional distress factors were assessed using teacher reports rather than observations.

Key Words: youth gambling, emotional distress, anxiety, impulsivity, risk taking, attention

The risks associated with excessive gambling translate into considerable personal and societal costs.¹ Many of today's youth report gambling as a frequent activity.² Yet, while most people gamble in a responsible manner, others show excessive activity. More than ever, adolescents and young adults are engaging in at-risk, problematic, and PG.¹

This behaviour is disconcerting for 2 reasons. Young people who begin gambling at an early age have greater chances of experiencing more severe gambling problems during adulthood.³ Secondly, youth seem more vulnerable than adults to negative gambling-related health, psychological, and social consequences^{1,4} including suicidality.⁵ Compared with their nongambling peers, adolescent gamblers also report significantly more problematic consumption of alcohol and drugs and symptoms corresponding to lifetime major depression.⁶ Although these are mere linkages, they do underscore the frequent observation that problem behaviours tend to cluster in the same people.³

Depression has been shown to be clearly associated with problem gambling and PG.⁴ Unfortunately, cross-sectional studies have not been able to shed any light on the nature of this comorbidity, thus raising the chicken-and-egg issue regarding directionality of effects. A consequence of gambling could be a chronic anxious and depressed mood. Conversely, emotional and behavioural problems can promote developmental proneness toward maladjustment, translating into a wider array of risk behaviours during adolescence, including gambling.⁷ Thus emotional distress could, in this case, pave the way toward later gambling behaviour.

Is distress a precursor or consequence of gambling involvement? If early emotional distress does not predict later gambling involvement, then it could likely be a consequence. However, if emotional distress prospectively predicts subsequent gambling in longitudinal studies, then it could be a precursor. This is especially the case if emotional distress was present at a time when gambling involvement was absent. Thus the term precursor is appropriate when emotional distress is measured at a time that predates any gambling involvement.

An essential part of understanding developmental pathways would be to better understand what predates youthful gambling. Although affective disorders are associated features of

PG in adults,⁴ this diagnosis is currently considered an impulse-control disorder.⁸ Similarly, impulsivity and its associated executive functioning components represent an important component of ADHD.⁸ It is not surprising that PG shares comorbid links with ADHD in adults.^{9,10} In fact, our recent study¹¹ found that early childhood impulsivity predicted gaming behaviour in children aged as young as 11 years. It is noteworthy that emotional distress is often associated with ADHD symptomatology in children.^{12,13} Earlier emotional distress could, in this case, impact later gambling involvement through its association with impulsivity. However, if emotional distress remains a predictor when other comorbid factors such as impulsivity are taken into account, then we are securing a direct effect, thus resolving an important directionality issue.

In our paper, we examine how early childhood emotional distress, rated by kindergarten teachers, predicts self-reported gambling behaviour in typically developing children during Grade 6. We also examine whether impulsive behaviour, reflecting frequent inattention, distractibility, and restlessness in the classroom, plays a role in the link between early emotional distress and later gaming behaviour in children.

Methods

Participants

Participants, living in lower SES areas of Montreal, were from the 1999 cohort of the MLPS.¹¹ This kindergarten cohort represents one-third of its catchment area and was actually selected following a multilevel consent process involving school board administrators, local school committees, and teachers. Once consent was obtained by parents in the fall of 1999 ($n = 467$), they were requested to complete survey materials. Their kindergarten children were assessed individually and by their teachers.

In the spring of 2005, a small research project on parent-child gambling involvement concerning an intentional subsample of MLPS children from intact families was approved by the ethics board of the Université de Montréal and the Centre de Recherche de l'Hôpital Sainte-Justine. The original 1999 kindergarten-entry cohort was selected for this purpose, mainly because children would be in Grade 6 in the fall of 2005. This was advantageous given that the previous youth gambling prevalence had been reported for children aged 12 years.^{4,9} Parental consent was requested for eligibility to participate in a follow-up study of kindergarten children from intact families as an intentional selection constraint for follow-up ($n = 377$). Although this design decision was mostly driven by budgetary constraints, we also found it desirable to have information on gambling involvement for both natural parents. A divorce during the course of the longitudinal study of child development often results in parental absence (usually the father) as a cause of attrition. Exclusively assessing children from intact families afforded methodological strength in that it not only balanced out some of the disadvantage issues but also restrained any possible

Abbreviations used in this article

ADHD	attention-deficit hyperactivity disorder
MLPS	Montreal Longitudinal Preschool Study
NLSCY	National Longitudinal Study of Children and Youth
PG	pathological gambling
SBQ	Social Behavior Questionnaire
SES	socioeconomic status

influence of unmeasured family or parental correlates of single-parenthood that could have confounded our observations. As such, 181 children from intact families for follow-up were recruited.

Telephone interviews of parents and children were conducted 6 years after the initial assessments. The criteria for our study ($n = 163$, 53% boys) required that the participant had complete data in kindergarten (mean age 5.5 years, SD 3 months) and Grade 6 (mean age 11.5 years, SD 3 months) for the 2 key variables.

Nonretained cases for analyses are attributable to incomplete child ($n = 6$) or parental gambling data ($n = 12$) at follow-up. Although there are socioeconomic differences between the larger MLPS and its subsample intended for this study (maternal education is higher for the selected sample, $P > 0.05$), there are no remarkable differences between the subsample intended for study ($n = 181$) and the subsample that was finally retained for data analysis on the key sociodemographic, family functioning, and behavioural characteristics that were measured.

Measures: Dependent Variable

Child Gambling Behaviour. This 5-item scale generates a global construct of child involvement in gambling in the past year. When children were in Grade 6, they were asked, "How often have you done the following for money or prizes?": cards (14% of the sample had participated to some degree); bingo (7.9%); purchased lottery draw tickets, instant lottery tickets (scratch and win), or sports lottery (4%); played video games or video poker (for example, arcades) (13%); and wagered on sports venues with friends or activities that require skill (for example, billiard, pool, or bowling) (8%). Responses ranged from never (0), less than once per month (1), 1 to 3 times per month (2), to once per week or more (3). The total score ranged between 5 and 15, with higher scores indicating greater levels of gambling behaviour ($\alpha = 0.75$, average score = 6.4, SD 1.37).

Measures: Independent Variable

Early Emotional Distress. Kindergarten teachers completed the SBQ, comprising numerous factors that assess children's behavioural adjustment in the classroom. The dependent measure comprises the emotional distress SBQ factor ($\alpha = 0.81$), which represents a composite of depressive (that is, seems unhappy, sad, or depressed; cries a lot) and anxious symptoms (seems worried or fearful, seems anxious, is nervous or tense). Referring to children's typical classroom behaviour, teachers rated behavioural frequency on a scale of 1 (often or very true) to 3 (never or not true). These were reverse-scored (except for the negatively worded attentive items) and then summed. A higher value on the scale indicates a higher degree of teacher-reported emotional distress. Factors from the SBQ provide reliable estimates of current and later psychosocial and academic adjustment.¹⁴⁻¹⁶ Norms from ages 2 to 18 years are available and established in the NLSCY.

Measures: Covariates

Sex. Given reported sex differences for both gambling and ADHD,¹⁷⁻¹⁹ this information was viewed as critical in our data analytic strategy.

Maternal Education. Although indicators of SES do not seem to play a role in risk for ADHD or gambling, this variable acts as a proxy for numerous often unmeasured, endogenous parental characteristics, such as economic resources, motivation, perseverance, cognitive stimulation, and achievement orientation in the home environment that are associated with proneness to problem behaviour in youth.⁷ Parents completed a sociodemographic questionnaire when children were in kindergarten.

Family Dysfunction. Problems in the home have been shown to be associated with both ADHD and gambling.^{18,20} When their children were in kindergarten, mothers completed a 12-item scale established in NLSCY. This scale generates a global construct of family functioning, such as problem solving, communication, roles, affective involvement, affective responsiveness, and self-regulation in times of conflict. The unit of analysis for this Likert-response scale is the family: strongly agree, agree, disagree, or strongly disagree, ranging from 0 to 3.^{21,22} The total score varies between 0 and 36, with higher scores indicating greater levels of family dysfunction ($\alpha = 0.88$).

Parental Gambling Involvement. There is an abundance of research on the intergenerational transmission of problem behaviours,²³ ADHD,²⁴ and gambling.²⁵ This 4-item scale generates a general construct of parental gambling involvement for money or prizes using a past-year time frame. When their children were in Grade 6, one parent responded to the following interview question: "How often have you and your spouse played the following activities?": cards (6.3% mothers and 8.1% fathers had participated in the past year); slot machines or video lottery terminals (4.4% mothers, 3.8% fathers); lottery (21.9% mothers, 21.3% fathers); and casino games (12.5% mothers, 10.6% fathers). Responses range from never (0), less than once per month (1), 1 to 3 times per month (2), to once per week or more (3). The items were answered by the mother and then for the respective spouse. Given that the scale addresses both parents, the total score varies between 4 and 24, with higher scores indicating greater levels of parental gambling behaviours ($\alpha = 0.58$).

Measures: Intermediate Variable

Early Impulsivity. Depressive symptomatology and ADHD often coexist¹¹ as do depression and gambling.⁶ Emanating from the kindergarten teacher SBQ ratings, our mediator variable captures a 9-item global impulsivity factor comprising inattentive, distractible, and hyperactive classroom behaviours (overall $\alpha = 0.91$): inattentive (2 items: inattentive, does not listen attentively, $\alpha = 0.81$); distractible (2 items: easily distractible, unable to concentrate, $\alpha = 0.82$); and hyperactive (5 items: seems agitated and has difficulty staying in one place, keeps moving, seems impulsive, has

Table 1 Pertinent child and family characteristics for participants retained for analysis (n = 163)

Sociodemographic variable	Mean (SD)
Family income when child was in kindergarten, Can\$	25 000 (5000)
Family size when child was in kindergarten	3.89 (1.26)
Maternal age at birth of child, years	25.34 (5.10)
Maternal education (\geq Grade 1)	12.57 (3.76)
Paternal education (\geq Grade 1)	12.86 (3.61)
Family functioning when child was in Grade 6	19.62 (5.01)
Population averages for these variables are available ¹³	

difficulty waiting his or her turn, or difficulty staying calm, $\alpha = 0.90$). Impulsivity is rated and interpreted such that higher values correspond to a higher frequency of classroom behaviours associated with ADHD.

Data Analytic Strategy

We begin by estimating a simple ordinary least-squares regression, in which child gambling behaviour in Grade 6 is regressed on kindergarten emotional distress. Our interest is in correctly modelling this linear relation, which can be interpreted as the impact of early childhood emotional distress on later childhood behaviours that are, in principle, precursors to adolescent gambling involvement. Once this link has been established, the next step is to ensure that we have accounted for the possibility of omitted variable bias, which is likely to arise if unobserved family or child characteristics are statistically or substantively correlated with our key variables. To secure an unbiased estimation of predictive power of the emotional distress variable, the model was reevaluated while taking into account child factors (sex and early impulsive behaviour) and family factors (maternal education, family dysfunction, and an estimation of parental gambling involvement). These controls can alternatively be viewed as potential explanations of the relation previously tested in the simple model. The results bear upon this fully controlled equation:

$$CGB_{i6GR} = a_1 + \beta_1 ED_{iKE} + \gamma_1 CHILD_{iKE} + \gamma_2 FAMILY_{iKE} + e_{it}$$

where a and e represent the intercept and stochastic error, respectively. Finally, we test for any indirect effects suggested by the fully controlled model.

Results

Descriptive statistics for the pertinent child and family characteristics are reported in Table 1. The preliminary results revealed a significant bivariate correlation between the 2 key variables of interest (standardized $\beta = 0.20$, $SE = 0.03$, $P <$

0.001). A 1-unit increase in emotional distress predicted a 0.20 unit increase in later gambling behaviour in children, holding constant all other variables in the model. However, as reported in Table 2, emotional distress, which was hypothesized to be an important predictor, no longer significantly predicted gambling behaviour when impulsivity was included in the fully controlled model, $F = 3.44$, $df = 6, 111$, $P < 0.01$ ($R^2 = 0.16$, Multiple $R^2 = 0.40$). This final result justified testing for the indirect effect of impulsivity in the relation between the 2 variables of interest.

The amount of mediation, or indirect effect, is defined as the reduction of the effect of our early childhood independent variable on the later outcome at Grade 6. There are 4 required steps in establishing mediation²⁶: early emotional distress must predict gambling behaviour, emotional distress must also predict impulsivity, impulsivity must predict later gambling, and finally, to establish that impulsivity explains the relation between early emotional distress and later gambling, the predictive effect of emotional distress on gambling should become unimportant when controlling for impulsivity. Ideally, the effects in both Steps 3 and 4 are estimated in the same equation (Table 2, Model 3).

Because all 4 criteria were successfully met, the results suggest that the measure of impulsivity completely mediates or explains the relation between emotional distress and gambling. Several critical ratio tests to statistically verify this indirect effect were computed. Impulsivity was clearly established as a full mediator (Sobel test = 2.57, $P < 0.01$; Aroian test = 2.55, $P < 0.01$; Goodman test = 2.59, $P < 0.01$).

Interpretation

Youthful gambling involvement has become an important public health issue in both social science and medicine.^{2,3} The associated risks translate into considerable personal, psychological, and societal costs. Some children aged as young as 11 years are engaging in a wide diversity of gambling activities.¹¹

As this field of research becomes more concerned with child development, the urge to address early predictors from concomitants becomes stronger. Because mood disorders are associated features of PG as a diagnostic classification in adults, it was realistic to suspect that its correlates could predate any signs of gambling.⁴ Indeed, higher levels of early emotional distress in kindergarten forecasted a higher propensity toward later child gambling behaviour. However, further testing revealed that this relation is completely explained by its comorbidity with early impulsivity. That is, the influence of emotional distress completely vanished when impulsivity was considered in the equation predicting later child involvement in gambling activities. This truly prospective association between early impulsivity and later child gambling behaviour, during a 6-year period, is above and beyond important confounds that are not often considered in past research. Impulsivity reflects a lack of inhibitory control and cognitive self-regulation of attention.¹¹ This

Table 2 Results from a series of regression equations addressing the relation between early emotional distress and later gambling in Grade 6. Model 3 addresses the role of early impulsivity

Variable	Model 1	Model 2	Model 3
Emotional distress	0.20 (0.03) ^a	0.21 (0.03) ^b	0.14 (0.06)
Sex		0.15 (0.22)	0.10 (0.22)
Family functioning		0.03 (0.02)	0.02 (0.02)
Maternal education		0.12 (0.23)	0.11 (0.22)
Parental gambling		0.06 (0.30)	0.05 (0.15)
Impulsivity			0.25 (0.02) ^a
R ²	0.04	0.10	0.16

^a *P* < 0.01
^b *P* < 0.05

developmental finding adds more support to the adult conceptualization, classification, and diagnosis of PG as an impulse-control disorder.⁸

Kindergarten behaviours characterized by inattentiveness, distractibility, and restlessness represent a vulnerability factor for earlier than average gambling involvement in middle childhood. In both adults and children, problems of impulsivity relate to abnormalities in risk estimation, decision-making, and feedback processing.²⁷ Such executive control activities recruit the orbitofrontal cortex, the anterior cingulate cortex, and the dorsolateral and medial prefrontal cortices.²⁸ Interestingly, children with ADHD show significant abnormalities in the neural substrates associated with decision-making and reward processing during guessing and gambling, to the extent that they react inefficiently to incorrect guessing and unexpected losses.²⁹ This evokes a vicious circle of ineffective self-assessment and self-regulation processes, similar to what has been observed among adult pathological gamblers with a childhood history of ADHD.³⁰ Childhood impulsivity, if not eventually outgrown, likely snowballs into cumulative risks for youngsters who become involved in gambling as a leisurely activity, thus charting a possible course toward more extensive, problematic gambling involvement in adolescence and emerging adulthood.¹¹

The results underscore the importance of early, timely, and effective clinical strategies. Early childhood preventive interventions, often implemented before parenting and child behaviours become habitual, offer the promise of better long-term benefits for both the person and society as a whole.^{31–34} Early childhood represents a critical developmental period in the acquisition of cognitive and emotional self-regulation,³⁵ as there is remarkable growth in the brain regions recruited for executive function.³⁶ This critical period has direct clinical implications for preventive intervention as an important strategy in circumventing or moderating long-term risks associated with impulsivity. For example,

executive function training prior to first grade represents a good investment because it tends to influence more general improvements in learning and social skills during the transition kindergarten.³⁷ This could be done with children with ADHD^{38,39} or more universal applications of inhibitory control training in typically developing preschool children in the general population.⁴⁰

Although we addressed directionality and mediation issues, the research design precludes resolving causal issues. Our study does not rule out the intuitively sensible possibility that emotional distress could become a correlate or consequence of excessive gambling involvement at a later developmental period. That is, our early childhood design does not preclude the likely possibility that emotional distress represents both a concomitant and an eventual consequence of problematic gambling in adolescence.

Unfortunately, the data set did not include formal criteria for assessing developmental psychopathology at age 5 years. Large population-based studies provide a portrait of the multitude of variations in typical development. Currently, we know of no other longitudinal study that comprises early childhood diagnoses and later measures of gambling behaviour. We encourage others concerned with this objective to extend these findings with more rigorous, population-based, prospective analyses of data emanating from multiple sources.

Our study builds on previous research on youth gambling, which tends to be cross-sectional, often focused on adolescence and adulthood, and generally fails to consider numerous possible alternative explanations for its findings. Using a developmental approach, we clarify that early emotional distress as measured by kindergarten teachers, as a stand alone characteristic, does not account for middle childhood involvement in gambling activities. We instead offer impulsivity as a solid early developmental marker. While it is likely that early emotional distress is more difficult to assess

and possible that teachers are less well trained to identify its features, it is also likely that they have similar difficulty assessing some aspects of inattention and distractibility. It is also very plausible that because restlessness is more observable than some aspects of sadness and anxiety, this may have added more weight to our impulsivity measure in the analyses. To examine this alternative explanation, we conducted some background analyses by removing the restlessness (thus more observable) items, and found very similar coefficients, ensuring more confidence in the results.

One could also question the clinical significance of the key measures in our study. With the exception of the gambling outcome, the impulsivity and emotional distress factors from the SBQ have been established as long-term predictors of maladjustment in a multitude of studies emanating from Montreal with French-Canadian children.^{13–16,33} Therefore, there is evidence of predictive validity and a great deal of developmental continuity in the underlying factor structure of our early childhood measures. Although the gambling outcome measure has been established in cross-sectional studies⁴¹ of slightly older children, its use in our design represents an innovation that awaits its true verdict in terms of predictive validity and clinical significance. It remains to be seen how much of the Grade 6 gambling measure translates into later clinical problems during adolescence. The longitudinal scope of our dataset offers the possibility to study normative and nonnormative behaviour. Our findings suggest how the nature and course of early child development relates to excessive gambling beyond childhood.

The neighborhoods were identified as disadvantaged because the schools offered free breakfasts. This program is in effect only in districts where welfare and unemployment are more prevalent. Leisurely venues involving games of chance have been shown to be more densely distributed in impoverished districts.^{42,43} As such, the social ecology presented by our sample offers a natural laboratory in which to examine the developmental precursors of gambling in youngsters. We nevertheless applied generous statistical controls to minimize any existing bias and rule out any concerns about generalizability. Any bias regarding disadvantage was also counterbalanced by the methodological constraints involving the consent process in longitudinal studies and we opted to only interview children from intact families. Although driven by budgetary constraints, the use of intact families renders the interpretation of our results quite conservative.

Although emotional distress might somehow occur concurrently with gambling behaviour or arise as a consequence of it, our study suggests that it is not a related causal factor or precursor. Rather, its comorbidity with impulsivity does seem to account for its association with child gambling involvement. Frequent hyperactive, inattentive, and distractible behaviours in childhood have also been associated with numerous long-term consequences, including underachievement and high school dropout, substance use, and delinquency.^{12,16,44} Be it a consequence or a correlate of early childhood

behaviour, there is reason to believe that earlier than average youth gambling can unravel into a costly public health issue if not prevented.⁴

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Résumé : La détresse émotionnelle précoce prédit-elle la participation ultérieure de l’enfant au jeu de hasard?

Objectif : Les jeunes gens s’adonnent au jeu de hasard, et certains, de façon excessive. Bien qu’une conséquence du jeu puisse être l’anxiété et la dépression, la détresse émotionnelle pourrait être un précurseur de la participation au jeu, ce qui pourrait refléter une propension développementale à un problème de comportement. Nous avons évalué si la détresse émotionnelle précoce influence directement le jeu ultérieur ou si elle fonctionne par une voie indirecte.

Méthodes : À l’aide d’une méthode prospective longitudinale, un sous-échantillon intentionnel d’enfants d’une cohorte de la maternelle de l’Étude expérimentale de type longitudinal de 1999, effectuée à Montréal (Québec), issus de familles intactes ont été retrouvés en 2005 pour un suivi en 6^e année. Les parents et les enfants consentants ont été interviewés séparément. Les variables et les sources principales concernant les enfants comprenaient les cotes de détresse émotionnelle et d’impulsivité de l’enseignant de la maternelle ainsi que le jeu auto-déclaré par les parents et les enfants.

Résultats : Des niveaux élevés de détresse émotionnelle cotés par l’enseignant de la maternelle prédisaient significativement une plus grande propension à un comportement de jeu ultérieur. L’impulsivité, un facteur souvent comorbide de la détresse émotionnelle, expliquait complètement cette relation prédictive plus que les facteurs confusionnels potentiels liés à l’enfant et à la famille, y compris le jeu parental.

Conclusions : Les enfants ayant des niveaux élevés de détresse émotionnelle à la maternelle étaient plus enclins à un comportement de jeu de l’enfant en 6^e année. L’influence de la détresse émotionnelle précoce disparaissait complètement lorsque les comportements reflétant l’impulsivité étaient pris en compte pour prédire le comportement de jeu ultérieur de l’enfant. La relation entre la détresse émotionnelle et la participation au jeu chez les enfants s’expliquait donc par la comorbidité de l’impulsivité précoce. Cette étude n’écarte pas la possibilité que la détresse émotionnelle puisse devenir un corrélât ou une conséquence de la participation excessive à des activités de jeu de hasard à une période du développement ultérieure.