

A Prospective Study of Youth Gambling Behaviors

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Little is known about the course and outcomes of adolescent gambling. This prospective study describes findings from a 3-wave (Time 1 [T1], Time 2 [T2], and Time 3 [T3]) assessment of gambling behaviors among youth ($N = 305$). Stable rates of any gambling and regular gambling (weekly or daily) were observed across T1, T2, and T3. The rate of at-risk gambling significantly increased at T3 (young adulthood), whereas the rate of problem gambling remained stable over time. Several adolescent risk factors were associated with either T3 at-risk or problem gambling, many of which are risk factors for adolescent substance abuse. Findings suggest that important to the origins of young adult gambling problems are risk factors associated with the problem behavior syndrome of adolescence.

The rapid expansion and societal acceptance of legalized and high-stakes gambling have raised concerns among public health officials and researchers that underage gambling represents an elevated risk for the eventual development of problem gambling (Jacobs, 1989; National Research Council, 1999). These concerns have been advanced along three lines of evidence: epidemiological data on the prevalence of gambling involvement, epidemiological estimates of problem or pathological gambling, and cross-sectional studies on the psychosocial correlates of youth gambling. The epidemiological data suggest that youth gambling, like many behaviors during adolescence, occurs on a frequency continuum, ranging from no involvement to experimentation, occasional gambling, regular gambling, and preoccupation with serious adverse consequences (Stinchfield & Winters, 1998). Most youth have gambled at some time and typically at an early age, oftentimes in grade school (Ladouceur, Dube, & Bujold, 1994). Participation in legalized games is not uncommon (Winters, Stinchfield, & Fulkeron, 1993a), boys are more involved in gambling than girls, and older youth tend to gamble more often than younger teen-agers (e.g., Acuri, Lester, & Smith, 1985). Some studies have found racial-ethnic differences in youth gambling (Wallisch, 1993; Zitzow, 1996), including a recent study of Minnesota youth in which White and Asian high school students reported lower rates of gambling than the other ethnic groups (Stinchfield, Cassuto, Winters, & Latimer, 1997).

A small but appreciable percentage of adolescents appears to be overinvolved with gambling. Jacobs (1989) estimated from his review that 4%–6% of adolescents are experiencing serious gambling problems. Shaffer and Hall (1996), in their comprehensive

review of all adolescent-prevalence studies, gave a similar estimate of between 4% and 7% of youth who display a serious gambling problem. In comparison, adults have prevalence rates of pathological gambling between 1% and 3% (American Psychiatric Association, 1994). Whether the definitions and measures of adolescent problem gambling are equivalent to adult measures of pathological gambling is still an open research question (National Research Council, 1999).

Finally, there is a growing literature on the psychosocial and behavioral correlates of youth gambling. Several cross-sectional studies have shown links between adolescent problem gambling and several individual characteristics, including substance abuse, juvenile delinquency, school problems, psychological problems, being victimized by sexual or physical abuse, parental history of gambling problems, and being male (National Research Council, 1999; Stinchfield & Winters, 1998; Wallisch, 1993).

The literature is lacking investigations of the long-term consequences and outcomes of adolescent gambling. To our knowledge, only one longitudinal study of youth gambling has been reported in the literature that examined whether adolescent gambling represents vulnerability for future problems (Winters, Stinchfield, & Kim, 1995). All participants were underage gamblers for the first-wave assessment, and about half of them had reached the legal gambling age (18 years or older) by the follow-up assessment. Overall rates of general gambling and problem severity, defined by an elevated cutoff score on an adolescent version of the South Oaks Gambling Screen (South Oaks Gambling Screen—Revised Adolescent [SOGS-RA]; Winters, Stinchfield, & Fulkeron, 1993b), did not change across the 1.5-year interval. However, a preference for legal games significantly increased, particularly for the legal-age respondents, whereas many informal and unregulated games, such as playing games of personal skill, significantly decreased. The authors interpreted the findings as reflecting a preference shift toward the more high-stakes games rather than an indication of significant increases in gambling involvement.

The present study focuses on the description of gambling behaviors on a subgroup of this prospective cohort for which a third assessment was conducted at the Year 8 point ($N = 305$). We describe trends in gambling involvement and problem severity across the three time points and the extent to which adolescent

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gambling and psychosocial risk status increase the likelihood of young adults revealing gambling problems. Psychosocial risk variables considered in the prediction analysis were informed by the adolescent gambling literature (Jacobs, 1989; Stinchfield & Winters, 1998). The gambling outcome groups were defined according to a categorical structure we have used in the prior studies of this cohort to reflect a two-tier conceptualization of "problematic" gambling behaviors: at-risk and problem gambling. These mutually exclusive groups reflect extant thinking in the gambling literature in which *problem-level* gambling is defined in terms of a severe-end group (in our case, problem gambling) and a separate intermediate group (in our case, at-risk gambling; Lesieur & Blume, 1987; Shaffer, Hall, & Vander Bilt, 1997). The latter group is believed to represent individuals who are at increased likelihood of developing a more serious gambling problem in the future if gambling involvement continues. Other researchers have used similar group distinctions in the study of adolescent gambling (see Shaffer & Hall, 1996).

Given this literature and these considerations, we hypothesized that adolescent psychosocial risk status and adolescent gambling involvement will be associated with an elevated presence of both at-risk and problem gambling outcomes during young adulthood. Although we did not test a formal developmental model for these two outcome groups, we looked for patterns of results that suggest how risk factors differentially influence varying gambling outcomes.

Method

Sample

The longitudinal cohort consists of 305 young adults who received three assessments (Time 1 [T1] in 1990, Time 2 [T2] in 1992, and Time 3 [T3] in 1997–1998). As reported in Table 1, their background characteristics are as follows: the mean ages were 16.0, 17.6, and 23.8, respectively; 49% were female; 96% were White; 95% had a high school degree (T3); and 86% resided in Minnesota (T3).

Several issues pertaining to sample adequacy and attrition merit discussion. First, there is the matter of how representative the sample was at T1. The baseline sample consisted of 702 participants and was randomly drawn from a targeted statewide telephone list of 4,000 households likely to have adolescents in residence (Winters et al., 1993a). Nine hundred ten eligible families (i.e., that had at least one 15- to 18-year-old in residence) were originally contacted for participation in the study. Thus, 208 nonparticipants (23%) did not consent to participate at T1 because either the parent/

guardian or the adolescent refused. The percentage of refusals was evenly divided between families living in urban and rural areas; no other demographic characteristics were available for refusals. Given that we used a targeted telephone list and not a random-digit-dial procedure, it is relevant to compare the T1 sample with Minnesota youth in general. On the basis of 1988 state population data of older adolescents (provided by the Minnesota Department of Human Services), the T1 sample's characteristics were found to be representative of Minnesota teen-agers with respect to locality (metropolitan vs. rural), gender, ethnicity (White vs. non-White), family situation (living with both biological parents vs. living with a single parent), and school status (in school vs. not in school).

A second sampling issue is the impact of attrition at T2. No significant differences were found between the 170 nonparticipants (24%) and the 532 longitudinal participants assessed at T2 on all demographic variables and all gambling involvement and problem severity measures collected at T1 (Winters et al., 1995). The one exception was that T2 nonparticipants tended to be slightly older than their respective participant groups ($p < .07$).

Finally, several issues pertain to the T3 sample. Resource limitations prohibited us from attempting to contact all 532 participants from the T1–T2 cohort. Therefore, we determined that a sample of 300 participants would be adequate to detect a medium effect size for the association of risk status to later gambling, with a statistical power of .80 and an alpha of .05. Assuming there would be attrition, we thus nominated 350 participants from the T1–T2 cohort for a T3 follow-up. The nomination process involved selecting high-risk and low-risk groups. We defined high-risk participants as those from the longitudinal cohort of 532 individuals who reported at T1 or T2 either (a) prior-year gambling on at least a weekly basis or (b) a score ≥ 2 on the SOGS–RA, a problem gambling measure for youth (Winters et al., 1993b). Using this procedure we nominated 160 participants. We randomly selected the 190 low-risk participants from those in the longitudinal cohort who did not meet the first rule. By virtue of successfully contacting 305 of the 350 target participants we obtained an 87% follow-up rate (the follow-up rates were virtually identical in the high- and low-risk groups).

Measures

The sample was administered at each time point a comparable structured telephone interview (see Winters et al., 1993a, for description). The interview consisted of the following domains: demographics, prior-year gambling frequency for 11 activities, several items pertaining to prior-year signs and symptoms of gambling-related problems (SOGS–RA at T1 and T2, Winters et al., 1993b; SOGS at T3, Lesieur & Blume, 1987, and Stinchfield, 2001), prior-year alcohol and other drug use frequency, mental health status, school achievement, delinquent behavior, and parental history of gambling behavior. At T1 and T2, participants were asked the grade of onset of their first gambling experience. The SOGS–RA and SOGS each contain (a) a set of items that measure frequency of gambling (betting for money) during the prior year across 10 types of games and (b) a set of *problem severity* items reflecting *DSM*-related criteria for pathological gambling, such as loss of control, preoccupation, and negative consequences associated with gambling involvement (e.g., "Have you felt like you would like to stop gambling but didn't think you could?" and "Have people criticized your gambling?"). The adult SOGS has 20 problem severity items (Lesieur & Blume, 1987), whereas the adolescent SOGS–RA, which was developmentally adjusted for use with youth, has 12 problem severity items (Winters et al., 1993b). (The extra SOGS items pertain to various sources from which the gambler may have borrowed money to finance his or her gambling habit.)

Procedure

Participants were administered the interview over the telephone at each time point. Interviewers were well-trained undergraduate or graduate re-

Table 1
Demographic Characteristics of the Study Sample

Variable	<i>n</i>	%	<i>M</i>
Male	156	51	
Female	149	49	
Caucasian	293	96	
HS graduate/college (T3)	290	95	
Living in state (T3)	262	86	
Age at T1			16.0
Age at T2			17.6
Age at T3			23.8

Note. $N = 305$. HS = high school; T1 = Time 1; T2 = Time 2; T3 = Time 3.

search assistants. A target case was considered unreachable if contact and consent could not be obtained after 20 callbacks spread over a 4-week period. For minors (relevant at T1 and T2), parental consent was required. We screened data for both missing cases and outlier scores on all study measures. To maximize self-report validity, we deleted questionnaires prior to statistical analysis if more than 10% of the items were not answered or received multiple responses (although this did not lead to any exclusions). To yield more efficient analysis and interpretation, we used compositing strategies (e.g., factor analysis) to reduce the number of common factors to a parsimonious number (e.g., the three delinquency items were collapsed into one scale).

Data analysis involved (a) descriptive statistics of gambling trends across the three time points and (b) odds ratios (ORs) and logistic regression analyses for predicting young adult (T3) gambling severity group membership (at-risk gambling and problem gambling, defined in the next section). We chose categorical analysis for the prediction analyses, because predictor and outcome variables were either naturally categorical or they lent themselves to categorical designations because of non-normal score distributions. Although it would have been ideal to treat each T1 and T2 predictor variable as separate independent variables, the low base rate of the majority of these variables, coupled with sample size considerations, weighed against this approach. Therefore, we chose to assign “presence” of the predictor variable if it was present at either the T1 or T2 measurement point. Guided by the study hypotheses, in the prediction analysis we focused on the two gambling severity groups (at risk and problem) that have received attention in the literature (Shaffer et al., 1997; Winters et al., 1995). The predictor and outcome variables for the prediction analysis are defined in the next section.

Predictor Variables (Based on T1–T2 Data)

Gender: Male was assigned risk status.

Early gambling onset: First gambling experience (any game) had occurred during Grade 6 or earlier.

Parental gambling history: One or both parents were rated by the youth as having a “gambling problem” (type of game not specified).

Delinquency (prior year): Youth had a history of theft, property damage, or had hit/beat up a person.

Substance abuse (prior year): Youth reported weekly or more use of alcohol, weekly or more use of tobacco, or monthly or more use of other drugs.

Psychological distress (prior year): Youth responded “somewhat true” or “true” to the anxiety item (“I feel anxious, worried or upset a lot of the time”) or to the depression item (“I feel down, sad or blue a lot of the time”).

Poorer school performance (prior year): Youth reported getting “mostly C’s, D’s and F’s” for grades.

Early at-risk gambling (prior year): Youth had a score of 2 or 3 (nonweighted sum) on the SOGS–RA (range: 0–12).

Early problem gambling (prior year): Youth had a score of 4 or more (nonweighted sum) on the SOGS–RA (0–12).

Young Adult Outcome Variables (Based on T3)

At-risk gambling (prior year): Participant had a score of 2 or 3 (non-weighted sum) on the SOGS (range: 0–12). Only the 12 items on the SOGS that are comparable to the 12 SOGS–RA items were scored.

Problem gambling (prior year): Participant had a score of 4 or more (nonweighted sum) on the SOGS (0–12). Only 12 items on the SOGS that are comparable to the 12 SOGS–RA items were scored.

We must note something about the cutoff scores we used for defining the at-risk and problem-gambling groups. There is a lack of consensus in the gambling research literature as to how to best categorically define adolescent gambling problem severity (Shaffer & Hall, 1996). Given this, as well as the fact that in a prior prospective report on T1–T2 data Winters et al. (1995) used the grouping strategy proposed here, we chose to define the problem severity groups for the present study in a manner that would maintain consistency between this and Winters et al.’s (1995) study.

Results

Trend Analysis

In Table 2 are presented trend data (T1, T2, and T3) on the percentages of participants who reported prior-year gambling for (a) any gambling, regardless of specific games (yes vs. no); (b) regular gambling (weekly or daily frequency for at least one game); and (c) frequency of playing specific games. Games in which at least 10% of the sample did not report participation are not reported (none of these games showed a significant rate change). The rates across time of any gambling were found to be consistently high, ranging from 80% to 88%; these rates did not statistically differ across time. Regular-gambling rates were found to be moderately low (18%, 13.1%, and 15.1%, respectively); these rates were also not significantly different across time. However, rates of prior-year gambling for individual games showed significant changes over the course of time. Statistically significant decreases occurred across time for card playing ($p < .01$), betting on games of personal skill ($p < .05$), and betting on sports teams ($p < .01$). Significant increases ($p < .01$) occurred for scratch tabs, gambling machines, and the lottery.

Rates of the two gambling severity groups—at-risk gambling and problem gambling—are reported in Table 3. At-risk gambling rates showed a significant increase ($p < .01$) over time, with the increase occurring at T3. The T3 rate (21%) represents a 74%

Table 2
Trend Data of Gambling Involvement (Prior 12 Months)

Type of gambling	Time 1 (%)	Time 2 (%)	Time 3 (%)	$\chi^2(2, N = 305)$
Any gambling	86	80	88	7.9
Regular gambling	18	13	15	2.9
Cards	51	34	18	74.1**
Personal skill	43	33	29	14.0*
Betting on sports	40	35	18	37.8**
Scratch tabs	29	46	45	23.3**
Machines	12	20	58	174.4**
Lottery	11	18	35	55.2**

* $p < .05$. ** $p < .01$.

Table 3
Trend Data of Gambling Severity Groups (Prior 12 Months)

Group	Time 1 (%)	Time 2 (%)	Time 3 (%)	$\chi^2(2, N = 305)$
At-risk gambling	14.8	12.1	21.0	11.1*
Problem gambling	2.3	4.3	3.9	0.6

Note. At-risk gambling = score of 2–3 on the South Oaks Gambling Screen—Revised Adolescent (SOGS–RA) or SOGS; problem gambling = score of 4+ on SOGS–RA or SOGS.

* $p < .05$.

increase from the T2 rate (12.1%) and a 47% increase from the T1 rate (14.8%). The prevalence rates for problem gambling were stable and low: 2.3% (T1), 4.3% (T2), and 3.9% (T3). These rates did not differ statistically as a function of time.

We also examined the trend data as a function of gender. On all gambling variables except one, men had higher rates. Compared to women, men reported more involvement in the specific games, and they had higher rates of at-risk and problem gambling. All of these gender comparisons were statistically significant ($p < .05$). The lone exception to this pattern was the rate of any gambling during the prior year: Both men and women reported high percentages. We also looked for Gender \times Time interactions on the gambling variables. None were found, which indicates that the observed pattern of gender differences was consistent across all measurement points.

Prediction Analysis

We analyzed in two ways the prediction of young adult gambling outcomes based on the adolescent measures. First, we computed separate bivariate ORs on the prevalence of the two young adult gambling outcome groups (at-risk gambling and problem gambling) for each of the nine adolescent predictor (risk) variables. These analyses provide a descriptive picture of the unadjusted OR of each risk factor's association with gambling outcome. An OR of 1.0 indicates no relationship to, or independence of, a factor with gambling abuse, ORs less than 1.0 indicate a negative or inverse relationship of a factor associated with gambling abuse, and ORs greater than 1.0 indicate a positive or direct association with gambling abuse. Logistic regression (forward stepwise) was

the second technique we used to analyze the data. These analyses provided adjusted ORs to control for shared variance among the multiple independent risk factors. We chose a stepwise logistic regression given that we were not formally testing a specific model, although its use can be highly influenced by statistical characteristics unique to a given study sample.

Results from the unadjusted OR analysis are reported in Table 4. Chi-square analyses indicated that the majority of risk variables were associated with significantly greater rates of the two gambling outcome groups. Only one risk variable, psychological distress, did not achieve a significant chi-square for at least one of the outcome groups. Factors, in descending order, that are significantly associated with increased likelihood of at-risk gambling at young adulthood are the following: at-risk gambling during adolescence, being a male, delinquency, problem gambling during adolescence, substance abuse, and early onset. The factors that are significantly associated with increased odds of problem gambling at young adulthood, in descending order, are the following: parental history, problem gambling during adolescence, being a male, at-risk gambling during adolescence, substance abuse, and poorer school performance. Table 4 shows the resulting chi-square statistics and the unadjusted ORs.

Results from the forward stepwise logistic regression are reported for the two gambling abuse groups. In Table 5 the significant effects and ORs are listed. Two risk variables were identified as nonredundant significant predictors of at-risk gambling, yielding a model chi-square of 21.6 ($p < .01$) and an overall classification of 77.4%. The significant variables, in order of step inclusion, are the following: at-risk gambling during adolescence and

Table 4
Odds Ratios (ORs) of the Association Between Time 1–Time 2 Participant Variables and Gambling Outcome Groups at Time 3

Participant variable	At-risk gambling		Problem gambling	
	OR	$\chi^2(1, N = 305)$	OR	$\chi^2(1, N = 305)$
Problem gambling	3.8	4.4*	7.8	6.4**
At-risk gambling	4.9	16.6**	2.3	4.2*
Early onset of gambling	1.9	3.9*	1.5	0.6
Parental gambling history	1.4	0.4	7.3	12.2**
Delinquency	2.6	7.4**	0.8	0.3
Substance abuse	2.0	4.1*	1.9	3.9*
Psychological distress	0.8	0.1	1.6	0.2
Poor school performance	0.8	0.2	2.4	3.8*
Gender (male)	2.8	8.5**	3.0	4.3*

* $p < .05$. ** $p < .01$.

Table 5
Multiple Logistic Regression (Adjusted Odds Ratios [ORs]) of the Association Between Participant Variables and Gambling Outcome at Time 3 (T3)

Variable	OR	Model $\chi^2(296, N = 305)$	Overall classification (%)
At-risk gambling, T3		21.6**	77.4
At-risk gambling	12.8		
Gender (male)	4.2		
Problem gambling, T3		12.4**	93.7
Parental gambling history	11.4		
Gender (male)	6.1		

** $p < .01$.

being a male. The findings for problem gambling indicate that again two nonredundant risk variables were identified, yielding a model chi-square of 12.4 ($p < .01$) and an overall classification of 93.7%. The significant variables, in order of step inclusion, are the following: parental history of gambling problems and being a male.

Discussion

This prospective study of youth gambling behaviors provides a picture of both stability and change with respect to the trend data, as well as a modicum of consistency regarding the adolescent risk variables that were found to significantly increase the likelihood of later gambling problems. Across three time points spanning 8 years, rates of prior-year gambling were consistently high (percentages were in the 80s), rates of regular gambling were consistently moderate (percentages were below 20%), and rates of problem gambling varied little in the very low range (percentages ranged from 2.3% to 4.3%). Concerns that early involvement in gambling and continued exposure to an environment that promotes gambling—particularly given that gambling opportunities have expanded greatly in Minnesota throughout the 1990s, when the participants were in their teen-age years—would trigger a meaningful increase in the rate of heavy gambling during late adolescence and young adulthood were not confirmed by the study.

However, the rate of both at-risk gambling, defined as an intermediate problem severity group, and of involvement in three specific games (gambling machines, lottery, and scratch tabs) significantly increased over time. This considerable increase in the rate of at-risk gambling at the young adulthood assessment highlights the importance of monitoring the course of gambling behaviors as young people mature. Given that a high proportion of these gamblers may progress to a more severe level of problem gambling at some future time (Shaffer et al., 1997), an important research priority is to further understand the extent to which at-risk gambling develops into problem gambling and what factors mediate this outcome. The coincidental finding of increases in specific legal games raises the possibility that legal access to popular games and venues may have contributed to the escalating rate of the at-risk group.

The study's results address the impact of psychosocial risk factors and early gambling experiences on the escalation of gambling involvement. Overall, the prediction analysis confirmed the predictive relevance of various psychosocial factors that have previously been linked to adolescent gambling involvement in

cross-sectional studies. The findings further support the conceptual view that risk factors often cited in the adolescent drug abuse literature (Clayton, 1992; Hawkins, Catalano, & Miller, 1992; Newcomb & Bentler, 1989) might be important to the development of gambling problems during young adulthood. This apparent developmental commonality between youth gambling and youth drug abuse lends credence to the view that the etiology of these two behavioral domains may share important roots. Several theories of youth behavioral disorders, including Jessor and Jessor's (1977) problem behavior theory and the so-called "conduct disorder hypothesis" (e.g., Baumrind & Moselle, 1985; Elliott, Huizinga, & Menard, 1989; Kellam, Rebok, Ialongo, & Mayer, 1994; Maddahian, Newcomb, & Bentler, 1988; Shedler & Block, 1990), highlight the contributions of many risk variables we identified (although not uniformly for both gambling outcome groups), such as delinquency, being male, school problems, and substance abuse. Indeed, the finding that being male was associated with elevated likelihood of membership in the at-risk and problem-gambling groups is consistent with the pervasive finding in the literature that boys experience more gambling problems than girls (Ladouceur, Boudreault, Jacques, & Vitaro, 1999; Lesieur et al., 1991; Stinchfield & Winters, 1998) as well as with the vast literature indicating that boys are more likely than girls to display externalizing disorders, such as conduct disorders and substance abuse (Clark & Bukstein, 1998). Moreover, we found that adolescent substance abuse predicted an increased likelihood of both gambling outcome groups, which is consistent with findings that substance abuse and adult problem gambling are significantly associated (Crockford & el-Guebaly, 1998; Gambino, Fitzgerald, Shaffer, Renner, & Courtnage, 1993).

Our finding that early at-risk and problem gambling was consistently and significantly associated with both young adult gambling outcomes emphasizes that early-onset and adolescent gambling involvement can be a harbinger of later gambling problems. The mechanisms by which such precocious gambling lays the foundation for an escalation to gambling problems is an important area for continuing research. From the standpoint of the present analysis, it is logical to further investigate the interaction between psychosocial risk factors and early gambling involvement as an important pathway to later problem gambling.

Four of the psychosocial risk variables—early onset, parental gambling history, delinquency, and poorer school performance—were related to only one of the gambling outcome groups. It is interesting to speculate about this differential pattern of results. It

may be that the two risk variables related to the at-risk gambling group, early onset and delinquency, reflect more a general deviance lifestyle. On the other hand, the two factors associated with the problem-gambling group, parental gambling history and poorer school performance, may have more relevance to gambling-specific problems. In this light, the at-risk group may represent a trajectory toward later problems with gambling that is secondary to a more fundamental pathway toward a delinquent lifestyle.

The findings of this study have several implications for prevention. The data support the application of gambling prevention strategies that aim to reduce well-known risk factors of adolescent problems, particularly factors related to disruptive behaviors. Given that the onset of gambling for many youth is quite early (Stinchfield & Winters, 1998), it is advisable to initiate prevention programs prior to the teen-age years. The possible etiological role of family history highlights the importance of educating parents about how their gambling behavior can negatively influence gambling attitudes and behaviors in their children. The study, in conjunction with the cross-sectional literature, also confirms the importance of screening teen-agers and young adults with a high-risk profile for possible gambling problems. The broad picture of risk that emerged from our investigation suggests that substance-abusing males with a history of juvenile delinquency and school problems, and those who have a family history of gambling problems, are particularly in need of screening for gambling problems.

Any prospective study will naturally benefit from additional longitudinal assessments. The present young adult participants may not have reached their peak risk years for the development of gambling problems. If the natural course toward pathological gambling requires access to relatively abundant financial resources, then a higher proportion of such gamblers may not emerge until the cohort ages into greater earning-producing years. Future studies should also further clarify the complexity of the causal links between risk factors and gambling. For example, we did not examine the possible influence of early gambling on later risk behaviors. Arsenault and her colleagues found that gambling leads to delinquent behaviors in adolescents (Arsenault, Vitaro, Brendgen, & Tremblay, 1997). Any youth who is overinvolved in gambling and is faced with a large gambling-related debt may turn to crime as a means to finance that debt. Other questions that merit attention for future research on the development of youth problem gambling are the role of candidate risk variables not addressed by this study (e.g., expectancy effects, peer behavior, temperamental traits), the extent to which risk factors that are differentially associated with at-risk versus problem gambling hold up across time, and whether there are distinct temporal sequences of symptoms among individuals who eventually develop the full-blown disorder.

A number of study limitations must be noted. The findings are based on self-report data, and several of the predictor variables were based on responses to single survey items. Further work in this area would benefit from converging lines of evidence based on a multitrait-multimethod design. The study sample was not a national sample, so the generalizability of the study's findings to non-Minnesota youth is not known. Furthermore, it is important to emphasize that the absolute percentages we reported for the gambling outcome groups were based on a sample obtained with an oversampling procedure. Thus, our figures should not be viewed as absolute prevalence estimates in the conventional manner but used

rather for comparison purposes across the three data points. Finally, despite our generally favorable follow-up rates at T2 and T3, there are indications that noncontacted cases in follow-up studies reveal more negative and pathological outcomes than the contact cases (Stinchfield, Niforopulos, & Feder, 1994).

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