ORIGINAL PAPER

Environmental Correlates of Gambling Behavior in Urban Adolescents

**Emerson M. Wickwire · James P. Whelan ·
Andrew W. Meyers · David M. Murray**

Abstract The present study considered the relation between adolescent gambling behavior and the perceived environment, the component of Jessor and Jessor's (1977) Problem Behavior Theory that assesses the ways that adolescents perceive the attitudes and behaviors of parents and peers. The predominantly African-American sample included 188 sophomores from two urban public high schools. Using the South Oaks Gambling Screen-Revised for Adolescents to assess gambling risk, rates of both at-risk (20.7%) and problem (12.8%) gambling were found to be high. Boys displayed more gambling problems than did girls. The perceived environment accounted for significant variance in gambling problems and frequency, with proximal components displaying stronger relationships than distal components. Perceiving parent gambling and friend models for problem behavior were positively correlated with gambling problems, and friend models were positively related to gambling frequency.

The authors Emerson M. Wickwire, Jr. James P. Whelan, and Andrew W. Meyers are members of The Institute for Gambling Education and Research, Department of Psychology, The University of Memphis, Memphis, TN. The primary research interest of this group is the prevention and treatment of gambling related problems.

David M. Murray, Ph.D., is the Chair of the Division of Epidemiology at the School of Public Health, The Ohio State University, Columbus, OH.

E. M. Wickwire · J. P. Whelan Jr. (✉) · A. W. Meyers
Institute for Gambling Education and Research,
Department of Psychology, The University of Memphis,
Memphis, TN 38152-3230, USA
e-mail: jwhelan@memphis.edu

D. M. Murray
Division of Epidemiology at the School of Public Health,
The Ohio State University,
Columbus, OH, USA

Among girls, family support was positively related to gambling problems. Among boys, this relation was negative.

Researchers and policy-makers have become increasingly concerned over the potential harmful effects of adolescent gambling. Gambling has been found to share with other problem behaviors of adolescence risk factors such as being male, association with deviant peers, and parent behavior (Felsher, Derevensky, & Gupta, 2004; Hardoon, Gupta, & Derevensky, 2004; Shaffer & Hall, 1996; Stinchfield, 2000). As a result, investigators have evaluated the applicability of findings related to other adolescent problem behaviors to youth gambling (Dickson, Derevensky, & Gupta, 2002, 2004; Evans, 2003; Jacobs, 2000). One consistently supported concept for understanding numerous adolescent problems has been the perceived environment (Jessor & Jessor, 1973, 1977), which assesses the ways that adolescents perceive the attitudes and behaviors of their parents and peers. The primary purpose of the present study was to identify how adolescents' perceptions of these social influences relate to their gambling behavior. A secondary goal was to investigate the gambling behavior of the at-risk but understudied population of urban, predominantly African-American adolescents.

As is true in many places today, North American adolescents spend their lives in an environment where gambling, defined as the wagering of money or valuables on an event where the outcome is uncertain, is legal for adults, culturally accepted, and romanticized. It is estimated that 85% of high school adolescents have gambled in their lifetimes, and approximately 73% of adolescents reported having gambled

within the previous 12 months (National Research Council, 1999; Shaffer & Hall, 1996). Gambling adolescents risk financial difficulties, and as gambling is illegal for minors, they also risk legal trouble. Although there is a lack of consensus regarding descriptive terminology for adolescent problematic gambling, and extant instruments are not without controversy (e.g., Derevensky, Gupta, & Winters, 2003; Shaffer & Hall, 1996), between 4 to 7% of adolescents aged 12–17 years appear to meet the diagnostic criteria for pathological gambling (e.g., Derevensky et al., 2003; Hardoon & Derevensky, 2002; Shaffer & Hall, 1996). These youth are classified as "problem" gamblers (Winters, Stinchfield, Botzet, & Anderson, 2002) and experience gambling-related problems including lower self-esteem (Gupta & Derevensky, 1998; Peacock, Day, & Peacock, 2000), depression (Gupta & Derevensky, 1998), and increased risk for suicidal thoughts and actions (Gupta & Derevensky, 1998; Langhinrichsen-Rohling, Rohde, Seeley, & Rohling, 2004). Considered "at-risk" for the development of serious gambling problems, an additional 10 to 14% of adolescents experience gambling-related consequences that may negatively impact their lives (Derevensky et al., 2003; Hardoon & Derevensky, 2002; Shaffer & Hall, 1996).

Investigators have identified several risk factors associated with adolescent gambling. For example, researchers have posited a link between early gambling involvement and gambling problems in adulthood (e.g., Vitaro, Wanner, Ladouceur, Brendgen, & Tremblay, 2004; Volberg, 1993). More frequent gambling has also been associated with increased risk of gambling problems (e.g., Jacobs, 2000). The most consistent finding is that boys are more likely than girls to experience gambling-related problems (e.g., Hardoon et al., 2004; National Research Council, 1999; Shaffer & Hall, 1996; Winters et al., 2002). Boys and girls wager differently, prefer different gambling activities, report different motives for gambling, and hold different beliefs regarding control over gambling (e.g., Felsher, Derevensky, & Gupta, 2003; Hardoon & Derevensky, 2001; Moore & Ohtsuka, 1999). Finally, the social contexts of gambling may differ for boys and girls, as boys and girls gamble differently when in peer groups (Hardoon & Derevensky, 2001), and boys are more likely than girls to report gambling with their parents (Ladouceur, Dube, & Bujold, 1994).

Although the research is limited, several studies have suggested that non-Caucasian adolescents are at greater risk for developing gambling-related problems than are their Caucasian peers (Stinchfield, 2000; Volberg, 2002; Wallisch, 1995; Zitzow, 1996). For example, Zitzow (1996) found that Native American adolescents gambled at younger ages and were more likely to experience gambling-related problems, earlier onset of problems from gambling, and greater frequency of such problems than were their non-Native American peers.

One provocative finding has been an association between adolescent gambling and other problem behaviors such as delinquency and substance abuse (e.g., Kassinove, Doyle, & Milburn, 2000; Shaffer & Hall, 1996; Winters & Anderson, 2000). The prevalence of at-risk and problem gambling among adolescents is comparable to the prevalence of other problem behaviors (Dickson et al., 2002; Winters et al., 2002), and adolescents who gamble problematically appear at least twice as likely to use alcohol, or marijuana and other illicit substances as are their "no problem gambling" classmates (Jacobs, 2000).

In addition to these demographic and behavioral variables, the ways that adolescents perceive their environments are also important predictors of involvement in problem behaviors including gambling (e.g., Felsher et al., 2004; Hardoon et al., 2004; Langhinrichsen-Rohling et al., 2004; Shaffer & Hall, 1996; Stinchfield, 2000; Wood & Griffiths, 2004). Parenting practices have also been associated with adolescent gambling involvement. Vachon, Vitaro, Wanner, and Tremblay (2004) reported that adolescents who perceived parent gambling involvement, low levels of parental monitoring, and inadequate parental disciplinary practices were more likely to experience gambling problems than were youth who did not report these perceptions. Similarly, Hardoon et al. (2004) reported that adolescents with gambling problems were more likely than their peers to report having friends who had gambling or substance abuse problems and to perceive less social support from both parents and peers. Vitaro, Brendgen, Ladouceur, and Tremblay (2001) found perceptions of parental supervision and friends' deviancy to be related to gambling behavior among adolescent males.

According to Jessor and Jessor (1973), the perceived environment is an adolescent's experience of the influences of his or her parents and peers and is influenced by an adolescent's personality traits and behavior. Within the Jessors' conceptualization, the likelihood of engaging in problem behavior is influenced by adolescents' perceptions of the social controls against problem behavior and perceptions of permissive attitudes and behavior models. The perceived environment system contains components divided into two sets representing their theoretical proximity to the target behavior (Jessor & Jessor, 1973; F. Costa, personal communication, January 6, 2004). The proximal perceived environment consists of perceived parent and peer models and attitudes directly concerning problem behavior and is considered to have a direct impact on the adolescent's behavioral choices. Specific proximal components include parent gambling, friend models of problem behavior, friend disapproval of problem behavior, and parent disapproval of problem behavior. The distal perceived environment assesses general characteristics of relationships with parents and peers, which are theoretically more removed from the adolescent's decision to engage in the target behavior. Specific distal components include

parent versus peer influence, parent versus peer compatibility, friend controls, friend support, family controls, and family support.

Initial empirical support for the perceived environment construct was provided by the Jessors' adolescent health project, in which perceived environment variables accounted for 28% of explained variance in marijuana use among junior high school students (Jessor & Jessor, 1973). Since then, variables in the perceived environment have been shown to be predictive of gambling, alcohol consumption, tobacco use, marijuana use, promiscuous sexual behavior, and general delinquent behavior among high school students (e.g., Costa, Jessor, & Turbin, 1999; Donovan, Jessor, & Costa, 1999; Jessor, Turbin, & Costa, 1998).

The present study was a comprehensive evaluation of the relation between the perceived environment system (Jessor & Jessor, 1973, 1977) and adolescent gambling behavior in a sample of urban and predominantly ethnic minority adolescents. Our first hypothesis was that the perceived environment would account for significant variance in the dependent variables of gambling frequency and gambling problems. Next, consistent with the theoretical tenet, we hypothesized that the proximal perceived environment would display a stronger relation than the distal perceived environment to gambling frequency and gambling problems. Our third hypotheses considered the relation between gender and gambling behavior. We predicted that boys would report higher levels of gambling problems and more frequent gambling than would girls. Further, we hypothesized that gender would moderate the relation between the perceived environment and gambling behavior. Our final hypotheses concerned the relations between individual perceived environment subscales and gambling behavior. We predicted that having a parent who gambles and higher levels of friend models for problem behavior would be positively related to gambling behavior. Conversely, we predicted that higher levels of parent disapproval and of friend disapproval of problem behavior would be negatively related to gambling behavior. Although current literature does not provide support for specific hypotheses pertaining to the distal perceived environment, a secondary aim of the paper was to explore the relation between distal perceived environment components and gambling behavior.

Methods

Participants

One hundred eighty-eight students (86 boys, 102 girls, M age = 15.9 years, $SD = 0.6$) were recruited from nine randomly selected sophomore English classes in two high schools representing different neighborhoods within an urban public school system. Teachers verified participants' ability to understand English. Participants identified themselves in the following ethnic categories: 167 (87.4%) African American, 6 (3%) Asian American, 3 (1.3%) Caucasian, 2 (1%) Hispanic, and 9 (4.7%) other. Participants were also asked, "During the past year, how satisfied have your teachers been with your grades in school?" and 4 responses ranged from "Not at all satisfied" to "Very satisfied." Eighty percent ($n = 153$) reported that their teachers were "somewhat satisfied" or "satisfied" with their grades ($M = 3.0$; $SD = .67$). Personal weekly income was assessed, and 5 responses ranged from "$0–$10" and "$100 or more." Weekly incomes were relatively equally distributed among the 5 responses.

Measures

Demographics

Demographic variables included age, gender, ethnicity, perceived teacher satisfaction with grades, and personal weekly income.

Perceived environment

The perceived environment (Jessor & Jessor, 1973) is traditionally measured by the 38-item Adolescent Health and Development Survey (AHDS; Jessor, Costa, & Turbin, 2001). Nine perceived environment components are measured using subscales that include from 2 to 8 items. Participants respond to Likert-style items that contain 3–4 points. A score is generated for each subscale, with higher total scores indicating higher levels of a given perceived environment variable. In the AHDS, internal consistencies ranged from .68 to .84 (personal communication, F. Costa, 2002).

For this study, eight gambling specific items were added to the proximal subscales of the questionnaire. These items were constructed to parallel other items in the questionnaire and to include explicitly gambling as a target behavior. Three items were added to the friend models subscale (e.g., "How many of your friends gamble?") and two items were added to both the parent disapproval and friend disapproval subscales (e.g., "If your parents knew you had gambled, would you get in trouble for it?" and "How do most of your friends feel about someone your age gambling?" respectively). In addition, parent gambling was added as a fourth proximal perceived environment subscale, bringing the total number of subscales to ten. Parent gambling was assessed with a single yes-no item, "Do either of your parents (or the adults you live with) play any games of chance for money?" Information about the perceived environment subscales appears in Table 1. It should be noted that due to the addition of the gambling items, the alphas for the proximal perceived

Table 1 Psychometric properties of perceived environment scales and gambling risk index

Variable name	Example item	Proximal/ distal	No. Items	Cronbach Alpha ($N = 188$)	Test-retest reliability ($n = 37$)	M (SD)
Parent gambling	Do your parents (or the adults you live with) play any games of chance for money?	p	1	—	.64	—
Parent disapproval of problem behavior	If your parents knew that you had drunk alcohol without their permission, would you get in trouble?	p	6	.87	.62	19.92 (4.2)
Friend models of problem behavior	How many of your friends drink alcohol fairly regularly?	p	7	.78	.86	12.85 (3.8)
Friend disapproval of problem behavior	How do most of your friends feel about someone your age smoking cigarettes	p	5	.81	.55	13.9 (3.4)
Parent-peer influence	If you had to make a serious decision about school, whom would you depend on more for advice—your friends or your parents?	d	4	.62	.69	9.7 (1.9)
Parent-peer compatibility	Would your friends agree with your parents (or the adults you live with) about what is really important in life?	d	3	.65	.55	8.8 (2.2)
Friend controls	If you were doing something that is bad for your health, would your friends try to get you to stop?	d	4	.78	.71	12.9 (2.4)
Family controls	Do your parents encourage you to do what you are interested in and show an interest in doing those things themselves?	d	8	.70	.71	12.1 (2.7)
Friend support	Are your friends interested in what you think and how you feel?	d	2	.75	.76	4.9 (1.2)
Family support	Are your parents interested in what you think and how you feel?	d	6	.83	.87	24.66 (5.0)
SOGS-RA	In the past 12 months, how often have you gone back another day to try to win back the money that you lost?	NA	12	.77	.74	1.53 (1.93)

Note. Test-retest and alpha coefficients were derived from the current sample. SOGS-RA, South Oaks Gambling Screen-Revised for Adolescents.

environment subscales in the current sample would be expected to differ from the original alphas of the AHDS (Jessor et al., 2001).

Gambling risk index

The South Oaks Gambling Screen—Revised for Adolescents (SOGS-RA; Winters, Stinchfield, & Fulkerson, 1993) is the most frequently used measure of adolescents' risk for gambling problems. Twelve "yes-no" items assess negative feelings and behaviors associated with gambling and are scored 1 or 0, respectively. The sum of these items is the total SOGS-RA score. Several additional items assess parent gambling and sources from which money is borrowed to gamble, but these items do not contribute to the total score. Winters et al. (1993) reported acceptable internal consistency ($\alpha = .80$) and high content and construct validity. In order to comply with a local public school system request, one non-scored item ("Do you think that either of your parents gambles too much?") was eliminated from the questionnaire.

The primary dependent variable in predictive analyses was the SOGS-RA total score. Although there is a lack of consensus regarding appropriate cutoff scores for determining the

problem gambling status of adolescents (e.g., Derevensky et al., 2003), categorical definitions of adolescent problem gambling nonetheless facilitate comparison across studies using various instruments. In reporting prevalence rates, we elected to remain consistent with Winters et al.'s (1993) original scoring system. SOGS-RA scores of 0 or a 1 are labeled "no-problem"; a 2 or 3 merits an "at-risk" label; and a 4 or greater indicates "problem" gambling.

Gambling frequency

In assessing gambling frequency, the SOGS-RA includes the question, "How many times, if at all have you done these activities in the past year?" Participants rate the frequency of their involvement in nine specific gambling activities from "Never" to "Daily" (see Table 3 for gambling activities). Responses to gambling participation items are scored from 0–4 but do not contribute to the total SOGS-RA score. A composite gambling frequency variable was created based on involvement in each of the nine gambling activities as reported on the SOGS-RA. The average score across the nine activities was gambling frequency.

Procedures

Following Institutional Review Board and school system approval, parents of students in selected classes were mailed letters asking them to contact the school principal or the researchers if they did not want their children to participate. No parent denied consent for participation.

Seven of the nine selected classes were visited once, while one additional class from each school was randomly selected for a second visit to evaluate the one-week test-retest reliability of the questionnaire. Survey administration took place in the students' classrooms and was conducted by researchers trained to administer the questionnaire to the students. Researchers explained how to complete the questionnaire and clarified that participation was completely voluntary. All students agreed to participate. To ensure confidentiality identifying information was not collected, and participants sealed their completed questionnaires in unmarked envelopes before returning them to the researchers. Upon completion, participants were given a debriefing information sheet that included contact information for gambling treatment alternatives.

Results

Preliminary analyses

Because gambling-specific items were added to the perceived environment measure for this study, psychometric properties of the questionnaire were evaluated. Internal consistency for the perceived environment subscales ranged from .62 to .87 ($M = .73$), and 1-week test-retest correlations ranged from .55 to .87 ($M = .70$). The internal consistency coefficient for the SOGS-RA was .77 and test-retest reliability coefficient was .74. Details are presented in Table 1.

In this survey students were nested within classes and schools. We would thus expect that observations within each school and class might be correlated. In order to evaluate the predictive relation between the independent variable of perceived environment and the dependent variable of gambling behavior, it was first necessary to evaluate the extent to which these correlations were likely to influence results. The intraclass correlation (ICC) for gambling problems was very small (ICC = 0.007), as was the ICC for a typical independent variable, parent disapproval (ICC = 0.077). The variance inflation associated with correlated observations in the context of a regression analysis of cross-sectional data is given by Scott and Holt (1982) as $1 + (n - 1)ICC_y ICC_x$ where there are n observations per class, ICC_y is the ICC for the dependent variable and ICC_x is the ICC for the independent variable. Given these small ICCs, the variance inflation associated with the correlated observations in the classes and schools is negligible. As a result, it was safe to use standard analytic methods that assume independent observations.

Because variables in the perceived environment represent the same larger construct, it was likely that scores on individual perceived environment variables would be related. As presented in Table 2, Pearson correlations between perceived environment variables ranged from $r = .02$ to $r = .54$. In terms of multicollinearity, correlations of that magnitude are generally not problematic.

Gambling behavior

Eighty percent ($n = 151$) of the sample reported having gambled at least once in their lives. Boys ($n = 78$; 90.7%) reported significantly more lifetime gambling involvement than did girls ($n = 73$; 71.6%; $\chi^2(1, N = 188) = 10.8, p < .01$). Sixty percent ($n = 112$) reported having gambled in the previous year, and boys ($n = 68$; 79.1%) were more involved in prior-year gambling than were girls ($n = 44$; 43.1%; $\chi^2(1,$

Table 2 Correlations among perceived environment subscales

	PGam	PD	FrM	FrD	PPI	PPC	FrC	FrS	FaC	FaS
PGam	1									
PD	−.005	1								
FrM	.177	−.279	1							
FrD	−.112	.225	−.529	1						
PPI	−.103	.370	−.046	.069	1					
PPC	−.121	.150	−.080	.245	.144	1				
FrC	−.059	.287	−.344	.521	.021	.525	1			
FrS	−.044	.079	−.133	.192	−.135	.401	.467	1		
FaC	.126	.420	−.173	.216	.159	.165	.168	.255	1	
FaS	−.113	.487	−.170	.232	.447	.341	.356	.327	.351	1

Note. PGam: Parent gambling; PD: Parent Disapproval of problem behavior; FrM: Friend Models for problem behavior; FrD: Friend Disapproval of problem behavior; PPI: Parent versus Peer influence; PPC: Parent versus Peer compatibility; FrC: Friend Controls against problem behavior; FrS: Friend Support; FaC: Family Controls against problem behavior; FaS: Family Support.

Table 3 Past year gambling involvement in specific activities

Type of gambling	Total sample ($N = 188$)		Boys ($n = 86$)		Girls ($n = 102$)		χ^2
	N	%	n	%	n	%	
Any gambling	112	59.6	68	79.1	44	43.1	25.0**
Regular gambling	51	27.1	34	39.5	17	16.7	12.3**
Played cards	51	27.1	29	33.7	22	21.6	3.5
Flipped coins	67	35.6	47	55.7	20	19.6	25.0**
Personal skill	61	32.4	40	46.5	21	20.6	14.3**
Sports teams with friends or family	76	40.4	47	55.7	29	28.4	13.3**
Sports with bookmaker	8	4.3	5	5.8	3	2.9	0.95
Bingo	15	8	9	10.5	6	5.9	1.3
Dice games	58	30.9	43	50.0	15	14.7	27.2**
Slot, poker, or other machines	11	5.9	5	5.8	6	5.9	0.00
Casino gambling	1	0.5	0	0.0	1	1.0	0.85

Note. At the time of study, Tennessee did not have a state lottery. Regular gambling is defined as at least weekly participation in at least one gambling activity. Personal skill refers to games of personal skill, such as pool, basketball, and bowling.

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

$N = 188) = 25.0, p < .01$). Twenty-seven percent ($n = 51$) reported gambling regularly (weekly or daily participation in at least one gambling activity). Boys ($n = 34$; 39.5%) reported more regular gambling than did girls ($n = 17$; 16.7%; $\chi^2(1, n = 188) = 12.3, p < .01$). Prior-year gambling involvement in nine specific gambling activities is reported in Table 3. We created yes/no variables for each gambling activities, and boys gambled significantly more than girls in most gambling activities.

The mean score on the gambling risk index was 1.53 ($SD = 1.93$). The mean gambling frequency was 1.45 ($SD = .66$), corresponding to "Less than Monthly" involvement. The correlation between the gambling risk index and gambling frequency was $r = .38$.

Based on the gambling risk index, participants were also divided into no problem, at-risk, and problem categories. As presented in Table 4, significantly more girls than boys were labeled no problem gamblers ($\chi^2(2, N = 188) = 28.4$, $p < .01$). Conversely, boys displayed significantly higher rates of at-risk and problem gambling than did girls

Table 4 Problem gambling classification indicating observed prevalence of no problem, at-risk, and problem gambling

	Total sample ($N = 188$)		Boys ($n = 86$)		Girls ($n = 102$)		χ^2
	n	%	n	%	n	%	
No problem	125	66.5	40	47	85	83	28.4**
At-risk	39	20.7	27	31	12	12	10.9**
Problem	24	12.8	19	22	5	5	12.4**

Note. Problem gambling classification is based on endorsement of problem gambling items in the gambling risk index (i.e., SOGS-RA). A score of 0 or 1 is labeled no problem gambling; a score of 2 or 3 is considered at-risk; and a score of 4 or greater indicates problem gambling.

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

($\chi^2(2, N = 188) = 10.9, p < .01$; and $\chi^2(2, N = 188) = 12.4$, $p < .01$, respectively).

Predicting gambling risk index

After the necessary assumptions for a linear regression model were found to be tenable, a simultaneous multiple regression was performed to evaluate the relation between the perceived environment and gambling problems. As shown in Table 5, all perceived environment subscales were entered into the regression equation, and the perceived environment accounted for 16% of the variance ($R^2 = .16$) in the gambling risk index. The friend models subscale displayed a statistically significant ($p < .05$) positive relation to the dependent variable.

Next, to compare the relative predictive strengths of the proximal and distal perceived environment systems, we performed two hierarchical multiple regressions. In the first model, the four proximal subscales were entered in Step 1 and explained 11% of the variance ($R^2 = .11; p < .001$) in the gambling risk index. In the next step, the six distal subscales were added to the model and explained an additional 5% ($\Delta R^2 = .05$) of the variance in the gambling risk index. This additional amount of variance explained was non-significant. In the second hierarchical regression, we reversed the order of variable inclusion. The distal subscales were entered in step 1, and they accounted for 10% ($R^2 = .10; p < .01$) of the variance in the gambling risk index. When the proximal subscales were added in step 2, an additional 6% of variance was explained, and this increase was statistically significant ($\Delta R^2 = .06; p = .01$).

A hierarchical multiple regression analysis was performed to evaluate the interaction between gender and the perceived environment. After adding all perceived environment subscales in step 1, gender was added to the model in step 2.

Table 5 Summary of simultaneous multiple regression for variables predicting gambling risk index ($N = 186$) and gambling frequency ($N = 186$)

Variable	B	SE B	p
SOGS			
Constant	2.951	1.448	.043
Parent who gambles	.344	.276	.214
Friend models	.091	.042	.033
Friend disapproval	−.0008	.053	.999
Parent Disapproval	−.060	.042	.153
Parent-peer influence	−.136	.085	.873
Parent-peer compatibility	.022	.075	.774
Friend controls	−.093	.085	.274
Friend support	−1.56	.142	.276
Family controls	−.108	.062	.081
Family support	.066	.035	.061
Gambling frequency			
Constant	−.101	.452	.823
Parent who gambles	.099	.086	.281
Friend models	.084	.013	.000
Friend disapproval	−.007	.016	.690
Parent disapproval	.008	.013	.518
Parent-peer influence	.014	.026	.604
Parent-peer compatibility	.008	.023	.733
Friend controls	.054	.027	.042
Friend support	−.006	.044	.180
Family controls	−.003	.019	.108
Family support	.018	.011	.109

Note. $R^2 = .158$ ($p = .001$) for SOGS-RA (South Oaks Gambling Screen-Revised for Adolescents); $R^2 = .29$ ($p < .001$) for gambling frequency.

An additional 4.4% of the variance in the gambling risk index was explained ($\Delta R^2 = .044$; $p < .01$). In step 3, we included all gender × perceived environment interactions. We then removed non-significant interactions in a setwise fashion based on their p values (e.g., $p > .8$, $p > .5$, $p > .2$). The final model included one significant interaction between gender and family support. An additional 2.6% of variance was explained, and this increase was statistically significant ($\Delta R^2 = .026$; $p < .05$). As depicted in Fig. 1, the family support subscale displayed a negative relation to the gambling risk index among boys. However, among girls the family support subscale was positively correlated with the gambling risk index.

Predicting gambling frequency

A simultaneous multiple regression was used to evaluate the relation between the perceived environment and gambling frequency. The perceived environment subscales accounted for 29.0% ($R^2 = .290$; $p < .001$) of the variance in gambling frequency. The friend models and friend controls subscales both displayed statistically significant ($p < .001$ and $p < .05$,
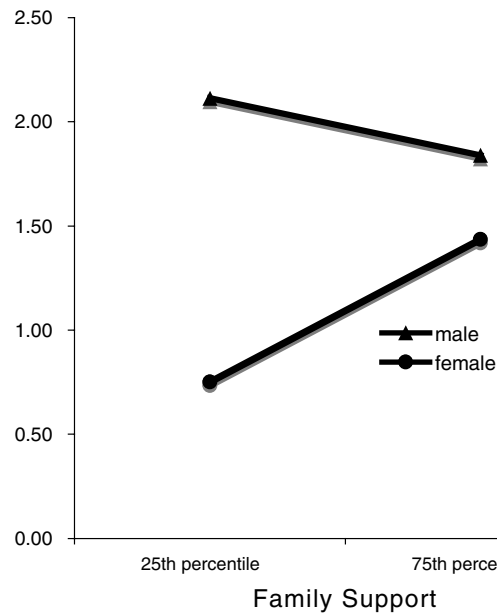

Fig. 1 Relation between family support and the gambling risk index (i.e., SOGS-RA) as a function of gender

respectively) positive relations to the dependent variable. Results are presented in Table 5.

In order to compare the predictive strengths of the proximal and distal perceived environment systems, we again performed two hierarchical multiple regression analyses as described in the multiple regression analysis with the gambling risk index as the dependent variable. In the initial model, the proximal subscales were entered first and accounted for 23.5% of the variance in gambling frequency ($R^2 = .235$; $p < .001$). In step 2, including the distal subscales explained an additional 5.5% ($\Delta R^2 = .06$; $p < .05$) of the variance in gambling frequency. In the second regression model, distal subscales were added in step 1 and the variance explained was non-significant ($R^2 = .039$; $p > .10$). When the proximal subscales were added, an additional 25% of variance was explained, and this increase was statistically significant ($\Delta R^2 = .251$; $p < .001$).

Finally, to evaluate the interaction between gender and the perceived environment in predicting gambling frequency, a hierarchical multiple regression was performed. After including all perceived environment subscales in step 1, gender was added in step 2 and explained an additional 4.6% of the variance in gambling frequency ($\Delta R^2 = .046$; $p = .001$). When the interaction terms were added to the model, no significant interactions were detected, and the increase in variance explained was non-significant.

Predicting problem gambling classification

To evaluate the relation between the perceived environment and problem gambling classification, we performed an

Table 6 Summary of logistic regression for variables predicting problem gambling classification ($N = 180$)

Variable	B	$SE\ B$	Wald	df	p	OR
Block 1						
Constant	−2.031	2.031	1	1	.317	.131
Parent who gambles	1.038	.397	6.831	1	.009	2.822
Friend models	.183	.061	9.160	1	.002	1.201
Friend disapproval	.007	.077	.009	1	.925	1.007
Parent disapproval	−.144	.061	5.609	1	.018	.866
Parent-peer influence	.130	.125	1.087	1	.297	1.139
Parent-peer compatibility	.060	.110	.298	1	.585	1.062
Friend controls	−.035	.119	.087	1	.768	.966
Friend support	−.274	.199	1.906	1	.167	.760
Family controls	−.119	.091	1.721	1	.190	.888
Family support	.103	.052	3.881	1	.049	1.109

unconditional logistic regression analysis comparing participants with no gambling problems to those in a combined at-risk/problem category (see Table 6). As in the analysis above, all perceived environment variables were entered into the logistic regression equation. Parent gambling, friend models, and family support displayed statistically significant positive relations to the dependent variable of problem gambling status. If the parent gambled, the student was 2.8 times more likely to report at-risk/problem gambling; for every one-point increase in the friend models subscale, the student was 1.2 times more likely to report at-risk/problem gambling; and for every one-point increase in family support, the student was 1.1 times more likely to be classified as an at-risk/problem gambler. Parent disapproval of problem behavior displayed a statistically significant ($p < .05$) negative relation to problem gambling status, indicating that for each one-point increase in the parent disapproval scale, the student was .866 times less likely to report at-risk/problem gambling.

We next compared the relative strengths of the proximal and distal perceived environments. First, we evaluated the importance of the proximal subscales after adjusting for the distal subscales by comparing a logistic regression model with both the proximal and distal subscales to a logistic regression model with just the distal subscales. There was a significant improvement in fit from the addition of the proximal subscales (Likelihood Ratio X^2 ($4, n = 182$) $= 40.7$, $p < .001$). We also evaluated the importance of the distal subscales after adjusting for the proximal subscales by comparing a logistic regression model with both to a model with just the proximal subscales. There was a significant improvement in fit from the addition of the distal subscales (Likelihood Ratio X^2 ($6, N = 186$) $= 14.6$, $p = 0.02$).

To evaluate whether gender moderated the relation between perceived environment and problem gambling status, we performed a hierarchical logistic regression, adding the perceived environment subscales in step 1, and gender and the interaction terms in steps 2 and 3, respectively. Likely

due to empty cells in the multi-dimensional logistic regression table, the interaction models could not be evaluated, so only overall results collapsing across boys and girls can be reported.

Discussion

We attempted to identify a set of predictors of adolescent problematic gambling and to explore how adolescents' perceptions of their parents and peers relate to their gambling behavior. Within a sample of urban, predominantly African-American youth, rates of problematic gambling were found to be high for both genders, and perceived environment variables accounted for significant variance in gambling problems and gambling frequency.

The vast majority of research on adolescent gambling has been conducted on Caucasian youth (Jacobs, 2000; National Research Council, 1999; Shaffer & Hall, 1996). However, being non-Caucasian has been identified as a risk factor for the development of gambling problems (Stinchfield, 2000; Volberg, 2002; Wallisch, 1995; Zitzow, 1996), and investigators have consistently recommended further exploration of gambling behavior among members of ethnic minority groups. The present results not only overlap with extant literature on gambling among Caucasian youth, but also contain some novel findings from this sample of urban, predominantly African-American adolescents.

Within our sample both the rates of lifetime (80%) and past-year (60%) gambling involvement were generally consistent with, yet lower than, previous reported estimates of 85% and 73%, respectively (National Research Council, 1999; Shaffer & Hall, 1996). However, rates of both at-risk (20.7%) and problem (12.8%) gambling were notably high, and 27% of the overall sample reported weekly gambling. These high rates of problematic gambling are consistent with previous research that suggests ethnic minority youth are at increased risk for gambling problems.

While the high rates of problematic gambling are cause for concern, it must be reiterated that the present sample was not randomly selected. Participants were drawn from only two high schools, and although these schools represent different urban neighborhoods, the sample is limited to local youth. At the same time, the ethnic breakdown of the sample corresponds well with the ethnic makeup of this urban school system, no parent denied participation for their child, and 100% of students in selected classes elected to participate in the study. Nonetheless, generalizability is unknown, and the prevalence estimates must be interpreted with caution. Further study of gambling among urban minority youth is warranted.

The present results suggest that the perceived environment is significantly related to adolescent gambling behavior. The perceived environment accounted for significant variance in the gambling risk index, gambling frequency, and problem gambling status. These results are consistent with past research on the role of parent and peer influences on adolescent gambling (e.g., Hardoon et al., 2004; Vachon et al., 2004; Wood & Griffiths, 2004), and on adolescent drinking and substance use (e.g., Ary, Duncan, Duncan, & Hops, 1999; Donovan et al., 1999; Simons-Morton, Chen, Abroms, & Haynie, 2004). As with other problem behaviors, gambling is influenced by the way adolescents perceive their parents and peers.

In the present study, the perceived environment was a significant predictor of gambling behavior but explained slightly less variance in the gambling risk index than in past research on other adolescent problem behaviors. For example, after controlling for age, ethnicity, and SES, the perceived environment was shown to account for between 22–34% of the variance in problem drinking among boys and between 23–32% of the variance in problem drinking among girls (Donovan et al., 1999), 28% of variance in marijuana use among junior high school students (Jessor & Jessor, 1973), and over 25% of variance in a multiple problem behavior index including times drunk, involvement with marijuana, and other deviant behaviors (Jessor & Jessor, 1977). In the current investigation, the perceived environment explained 29% of variance in gambling frequency but only 15.8% of variance in the gambling risk index.

The discrepancy in variance explained for gambling problems and gambling frequency warrants consideration. These variables were moderately correlated ($r = .38$), and some adolescents may be reporting frequent gambling but do not perceive it to be a problem. It is unclear whether these adolescents would be accurate in this perception. Within the adolescent gambling literature, there has been considerable controversy over how to interpret scores on various screening instruments (Derevensky et al., 2003; Shaffer & Hall, 1996), and there is no "gold standard" for classifying adolescent gambling problems. Another possible explanation for the

inconsistency in variance explained may be the differences in the social contexts of adolescent gambling and of other problem behaviors. Little is known about the social contexts in which adolescents gamble and the meaning they ascribe to the activity. Finally, the differences in variance explained might be due to a characteristic of an urban, largely African-American sample. Nonetheless, findings in the current study support the hypothesis that adolescent gambling, like other problem behaviors of adolescence, is significantly related to the ways adolescents perceive their environments.

The hypothesis concerning the relative strength of proximal and distal perceived environment factors was supported. As Problem Behavior Theory predicts (Donovan et al., 1999; Jessor & Jessor, 1977), the proximal perceived environment accounted for greater variance in the gambling risk index, gambling frequency, and problem gambling status than did the distal. Although relationship quality has predicted problem behavior among adolescents (e.g., Kafka & London, 1991; Werner & Silberstein, 2003), the current finding suggests that perceptions directly pertaining to problem behavior are more powerful predictors of gambling behavior than more general perceptions concerning relationships with family and friends.

Our findings about gambling by adolescent boys and girls are consistent with past results in the adolescent gambling literature. Gender has consistently been shown to be the strongest predictor of gambling behavior (e.g., Hardoon & Derevensky, 2002; Shaffer & Hall, 1996). As predicted, boys scored significantly higher than girls on measures of regular, at-risk, and problem gambling.

However, our hypotheses concerning the interaction of gender and the perceived environment were mostly unsupported. It is important to note that we had limited power to test for interactions and thus were not able to provide a robust test for the moderation hypotheses. Nonetheless, we detected one significant interaction between gender and family support. Among girls, family support displayed a positive relation to the gambling risk index. Girls who perceived higher levels of family support were more likely than girls who did not to report gambling problems. However, among boys, family support displayed a negative relation to the gambling risk index. Perhaps adolescent boys are especially sensitive to the benefits of a supportive family. Or, perhaps these girls' families are responding to the girls' problems by increasing support, while boys' families do not respond that way.

The hypotheses pertaining to specific proximal perceived environment variables were mostly supported. Parent gambling, parent disapproval of problem behavior, and friend models of problem behavior were all significantly related to at least one dependent variable. Only friend disapproval was unrelated to any measure of gambling behavior. The significant negative relation between parent disapproval and

problem gambling status indicates that adolescents who perceive that they will get in trouble for engaging in problem behavior are less likely to experience gambling problems. Although correlational, this finding suggests that parents should communicate their disapproval of gambling to their adolescent children. Further, this result appears to complement the results of Vachon et al. (2004), who found that youth who perceive inadequate parental disciplinary practices were more likely to experience gambling problems. Similarly, adolescents who reported that at least one parent gambles were more likely to self-identify as having gambling problems compared to adolescents who reported no parent gambling. Finally, in addition to the interaction between gender and family support, the importance of family relationships was further highlighted in the significant positive relation between family support and problem gambling classification. Although this main effect was in the positive direction, we were unable to test whether gender moderated this relation in predicting problem gambling classification, which seems likely based on the interaction described above.

In addition to parent and family correlates, peer correlates were also related to adolescent gambling. Friend models displayed a significant positive relation to the gambling risk index, gambling frequency, and problem gambling status, results consistent with previous research on adolescent gambling as well as other problem behaviors (e.g., Ary et al., 1993; Donovan et al., 1999; Simons-Morton et al., 1999). The salience of peer influences on adolescent gambling behavior was further evidenced by the distal variable friend controls. Adolescents who perceived that their friends exert more social control over them reported significantly more frequent gambling, but not gambling problems, than adolescents who reported that their friends exert no such controls. Perhaps friend controls actually measures closeness with friends. If this were the case, then adolescents who perceive their relationships with their friends as particularly close may be more likely to engage in problem behavior, either because they do not view gambling as a problem or because they believe that their friends would intervene if necessary to protect them. This result is largely consistent with Hardoon et al. (2004), who found that non-gamblers and social gamblers reported significantly higher levels of perceived social support than did at-risk and problem gamblers.

The present study has numerous strengths, including a sound theoretical basis incorporating topical psychosocial variables supported by previous literature, an understudied population of interest, and thorough analyses to evaluate statistical assumptions and interactions between variables. In addition, all perceived environment questions except those pertaining to gambling were directly taken from an established health questionnaire, the Adolescent Health and Development Survey (Jessor et al., 2001). We assessed psychometric properties of the questionnaire and found adequate

internal consistency and test-retest reliability on all but two subscales. The study also provides an important estimate of the reliability of the SOGS-RA as a measure of gambling problems in an urban, predominantly African American population.

Several limitations of the present study must be noted. In addition to the uncertain generalizability, numerous demographic characteristics were confounded. Therefore, we were unable to determine if the high gambling prevalence rates were due to ethnicity, SES, geographic region, the city school environment, or just a unique characteristic of this sample. Further, all behavioral data collected was based on self-report. We also performed a large number of statistical analyses. With 10 perceived environment independent variables and 3 dependent variables, 30 correlations were assessed. Using a standard Type I error rate (i.e., $p = .05$), we would thus expect 1.5 significant associations by chance alone. Yet we identified 6 statistically significant associations and an additional significant interaction, supporting the notion that the perceived environment is an important predictor of gambling behavior.

The findings presented here suggest several directions for subsequent research. The discrepancy in variance explained in gambling frequency and gambling problems highlights the need for careful consideration of the meaning of adolescent gambling problems and how they are assessed (e.g., Derevensky et al., 2003; Shaffer & Hall, 1996). In terms of specific components of the perceived environment, researchers should consider how parent disapproval and parent modeling might interact to encourage adolescent gambling. Similarly, the relations between gender, family support, and gambling behavior should be explored. Our findings suggest that boys and girls experience family support in different ways, and this information could be used to guide family-based prevention efforts. To understand better the roles of peer influences in adolescent gambling, investigators should more fully explore the role of peer models through the influences of active peer support for gambling and passive peer models and social norms, as well as the how the characteristics of peer relationships relate to gambling behavior.

In terms of prevention efforts, future research should use these perceived environment findings as fodder for prevention efforts in schools and with parents. In addition, parent behavior and attitudes and peer behavior should be researched as possible flags for indicated prevention efforts to reduce problematic gambling behavior.

The current study improves our understanding of gambling among adolescents in at least two important ways. First, this study represents the largest investigation of the gambling behavior of urban African-American youth to date. We found notably high rates of regular, at-risk, and problem gambling, and these findings indicate that gambling behavior in this population demands further research attention.

Second, we now have empirical evidence that gambling, like other problem behaviors of adolescence, is affected by the way adolescents perceive their worlds, and especially by the way adolescents perceive their parents' and peers' attitudes toward gambling and their gambling behavior. Continued exploration of these influences and other reasons why adolescents choose to gamble, will contribute to a clearer understanding of adolescent gambling and its attending problems.

References

Ary, D. V., Duncan, T. E., Duncan, S. E., & Hops, H. (1999). Adolescent problem behavior: The influence of parents and peers. *Behavior Research and Therapy*, *37,* 217–230.

Costa, F. M., Jessor, R., & Turbin, M. S. (1999). Transition into adolescent problem drinking: The role of psychosocial risk and protective factors. *Journal of Studies on Alcohol*, *60,* 480–490.

Derevensky, J. L., Gupta, R., & Winters, K. (2003). Prevalence rates of youth gambling problems: Are the current rates inflated? *Journal of Gambling Studies*, *19,* 405–425.

Dickson, L. M., Derevensky, J. L., & Gupta, R. (2002). The prevention of gambling problems in youth: A conceptual framework. *Journal of Gambling Studies*, *18,* 97–159.

Dickson, L. M., Derevensky, J. L., & Gupta, R. (2004). Harm reduction for the prevention of youth gambling problems: Lessons learned from adolescent high-risk behavior prevention programs. *Journal of Adolescent Research*, *19,* 233–263.

Donovan, J. E., Jessor, R., & Costa, F. M. (1999). Adolescent problem drinking: Stability of psychosocial and behavioral correlates across a generation. *Journal of Studies on Alcohol*, *60,* 352–361.

Evans, R. I. (2003). Some theoretical models and constructs generic to substance abuse prevention programs for adolescents: Possible relevance and limitations for problem gambling. *Journal of Gambling Studies*, *19,* 287–302.

Felsher, J. R., Derevensky, J. L., Gupta, R. (2003). Parental influences and social modeling of youth lottery participation. *Journal of Community and Applied Social Psychology*, *13,* 361–377.

Gupta, R., & Derevensky, J. (1998). Adolescent gambling behavior: A prevalence study and examination of the correlates associated with excessive gambling. *Journal of Gambling Studies*, *14,* 319–345.

Hardoon, K., & Derevensky, J. L.(2001). Social Influences involved in children's gambling behavior. *Journal of Gambling Studies*, *17,* 191–215.

Hardoon, K. K., & Derevensky, J. L. (2002). Child and adolescent gambling behavior: Current knowledge. *Clinical Child Psychology and Psychiatry*, *7,* 263–281.

Hardoon, K. K., Gupta, R., Derevensky, J. L. (2004). Psychosocial variables associated with adolescent gambling. *Psychology of Addictive Behaviors*, *18,* 170–179.

Jacobs, D. F. (2000). Juvenile gambling in North America: An analysis of long-term trends and future prospects. *Journal of Gambling Studies*, *16,* 119–152.

Jessor, R., Costa, F., & Turbin, M. S. (2001). *Adolescent health and development survey*. Boulder: Colorado University.

Jessor, R., & Jessor, S. L. (1973). The perceived environment in behavioral science: Some conceptual issues and some illustrative data. *American Behavioral Scientist*, *16,* 801–828.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development*. New York: Academic Press.

Jessor, R., Turbin, M. S., & Costa, F. M. (1998). Risk and protection in successful outcomes among disadvantaged adolescents. *Applied Developmental Science*, *2,* 194–208.

Kafka, R. R., & London, P. (1991). Communication in relationships and adolescent substance use: The influence of parents and friends. *Adolescence*, *26*(103), 587–588.98.

Kassinove, J. I., Doyle, K. A., & Milburn, N. G. (2000). Gambling and alcohol use in adolescence. *Journal of Social Behavior and Personality*, *15,* 51–66.

Ladouceur, R., Dubé, D., & Bujold, A. (1994). Gambling among primary school students. *Journal of Gambling Studies*, *10,* 363–370.

Langhinrichsen-Rohling, J., Rohde, P., Seeley, J. R., & Rohling, M. L. (2004). Individual, family, and peer correlates of adolescent gambling. *Journal of Gambling Studies*, *20,* 23–46.

Moore, S. M., & Ohtsuka, K. (1999). Beliefs about control over gambling among young people, and their relation to problem gambling. *Psychology of Addictive Behaviors*, *13,* 339–347.

National Research Council (1999). *Pathological gambling: A critical review.* Washington, DC: National Academy Press.

Peacock, R. B., Day, P. A., Peacock, T. D. (2000). Adolescent gambling on a Great Lakes Indian reservation. *Journal of Human Behavior in the Social Environment*, *2,* 5–17.

Scott, A. J., & Holt, D. (1982). The effect of two-stage sampling on ordinary least squares methods. *Journal of the American Statistical Association*, *77,* 848–854.

Shaffer, H. J., & Hall, M. N. (1996). Estimating the prevalence of adolescent gambling disorders: A qualitative synthesis and guide toward standard gambling nomenclature. *Journal of Gambling Studies*, *12,* 193–214.

Simons-Morton, B., Chen, R., Abrams, L., & Haynie, D. L. (2004). Latent growth curve analyses of peers and parent influences on smoking progression among early adolescents. *Health Psychology*, *23,* 612–621.

Stinchfield, R. (2000). Gambling and correlates of gambling among Minnesota public school students. *Journal of Gambling Studies*, *16,* 153–173.

Vachon, J., Vitaro, F., Wanner, B., & Tremblay, R. (2004). Adolescent gambling: Relationships with parent gambling and parenting practices. *Psychology of Addictive Behaviors*, *18,* 398–401.

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.

Vitaro, F., Wanner, B., Ladouceur, R., Brendgen, M., & Tremblay, R. E. (2004). Trajectories of gambling during adolescence. *Journal of Gambling Studies*, *20,* 47–69.

Volberg, R. (1993). *Gambling and problem gambling in Washington state*. Report to the Washington State Lottery. Albany, NY: Gemini Research.

Volberg, R. (2002). *Gambling and problem gambling among adolescents in Nevada*. Report to the Nevada Department of Human Resources. Albany, NY: Gemini Research.

Wallisch, L. (1995). *Gambling in Texas: The 1995 survey of adolescent gambling behavior*. Austin, TX: Texas Commission on Alcohol and Drug Abuse.

Werner, N. E., & Silberstein, R. K. (2003). Family relationship quality and contact with deviant peers as predictors of adolescent problem behaviors: The moderating role of gender. *Journal of Adolescent Research*, *18*(5), 454–480.

Winters, K. C., & Anderson, N. (2000). Gambling involvement and drug use among adolescents. *Journal of Gambling Studies*, *16*, 175–198.

Winters, K. C., Stinchfield, R., & Fulkerson, J. M. A. (1993). Toward the development of an adolescent gambling problem severity scale. *Journal of Gambling Studies*, *9,* 63–84.

Winters, K. C., Stinchfield, R., Botzet, A., & Anderson, N. (2002). A prospective study of youth gambling behaviors. *Psychology of Addictive Behaviors*, *16,* 3–9.

Wood, R. T. A., & Griffiths (2004). Adolescent lottery and scratch-card players: Do their attitudes influence their gambling behavior? *Journal of Adolescence*, *27,* 467–475.

Zitzow, D. (1996). Comparative study of problematic gambling behaviors between American Indian and non-Indian adolescents within and near a Northern Plains reservation. *American Indian and Alaska Native Mental Health Research: Journal of the National Center*, *7,* 14–26.