

Theory of Planned Behavior in School-Based Adolescent Problem Gambling Prevention: A Conceptual Framework

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Abstract Given its serious implications for psychological and socio-emotional health, the prevention of problem gambling among adolescents is increasingly acknowledged as an area requiring attention. The theory of planned behavior (TPB) is a well-established model of behavior change that has been studied in the development and evaluation of primary preventive interventions aimed at modifying cognitions and behavior. However, the utility of the TPB has yet to be explored as a framework for the development of adolescent problem gambling prevention initiatives. This paper first examines the existing empirical literature addressing the effectiveness of school-based primary prevention programs for adolescent gam-

bling. Given the limitations of existing programs, we then present a conceptual framework for the integration of the TPB in the development of effective problem gambling preventive interventions. The paper describes the TPB, demonstrates how the framework has been applied to gambling behavior, and reviews the strengths and limitations of the model for the design of primary prevention initiatives targeting adolescent risk and addictive behaviors, including adolescent gambling.

Keywords Adolescence · Youth · Gambling · Problem gambling · Prevention · Theory of planned behavior (TPB)

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Introduction

The prevention of problem gambling among youth has emerged as a significant area of concern in recent years. Evidence from international prevalence studies reveals that an identifiable proportion of adolescents gamble excessively and experience significant problems as a result. Current estimates suggest that approximately 0.4–8.1 % among adolescents aged 12–19 years meet diagnostic criteria for pathological gambling, and another 8–14 % are at risk for developing severe gambling problems (Volberg, Gupta, Griffiths, Ólason, & Delfabbro, 2010). Gambling problems are frequently associated with serious comorbid and subsequent health, psychological, and

social problems. Specifically, adolescent gambling problems have been correlated with alcohol and substance use problems, academic problems, poor or disrupted family relationships, delinquency, risky sexual behaviors, mental health problems, and suicidal ideation and behaviors (Blinn-Pike, Worthy, & Jonkman, 2010; Cook et al., 2014; Shead, Derevensky, & Gupta, 2010). Untreated adolescent problem gambling has also been linked in prospective studies with criminal behavior (Wanner, Vitaro, Carbonneau, & Tremblay, 2009) and depression (Dussault, Brendgen, Vitaro, Wanner, & Tremblay, 2011) in young adulthood. The significant negative and long-lasting implications of adolescent gambling problems for health and well-being underscore the importance of prevention among this vulnerable population.

In response to this need, school-based educational and prevention initiatives have increasingly been made available (Williams, West, & Simpson, 2012). Despite their importance, empirical evidence for sustained changes in adolescent gambling and problem gambling behavior is limited. Considering that the principle goal of any prevention initiative is to decrease the incidence of potential problematic behavior, there is a clear need for the development of youth problem gambling prevention initiatives in the context of other established theoretical models in order to improve the likelihood of successful long-term outcomes.

This paper will review the existing empirical literature on the effectiveness of available school-based prevention programs for adolescent gambling. Given the limitations of existing preventive interventions, we will present an argument for consideration of the theory of planned behavior (TPB; Ajzen, 1991, 2002) in the development of adolescent problem gambling prevention initiatives. Specifically, we will describe the TPB and will demonstrate how the framework has been applied to gambling behavior. Further, we will critically review the strengths and limitations of the model for the design of prevention initiatives targeting adolescent risk behaviors, including excessive gambling.

Prevention of Youth Gambling

Youth gambling prevention initiatives can be grouped into two broad categories: (a) *gambling-specific psychoeducational prevention programs*, and

(b) *gambling-specific psychoeducational and skills training prevention programs*. The goal of gambling-specific psychoeducational prevention programs is to increase awareness or knowledge about gambling and issues related to problem gambling (Derevensky, Gupta, Dickson, & Deguire, 2004; Ladouceur, Goulet, & Vitaro, 2012). The underlying premise of this approach is that youth are usually misinformed about the risks of the targeted behavior and that educating them on the psychosocial consequences of the behavior will deter or postpone initiation (Lantz et al., 2000). Although the content is diverse, gambling-specific psychoeducational prevention programs generally present one or more of the following types of information: the nature of gambling, gambling odds and probabilities, erroneous cognitions and gambling fallacies, warning signs of problem gambling, and the consequences associated with excessive gambling (Derevensky et al., 2004; Ladouceur et al., 2012; Williams, Wood, & Currie, 2010).

In contrast to gambling-specific psychoeducational prevention programs, gambling-specific psychoeducational and skills training prevention programs recognize that misinformation or knowledge deficits are only one of many factors that are associated with the initiation of youth problem gambling, and therefore go beyond merely presenting factual information (Ladouceur et al., 2012; Williams, Connolly, Wood, Currie, & Davis, 2004). Their approach to the prevention of youth problematic behavior is to influence attitudes related to the behavior with a focus on skills development to cope with high-risk situations (Lantz et al., 2000). Gambling-specific psychoeducational and skills training prevention programs typically cover a broad scope of themes, which include enhancement of self-esteem and self-image, development of interpersonal skills to better cope with stressful life events, development of problem-solving and decision-making skills, and development of skills for resisting peer pressure (Derevensky et al., 2004; Ladouceur et al., 2012; Williams et al., 2010).

Effectiveness of Youth Gambling Prevention Programs

While a number of available youth gambling prevention initiatives have been implemented in school settings, there have been a limited number of published evaluations to date. A summary of studies

investigating the effectiveness of gambling prevention programs is provided in Table 1.

Among the gambling-specific psychoeducational prevention programs that have been empirically evaluated, the majority have demonstrated improvements in participants' knowledge about gambling and/or excessive gambling (Ferland, Ladouceur, & Vitaro, 2002; Ladouceur, Ferland, & Vitaro, 2004; Ladouceur, Ferland, Vitaro, & Pelletier, 2005; Lavoie & Ladouceur, 2004; Lemaire, de Lima, & Patton, 2004; Taylor & Hillyard, 2009; Turner, Macdonald, Bartoshuk, & Zangeneh, 2008; Vitaro, Paré, Trudelle, & Duchesne, 2005; Walther, Hanewinkel, & Morgenstern, 2013). Several of the prevention programs assessed have also shown reductions in participants' erroneous cognitions or misconceptions about gambling (Ferland et al., 2002; Ladouceur, Ferland, & Fournier, 2003; Ladouceur, Ferland, Roy, Pelletier, Bussi eres, & Auclair, 2004; Ladouceur, Ferland, & Vitaro, 2004; Lavoie & Ladouceur, 2004; Lemaire et al., 2004; Todirita & Lupu, 2013; Vitaro et al., 2005; Walther et al., 2013). However, no study has demonstrated that these gains in knowledge or reductions in misconceptions are maintained over time. Although alterations in knowledge and misconceptions about gambling are assumed to be a precondition for eliciting changes in gambling behavior, only three studies (Turner, Macdonald, Bartoshuk, et al., 2008; Vitaro et al., 2005; Walther et al., 2013) have actually examined the effectiveness of existing programs in producing behavioral modifications. Of the programs that have been assessed, only one was successful in modifying gambling behavior by reducing the number of current gamblers immediately following the delivery of the intervention (Walther et al., 2013).

With regards to the gambling-specific psychoeducational and skills training prevention programs that have been empirically evaluated, almost all have shown improvements in participants' knowledge about gambling and/or excessive gambling and reductions in their erroneous cognitions or misconceptions about gambling (Ferland, Ladouceur, & Vitaro, 2005; Gaboury & Ladouceur, 1993; Turner, Macdonald, & Somerset, 2008; Williams, 2002; Williams et al., 2004, 2010). In addition, there is some evidence that these improvements in knowledge or decreases in misconceptions are maintained for up to 6 months following the delivery of the program (Ferland et al., 2005; Gaboury & Ladouceur, 1993; Williams, 2002).

A small number of the programs evaluated have also stimulated the development of more negative attitudes toward gambling (Williams, 2002; Williams et al., 2004, 2010). Certain prevention programs also produced actual behavioral changes, with concomitant improvement observed in participants' coping, applied decision-making and problem-solving skills (Turner, Macdonald, & Somerset, 2008; Williams et al., 2010), as well as reductions in the frequency of gambling participation (Williams et al., 2004, 2010).

According to Nation et al. (2003) and Weissberg, Kumpfer, and Seligman (2003), there are several characteristics associated with effective youth prevention programs that have been identified in the literature. Such programs: (1) are comprehensive and incorporate a combination of interventions to address the salient precursors or mediators of the problem behavior; (2) use diverse teaching methods that focus on increasing awareness of the problem behavior and on acquiring or enhancing skills; (3) have a theoretical justification, are based on accurate information, and are supported by empirical research; (4) are tailored to the community, cultural norms and developmental stages of the participants, and make efforts to include the target group in program planning; and (5) adapt evidence-based programming through ongoing intervention evaluation and continuous quality improvement.

Based on the above characteristics, it is evident that the effectiveness of existing school-based problem gambling prevention initiatives needs to continue to be evaluated for the purpose of program refinement (Derevensky et al., 2004). Several of the empirical studies we reviewed lacked behavioral measures of gambling or follow-up evaluations after post-test measurement. Without measurement of gambling behavior and post-test follow-ups, it is difficult to draw firm conclusions regarding the transfer of learning to actual gambling behavior or learning retention over time (Ladouceur et al., 2012).

Based on our review, there is also a clear need for the development of school-based problem gambling prevention initiatives in the context of theoretical models of behavioral change in order to improve the likelihood of sustained successful outcomes (Williams et al., 2010). Many of the existing prevention programs have been developed in the absence of a clear theoretical framework describing the expected causal mechanisms by which the program exerts its effect. While an underlying assumption of these

Table 1 Empirical studies concerning the evaluation of youth gambling prevention programs

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
<i>Gambling-specific psychoeducational prevention programs</i>				
Ferland et al. (2002)	Cognitive model	Participants: students in grades 7 and 8 from two high schools (total $N = 424$; mean age = 13.1 years; range 11–15 years) Experimental design	Statistically significant increase in knowledge about gambling observed for all three intervention conditions (video only, lecture/activities, combined video and lecture/activities) but not for control condition Statistically significant decrease in misconceptions about gambling observed for all three intervention conditions but not for control condition	No measure of gambling behaviors No long-term follow-up after post-intervention measurement
Lavoie and Ladouceur (2004)	Cognitive model	Conditions: video only condition; lecture/activities condition; combined video and lecture/activities condition; control condition 'Lucky' video was a 20-min French-language educational film on knowledge and misconceptions about gambling Lecture/activities consisted of a presentation of information about gambling with interactive activities Measurement intervals: pre-intervention, post-intervention (1 week after intervention) Questionnaire assessed knowledge about gambling (Cronbach $\alpha = 0.74$) and misconceptions about gambling (Cronbach $\alpha = 0.58$) Participants: students in grades 5 and 6 from two primary schools (total $N = 273$; mean age = 11.53 years; range 10–13 years) Experimental design	Combined video and lecture/activities condition significantly better than video only condition for decreasing misconceptions about gambling Statistically significant increases in knowledge about gambling observed for both intervention conditions (video only, combined video and discussion/activities) but not for control condition Statistically significant decreases in misconceptions about gambling observed for both intervention conditions but not for control condition	No measure of gambling behaviors No long-term follow-up after post-intervention measurement

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Ladouceur, Ferland, and Vitaro (2004)	Cognitive model	<p>Conditions: video only condition; combined video and discussion/activities condition; control condition</p> <p>French-language 'Lucky' video used</p> <p>Discussion/activities consisted of a 20-min presentation of information about gambling with interactive activities</p> <p>Measurement intervals: pre-intervention, post-intervention (after recess)</p> <p>Same questionnaire as Ferland et al. (2002)</p> <p>Participants: students in grades 7 and 8 from four high schools (total $N = 371$; mean age = 12.8 years; range 12–15 years)</p>	<p>No statistically significant differences between the two intervention conditions in increasing knowledge or reducing misconceptions about gambling</p> <p>Statistically significant increase in knowledge about gambling observed for experimental condition but not for control condition ($\eta^2 = 0.02$)</p>	<p>No measure of gambling behaviors</p>
Ladouceur et al. (2003)	Cognitive model	<p>Experimental design</p> <p>Conditions: video (experimental) condition; control condition</p> <p>English-language translation of the 'Lucky' video used</p> <p>Measurement intervals: pre-intervention, post-intervention (1 week after intervention)</p> <p>English-language translation of Ferland et al. (2002) questionnaire used</p> <p>Study 1 participants: students in grades 5 and 6 from three primary schools (total $N = 153$)</p>	<p>Statistically significant decrease in misconceptions about gambling observed for experimental condition but not for control condition ($\eta^2 = 0.04$)</p> <p>Statistically significant decrease in gambling-related misconceptions observed for experimental condition but not for control condition ($\eta^2 = 0.04$)</p>	<p>No long-term follow-up after post-intervention measurement</p> <p>No measure of gambling behaviors</p>

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
		Study 2 participants: students in grades 5 and 6 from same schools (total $N = 356$)	Prevention programs delivered by a gambling specialist were observed to be more effective at reducing misconceptions than those delivered by teachers in study 2	No long-term follow-up after post-intervention measurement
		Experimental design for both studies	Prevention exercises delivered by gambling specialists were observed to be more effective at reducing misconceptions than the 'Count Me Out' intervention delivered by either gambling specialists or teachers in study 2	
		Study 1 conditions: experimental condition; control condition	For students with a high baseline level of gambling-related misconceptions, 'Count Me Out' intervention delivered by gambling specialists observed to be most effective at reducing misconceptions in study 2	
		Study 2 conditions: teacher-delivered 'Count Me Out' condition; specialist-delivered 'Count Me Out' condition; specialist-delivered exercises condition		
		Study 1 experimental condition consisted of a one-session program (60 min) with exercises for raising awareness about randomness and chance in gambling		
		Study 2 compared study 1 exercises with the 'Count Me Out' intervention		
		Measurement intervals: pre-intervention, post-intervention (after program delivery)		
		Same questionnaire as Ferland et al. (2002)		
Ladouceur, Ferland, Roy, et al. (2004)	Cognitive model	Study 1 participants: students in grades 7 and 9 from two high schools (total $N = 345$)	Statistically significant decrease in gambling-related misconceptions observed for experimental condition but not for control condition in study 1, even for students with a high baseline level of gambling-related misconceptions (i.e., three or more errors)	No explicit information provided regarding the psychometric properties of questionnaire assessing gambling-related misconceptions

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Ladouceur et al. (2005)	Cognitive model	<p>Study 2 participants: students in grades 7 to 9 from four high schools (total $N = 520$)</p> <p>Same experimental design, conditions, and measurement intervals as Ladouceur et al. (2003)</p> <p>Questionnaire assessed understanding of notions of chance and randomness</p>	<p>No statistically significant differences between the three conditions in reducing gambling-related misconceptions observed in study 2</p> <p>For students with a high baseline level of gambling-related misconceptions, exercises delivered by gambling specialists were observed to be more effective at reducing misconceptions than the ‘Count Me Out’ intervention delivered by teachers in study 2</p>	<p>No measure of gambling behaviors</p> <p>No long-term follow-up after post-intervention measurement</p>
Ladouceur et al. (2005)	Cognitive model	<p>Participants: students in grades 11 and 12 from three high schools (total $N = 568$)</p> <p>Experimental design</p>	<p>Statistically significant increase in overall knowledge about gambling observed for experimental condition but not for control condition</p> <p>Statistically significant increase in knowledge about excessive gambling observed for experimental condition but not for control condition</p> <p>Statistically significant decrease in stereotypical perceptions of problem gamblers observed for experimental condition but not for control condition</p> <p>Significantly fewer students in the experimental condition reported an intention to gamble in the forthcoming year</p>	<p>No measure of gambling behaviors</p> <p>No long-term follow-up after post-intervention measurement</p>
		<p>Conditions: video (experimental) condition; control condition</p>		
		<p>‘Gambling Stories’ video was a 20-min educational film designed to inform adolescents on the possible consequences of excessive gambling and to increase awareness about youth problem gambling</p> <p>Measurement intervals: pre-intervention, post-intervention (1 month after intervention)</p> <p>Questionnaire assessed overall knowledge of gambling (Cronbach $\alpha = 0.61$), knowledge of excessive gambling (Cronbach $\alpha = 0.69$), and misconceptions about gambling (Cronbach $\alpha = 0.64$). Test–retest reliability at one-month interval was good ($r = 0.7$)</p>		

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Vitaro et al. (2005)	Theoretical model not explicitly stated	<p>Post-intervention questionnaire also assessed intention to gamble in the forthcoming year</p> <p>Participants: students in grades 10 and 11 from 13 high schools (total $N = 2848$)</p>	<p>Statistically significant increases in overall knowledge about gambling and excessive gambling, and statistically significant decreases in gambling-related erroneous cognitions observed for both intervention conditions (untrained teachers, trained teachers) but not for control condition</p>	No long-term follow-up after post-intervention measurement
		Experimental design	<p>Statistically significant increases in responsible gambling attitudes and statistically significant decreases in negative attitudes about gambling prevention and treatment observed for both intervention conditions but not for control condition</p> <p>No statistically significant changes observed for gambling frequency or problem gambling behaviors</p> <p>Teachers who received training about gambling were more effective at reducing erroneous cognitions and negative attitudes towards prevention and treatment than untrained teachers</p>	
		<p>Conditions: untrained teachers intervention condition; trained teachers intervention condition; control condition</p> <p>'LE JEU CHEZ LES JEUNES: Atelier de sensibilisation et de prévention—Niveau II' is a one-session program providing information about gambling, gambling-related erroneous cognitions, and the characteristics of youth problem gambling</p>		
		Measurement intervals: pre-intervention, post-intervention (2–3 months after intervention)		
		<p>Questionnaire assessed overall knowledge of gambling and excessive gambling (Cronbach $\alpha = 0.75-0.85$), gambling-related erroneous cognitions (Cronbach $\alpha = 0.78-0.83$), attitudes about gambling (Cronbach $\alpha = 0.67-0.76$), attitudes about gambling prevention and treatment (Cronbach $\alpha = 0.55$), gambling frequency and problem gambling behaviors (Cronbach $\alpha = 0.85-0.90$)</p>		

Table 1 continued

Study	Study characteristics/design	Key findings	Study limitations
Lemaire et al. (2004)	Theoretical model not explicitly stated Participants: students in grades 7 and 8 from public high schools (total $N = 894$)	Statistically significant increase in knowledge about the definition of gambling observed for intervention condition but not for control condition	No explicit information provided regarding the psychometric properties of questionnaire assessing gambling-related knowledge
	Experimental design	Statistically significant increase in knowledge of how gambling works observed for intervention condition but not for control condition	No measure of gambling behaviors
	Conditions: intervention condition; control condition	Statistically significant decrease in misconceptions about gambling observed for intervention condition but not for control condition	No long-term follow-up after post-intervention measurement
	'It's Your Lucky Day' is a one-session program providing information about gambling, randomness and probability, risk-taking, decision-making, community resources available	No statistically significant change observed for knowledge of the symptoms of pathological gambling	
	Measurement intervals: pre-intervention, post-intervention (1 month after intervention)		
	Questionnaire assessed knowledge of the definition of gambling, knowledge of how gambling works, misconceptions about gambling, knowledge of the symptoms of pathological gambling, and knowledge of available community resources		
Turner, Macdonald, Bartoshuk, et al. (2008)	Reasoned action framework Participants: students in grades 5 to 12 from 18 schools (total $N = 374$)	Statistically significant increase in knowledge about random events observed for intervention condition but not for control condition ($\eta^2 = 0.02$)	No explicit information provided regarding the psychometric properties of scales assessing gambling-related knowledge
	Experimental design	No statistically significant change observed for knowledge of luck and skills, attitudes towards gambling, coping skills, gambling behaviors or problem gambling behaviors	No long-term follow-up measurement after 2-month post-intervention measurement

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Taylor and Hillyard (2009)	Theoretical model not explicitly stated	<p>Conditions: intervention condition; control condition</p> <p>Intervention consisted of a one-hour presentation of information about gambling with discussions, interactive activities, and brief skits</p> <p>Measurement intervals: pre-intervention, post-intervention (2 months after pre-test)</p> <p>Questionnaire assessed knowledge of the nature of random events [Random Events Knowledge Test (REKT)], knowledge of luck and skill, attitudes towards gambling, coping skills for stressful situations, gambling frequency and problem gambling behaviors [South Oaks Gambling Screen Revised for Adolescents (SOGS-RA)]</p> <p>Participants: students ages 8–18 from drawn from primary schools, junior high schools, high schools, and a juvenile detention center (total $N = 8455$)</p>	<p>Statistically significant increase in knowledge about gambling and its associated dangers observed for intervention condition but not for control condition</p> <p>Absence of control condition</p>	
		Time series experimental design (no control group)	<p>Primary school students observed to show the greatest increase in knowledge from pre- to post-intervention, and high school students observed to show the least improvement in knowledge</p> <p>Males were observed to show greater increase in knowledge from pre- to post-intervention than females</p>	<p>No long-term follow-up after post-intervention measurement</p> <p>No post-intervention measure of gambling behaviors</p>
		<p>Intervention consisted of a 45-min presentation of information with activities and discussion. Students also receive CD-ROM with interactive activities to reinforce learning following program completion</p> <p>Measurement intervals: pre-intervention, post-intervention (after program delivery)</p> <p>Questionnaire assessed knowledge of gambling and its associated dangers (Cronbach $\alpha = 0.58$). A measure of problem gambling behaviors (Modified South Oaks Gambling Screen [MSOGS]; Cronbach $\alpha = 0.87$) was also included in the pre-intervention questionnaire but not in the post-intervention questionnaire</p>		

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Walther et al. (2013)	Adapted from drug use prevention approach; theoretical model not explicitly stated	Participants: students in grades 6 and 7 from 27 schools (total $N = 2109$; mean age = 12.0 years)	Statistically significant increases in knowledge about gambling and gambling related-misconceptions observed for both intervention condition and control condition, but gains in knowledge greater for students in the intervention group (Cohen's $d = 0.18$)	Non-random assignment of subjects to control condition
		Quasi-experimental design (non-random assignment to conditions)	Statistically significant increase in negative attitudes and beliefs towards gambling observed for intervention condition compared to control condition (Cohen's $d = 0.15$)	Differences in measurement intervals between and within control and intervention groups
		Conditions: intervention condition; control condition	Statistically significant reduction in the number of current gamblers observed between pre- and post-test for intervention condition compared to control condition (Cohen's $d = 0.02$)	Observed effects cannot be attributed specifically to gambling prevention unit since students completed three other prevention units for Internet use, online communication and computer gaming
		Intervention consisted of a 90-min presentation of information on gambling with activities and discussion. This gambling unit was one of four units completed by the students		No long-term follow-up after post-intervention measurement
		Measurement intervals: pre-intervention, post-intervention. Post-intervention measurement was completed at different times for the intervention group (mean of 31 weeks after pre-test) and control group (mean of 20 weeks after pre-test)		
		Questionnaire assessed knowledge about gambling and gambling-related misconceptions (Cronbach $\alpha = 0.60$), gambling attitudes and beliefs (Cronbach $\alpha = 0.75$), lifetime gambling behavior and gambling frequency		
Todritia and Lupu (2013)	Cognitive-behavioral model	Participants: students in grade 6 from one school (total $N = 81$; age range = 12–13 years)	Statistically significant increases in gambling-related knowledge observed for both intervention conditions but not control condition from pre- to post-intervention	Intervention and control samples drawn from only one school; limits generalizability of the findings

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
		Experimental design	Gambling-related knowledge observed to be significantly greater in the information than REE intervention condition	No explicit information provided regarding the psychometric properties of scales assessing gambling-related knowledge
		Conditions: information condition; rational emotive education (REE) condition; control condition		No long-term follow-up after 10-week post-intervention measurement
		Information intervention, delivered using computer software, consisted of a presentation of information about gambling with interactive activities designed to teach students to replace gambling-related misconceptions, cognitive errors, and positive attitudes with rational and correct conceptions		
		REE intervention consisted of a presentation of information about the connections between emotions, cognitions and behaviors		
		Measurement intervals: pre-intervention, post-intervention (10 weeks after pre-test)		
		Questionnaire assessed gambling-related misconceptions, erroneous cognitions, and attitudes		
		<i>Gambling-specific psychoeducational and skills training prevention programs</i>		
Gaboury and Ladouceur (1993)	Adapted from alcohol prevention approach; theoretical model not explicitly stated	Participants: junior and senior students from five high schools (total $N = 289$; mean age = 16 years)	Knowledge about gambling and coping skills improved post-intervention for students in intervention condition but not for control condition	No information provided regarding the psychometric properties of scales assessing gambling-related knowledge and attitudes
		Experimental design	Improvements in knowledge were maintained at follow-up	
		Conditions: intervention condition; control condition	Improvements in coping skills were not maintained at follow-up	
	Intervention consisted of a three-session curriculum (75 min per session) providing information about gambling and strategies for coping with gambling behavior		No statistically significant change in students' actual gambling behavior or attitudes towards gambling at post-intervention and follow-up	

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Ferland et al. (2005)	Adapted from smoking, alcohol and drug prevention approach; Theoretical model not explicitly stated	<p>Measurement intervals: pre-intervention, post-intervention; 6-month follow-up</p> <p>Questionnaire assessed knowledge about gambling, attitudes towards gambling, gambling behaviors [South Oaks Gambling Screen (SOGS)]</p> <p>Participants: junior high school students from eight high schools (total $N = 1193$; mean age experimental group = 13.3 years; mean age control group = 13.8 years; range = 12–14 years)</p> <p>Experimental design</p>	<p>Statistically significant increase in gambling-related knowledge observed for intervention condition but not control condition from pre- to post-intervention</p>	<p>Unable to assess the impact of curriculum on gambling-related problems given low base rate of problems reported</p>
		Experimental design	<p>Statistically significant decrease in attitudinal errors observed for intervention condition but not control condition from pre- to post-intervention</p>	
		Conditions: intervention condition; control condition	<p>Improvements in knowledge were maintained at 6-month follow-up</p>	
		<p>Intervention was an adaptation of the curriculum used in Gaboury and Ladouceur (1993). Sessions were reduced to 60 min in length, and a supplemental module covering strategies for coping with peer pressure was incorporated</p>	<p>Continued decrease in attitudinal errors was observed from pre-intervention to 6-month follow-up</p>	
		<p>Measurement intervals: pre-intervention, post-intervention; 3-month follow-up; 6-month follow-up</p>	<p>No statistically significant changes in students' social problem-solving skills or gambling frequency at post-intervention or follow-up</p>	
		<p>Questionnaire assessed knowledge about gambling (Cronbach $\alpha = 0.74$), gambling-related attitudinal errors (Cronbach $\alpha = 0.58$), social problem-solving skills [Inventaire de résolution de problèmes sociaux révisé (IRPS-R)], gambling frequency and problem gambling (DSM-IV-Multiple Response-Juvenile [DSM-IV-MR-J]; Cronbach $\alpha = 0.75$)</p>		

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Williams (2002)	Adapted from existing prevention programs; theoretical model not explicitly stated	Participants: students in grades 10 to 12 from 2 schools (total $N = 439$; mean age = 15.4 years; range 14–19 years)	Statistically significant increase in knowledge about gambling observed for intervention condition but not control condition from pre- to post-intervention	Intervention and control samples drawn from only one school each; limits generalizability of the findings
	Experimental design		Statistically significant decreases in positive attitudes towards and erroneous cognitions about gambling observed for intervention condition but not control condition from pre- to post-intervention	No explicit information provided regarding the psychometric properties of scales assessing gambling-related knowledge, gambling attitudes, and ability to calculate gambling odds
		Conditions: intervention condition; control condition	Statistically significant increase in ability to calculate gambling odds for both intervention and control conditions from pre- to post-intervention	
		Intervention consisted of a five-session curriculum (80 min per session) providing information about the nature of gambling and problem gambling, activities to increase students' understanding of erroneous cognitions and gambling fallacies, and teaching and rehearsal of decision-making, social problem-solving and adaptive coping skills	Changes in knowledge, attitudes, and erroneous cognitions were maintained at follow-up, but not the change in ability to calculate gambling odds	
		Measurement intervals: pre-intervention, 1-week post-intervention; 3-month follow-up	No statistically significant changes in actual gambling behavior (frequency, time spent, money won, money lost) or change in problem gambling at post-intervention and follow-up	
		Questionnaire assessed knowledge of gambling, ability to calculate odds, erroneous cognitions, gambling attitudes, coping skills, gambling frequency, expenditure, and problem gambling [DSM-IV-Multiple Response-Juvenile (DSM-IV-MR-J)]		

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
Williams et al. (2004)	Adapted from existing prevention programs; theoretical model not explicitly stated	Participants: students in grades 9 to 12 from 12 schools (total $N = 578$; mean age = 16.2 years)	Statistically significant increases in knowledge about gambling and in awareness of erroneous cognitions observed for intervention condition but not control condition from pre-intervention to follow-up	Post-intervention measurement collected but not analyzed; limits conclusions regarding the maintenance of observed changes over time
Same experimental conditions and prevention curriculum as Williams (2002)			Statistically significant increase in negative attitudes towards gambling observed for intervention condition but not control condition from pre-intervention to follow-up	No data provided regarding the psychometric properties of scales assessing gambling-related knowledge, awareness of erroneous cognitions, gambling attitudes, or decision-making and problem-solving skills
Measurement intervals: pre-intervention and follow-up (3 months after intervention). Measures also collected after each session but not analyzed in this study			Statistically significant decreases in time spent gambling and gambling expenditure intervention condition but not control condition from pre-intervention to follow-up	
Questionnaire assessed knowledge of gambling and problem gambling, awareness of erroneous cognitions, gambling attitudes, decision-making and coping skills, gambling frequency, gambling expenditure, and problem gambling (DSM-IV-MR-J). Scales are reported to have been previously validated and show good 1-month test-retest reliability, as well as good concurrent and predictive validity. However, results for the scale validation are reported elsewhere in an unpublished technical report			Increases in knowledge about gambling, awareness of erroneous cognitions, and negative gambling attitudes were found to be predictive of decreases in time and money spent gambling	
Williams et al. (2010)	Adapted from existing prevention programs; theoretical model not explicitly stated	Participants: students in grades 9 to 12 from 10 schools (total $N = 1240$; mean age = 16.0 years; range 14–20)	No statistically significant change in decision-making and coping skills, or change in problem gambling at follow-up Statistically significant increases in gambling knowledge, negative gambling attitudes, and decision-making and coping skills observed for both intervention conditions but not control condition from pre- to post-intervention	No long-term follow-up measurement after 3–7 month post-intervention measurement; limits conclusions regarding the maintenance of observed changes over time

Table 1 continued

Study	Theoretical model or framework	Study characteristics/design	Key findings	Study limitations
		<p>Same prevention curriculum as Williams et al. (2004). An optional sixth booster session was delivered to some participants at minimum one month later (standard program: $n = 682$; booster program: $n = 267$)</p> <p>Conditions: standard intervention condition; booster intervention condition; control condition</p> <p>Measurement intervals: pre-intervention and post-intervention (3 to 7 months after intervention)</p> <p>Same questionnaire as Williams et al. (2004). Specifically, scales measured knowledge of gambling and problem gambling, awareness of erroneous cognitions (1-month test-retest reliability; $r = .69$), gambling attitudes (1-month test-retest reliability; $r = .78$), decision-making and coping skills, gambling frequency, gambling expenditure, and problem gambling (DSM-IV-MR-J; Cronbach $\alpha = 0.75$)</p>	<p>Statistically significant decreases in erroneous cognitions observed for both intervention conditions but not control condition from pre- to post-intervention</p> <p>Statistically significant decreases in proportion of current gamblers and gambling frequency for both intervention conditions but not control condition from pre- to post-intervention</p> <p>Knowledge and negative attitudes observed to be significantly greater in the booster than standard condition</p> <p>No statistically significant change in gambling expenditure or in proportion of problem gamblers at follow-up</p>	<p>Differences in measurement intervals between and within control and intervention groups</p>
Turner et al. (2005)	Pathways model of gambling and problem gambling	<p>Participants: students in grades 7 to 13 (total $N = 392$; age range = 12–21)</p> <p>Experimental design</p>	<p>Statistically significant increase in knowledge about random events observed for intervention condition but not for control condition ($\eta^2 = 0.014$)</p> <p>No statistically significant change observed for knowledge of gambling probabilities, knowledge of luck and skill, problem gambling and self-monitoring skills, coping skills, or problem gambling behaviors</p>	<p>No explicit information provided regarding the psychometric properties of scales assessing knowledge of gambling probabilities, knowledge of luck and skill, knowledge of problem gambling and self-monitoring skills, and coping skills for stressful situations (PRI)</p> <p>No long-term follow-up after 10–12 week post-intervention measurement</p>

Table 1 continued

Study	Study characteristics/design	Key findings	Study limitations
Theoretical model or framework	<p>Conditions: intervention condition; control condition</p> <p>Intervention consisted of a six-session curriculum (70 min per session) with a seventh booster session providing information about the nature of random events and the impact of emotions experienced during gambling on decision-making, as well as teaching and rehearsal of adaptive coping skills and self-monitoring</p> <p>Measurement intervals: pre-intervention, post-intervention (10–12 weeks after pre-test)</p> <p>Questionnaire assessed knowledge of the nature of random events (REKT; Cronbach $\alpha = 0.70$), knowledge of gambling probabilities, knowledge of luck and skill, knowledge of problem gambling and self-monitoring skills, coping skills for stressful situations (Preventative Resources Inventory [PRI]), and problem gambling behaviors (SOGS-RA; Cronbach $\alpha = 0.87$)</p> <p>Participants: students in grades 10 to 12 (total $N = 201$; age range = 15–18)</p>	<p>Statistically significant increase in knowledge about random events observed for intervention condition but not for control condition ($\eta^2 = 0.104$)</p>	<p>No explicit information provided regarding the psychometric properties of scale assessing knowledge of coping strategies</p>
Turner, Macdonald, and Somers (2008)	<p>Cognitive-behavioral theory and reasoned action framework</p> <p>Same experimental design, conditions, and measurement intervals as Turner et al. (2005)</p> <p>Intervention was an adaptation of the curriculum used in Turner et al. (2005). Adaptations were geared towards enhancing compliance with the curriculum content, and included requiring teaching of all modules, requiring increased and consistent student access to curriculum materials, and transfer of CD-ROM content to VHS video</p> <p>Questionnaire assessed knowledge of the nature of random events (REKT; Cronbach $\alpha = 0.70$), knowledge of problem gambling and self-monitoring skills (Cronbach $\alpha = 0.61$–0.69), knowledge of coping strategies, coping skills (PRI; Cronbach $\alpha = 0.74$–0.91), and problem gambling behaviors (SOGS-RA; Cronbach $\alpha = 0.87$)</p>	<p>Statistically significant improvement in knowledge about self-monitoring skills observed for intervention condition but not for control condition ($\eta^2 = 0.053$)</p> <p>Statistically significant increase in knowledge about coping strategies observed for intervention condition but not for control condition ($\eta^2 = 0.056$)</p> <p>No statistically significant change observed for coping skills or problem gambling behaviors</p>	<p>No long-term follow-up after 10–12 week post-intervention measurement</p>

programs is that changes in gambling knowledge and attitudes are a precondition for producing changes in gambling behavior, numerous investigations have documented weak correlations between individuals' knowledge or attitudes and their actual behavior (Ajzen & Fishbein, 1977; Ajzen, Joyce, Sheikh, & Gilbert, 2011), and that knowledge alone does not predict behavior change (Ogden, 2012). However, even under conditions where a preventive intervention is "theory-based," it is often unclear exactly how the theory was used in its development (Webb, Sniehotta, & Michie, 2010). Further, health and social cognition research has suggested that other factors can play an influential role in behavior change. These include: perceptions of risk in performing the behavior; notions of self-efficacy; and intentions or motivations to change the behavior (Ogden, 2012). As such, it is plausible that the effectiveness of existing prevention initiatives in changing adolescent gambling behavior is generally restricted because the initiatives fail to target all of the salient factors that influence behavior change. This situation has led gambling researchers to propose consideration of alternate models that could more accurately describe behavioral decision-making processes (Cummings & Corney, 1987; Evans, 2003). Social behavior theories, such as the TPB, are some of the most pervasive models for conceptualizing the causal pathways between beliefs and health behavior outcomes.

Theory of Planned Behavior

The TPB is a well-established social cognition framework used to explain and predict a range of human behaviors (Ajzen, 1991, 2002). The TPB is an extension of the earlier theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TRA proposes that the immediate determinant (or cause) of any volitional behavior is an individual's intention to engage in that behavior. Behavioral intentions represent a person's motivation, expressed as a conscious plan or decision, to exert effort in performing a specific behavior. Intentions to perform the behavior are themselves determined by two distinct factors: attitudes and subjective norms. Attitudes are the individual's overall positive or negative evaluations of performing the focal behavior. Subjective norms consist of the individual's

perceptions of social pressure from important others to perform or not perform the behavior.

One limitation of the TRA is that it is restricted to the prediction of behaviors under an individual's volitional control (i.e., the person can decide, at will, to perform or not perform the behavior). However, the performance of many behaviors depend to a certain extent on "environmental constraints" or factors extraneous to an individual's intention or motivation, such as access to the necessary resources (e.g., time, money, skills) and opportunities to perform the behavior (Ajzen, 1991). To extend the applicability of the TRA to other behaviors outside of an individual's complete control, the TPB incorporates the perception of control over performance of the behavior as an additional predictor. Perceptions of control, or perceived behavioral control (PBC), represent an individual's expectations about the facility or difficulty related to performing a specific behavior. Ajzen (1991) proposes that PBC most closely resembles the concept of perceived self-efficacy. In the TPB, PBC is thought to influence performance of behaviors both directly and indirectly through an interaction with behavioral intentions. First, PBC is said to moderate the relationship between intentions and behavior such that behavioral intentions will increasingly predict behavior as perceptions of control over the behavior are strengthened. For example, the intention to quit smoking will be amplified as individuals perceive themselves to have control over their smoking behavior, which will increasingly lead to quitting behavior. The impact of PBC on behavior can also be direct where perceptions of control are accurate or realistic: when PBC is accurate, it provides useful information about the actual control an individual can exercise in the performance of a specific behavior (Ajzen, 2002). We provide an illustration of the proposed causal relationships within the TPB in Fig. 1.

Application of the TPB in the Prediction of Gambling Behaviors

The explanatory value of the TPB model for young adult gambling and disordered gambling behavior has received some empirical support. Martin et al. (2010) investigated the predictive relationships between key TPB components (i.e., attitudes, subjective norms, PBC, intentions) and past-year gambling participation,

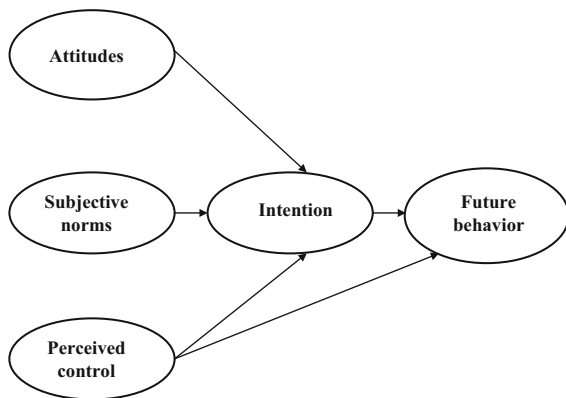


Fig. 1 Conceptual illustration of the theory of planned behavior (TPB)

as well as the frequency of participation. They observed that gambling-related attitudes, subjective norms, and PBC were predictive of the frequency of gambling participation, and that intention to gamble mediated the relationship between gambling frequency and the other TPB determinants. Conversely, only subjective norms and PBC were significantly associated with past-year gambling, with the relationship between PBC and past-year gambling mediated by gambling intentions.

Consistent with Martin et al. (2010), Wu and Tang (2012) observed that positive gambling attitudes, positive subjective norms regarding gambling, and a poor sense of control over gambling refusal were predictive of intentions to gamble, accounting for approximately 56 % of the explained variance in gambling intentions. They also indicated that gambling intentions and perceived control over resisting gambling are the most proximal predictors of problem gambling behavior, and that gambling intentions mediate the relationship between problem gambling behavior and the other TPB determinants.

Of interest, Martin et al. (2011) observed differences in the explanatory value of the TPB between problem and non-problem young adult gamblers. Specifically, they found that for non-problem gamblers, attitudes, subjective norms, and PBC were predictive of gambling frequency, and that intention to gamble mediated the relationship between gambling frequency and the other TPB constructs. Conversely, for problem gamblers, intentions did not mediate the association between the components of the TPB and gambling frequency, as none of the TPB components

were predictive of gambling intention. Rather, it was found that gambling-related attitudes independently predicted gambling frequency within this group.

To date, only one published study has explored the relationships between TPB components and gambling behavior among younger youth. Drawing from a sample of 757 secondary school and 250 university students aged 14–25, Moore and Ohtsuka (1997) found that intentions to gamble were modestly associated with gambling-related attitudes and subjective norms, accounting for 13–15 % of the explained variance. Additionally, they observed that gambling frequency was predicted most strongly by intentions to gamble (24–26 % of explained variance). It should, however, be noted that PBC was not included as a factor in the model.

The TPB in Adolescent Behavior Change Interventions

The TPB suggests that manipulations of attitudes, subjective norms, and control perceptions could potentially produce long-term changes in intentions and behavior (Fishbein & Ajzen, 2010). Montaña and Kasprzyk (2008) propose that for theory to adequately drive the intervention, it must provide a framework for the selection of salient factors that can be influenced from among the many possible factors associated with the behavior, and they suggest that the TPB is particularly useful in this regard. Additionally, Shek and Sun (2011) and Sun and Shek (2010, 2013) advocate for the incorporation of positive youth development constructs (e.g., promotion of cognitive competence, development of self-efficacy, fostering prosocial norms) in adolescent risk behavior prevention initiatives, and these positive youth development constructs parallel several of the TPB's targets for intervention (e.g., attitudes and beliefs, subjective norms, PBC). Consequently, interest in the utility of the TPB model for adolescent behavioral change interventions has increased over the past few years.

A number of studies have applied the TPB to the development of preventive interventions aimed at modifying beliefs, intentions, and behaviors pertinent to several adolescent risk activities, or in the evaluation of these interventions. Targeted adolescent risk activities have included general risk-taking (Buckley, Sheehan, & Shochet, 2010; Chapman, Buckley, &

Sheehan, 2012), unsafe driving (Poulter & McKenna, 2010; Sheehan et al., 1996), and risky sexual practices (Hill & Abraham, 2008; Jemmott, Jemmott, Braverman, & Fong, 2005; Jemmott, Jemmott, Fong, & McCaffree, 1999). However, the theory has been relatively neglected in the field of addiction (Webb et al., 2010). In one study, Cuijpers, Jonkers, De Weerd, and De Jong (2002) evaluated a TPB-based prevention program designed to target secondary school students' attitudes, social norms, and self-efficacy with respect to tobacco, alcohol, and cannabis use. Results of their study at 3-year follow-up revealed a significant decrease in the proportion of students reporting daily tobacco use, weekly alcohol use, and monthly cannabis use for the intervention group but not the control group. Recently, Guo, Lee, Liao, and Huang (2015) evaluated the effects of a TPB-based substance-use preventive education program on enhancing students' behavior intentions to abstain from illicit drug use and reducing their actual illicit drug use. They observed that students who received the prevention program demonstrated greater changes in their substance-related attitudes, subjective norms, PBC, and intentions over time than did those who received no intervention. Guo et al. also found that, compared to the control group, a significantly smaller proportion of participants in the TPB-based intervention group reported illicit drug use 6 months and 1 year following program delivery. These preliminary findings have prompted researchers to advocate for increased recognition of the value of behavior change theories such as the TPB in the development of interventions for addictive behaviors (Webb et al., 2010). Consideration of the TPB framework in the design and evaluation of prevention programs aimed at adolescent problem gambling is therefore warranted.

Strengths and Limitations of the TPB in Prevention Practice

As the literature suggests, the TPB is a valuable framework for the development of behavior change interventions, with research results indicating that the application of the model to behavioral interventions produces moderate changes in beliefs, intentions, and behaviors for youth risk activities and addictive behaviors. The planned behavior model is useful in

intervention design because it provides important information about the primary beliefs that influence intentions to perform or not perform the behavior under consideration, and therefore allows for the selection of appropriate targets for intervention.

Additionally, the TPB offers advantages over other cognitive and behavior change models. For one, the TPB can be applied to situations where individuals may lack the intention to change or where their actual level of intention is unknown, situations that are common in the practice of primary prevention (Romano & Netland, 2008). Adolescents are frequently reported to fail to actively seek to change their problematic gambling behavior for multiple reasons, including the belief that they can control their behavior, as well as adolescent self-perceptions of invincibility and invulnerability (Gupta & Derevensky, 2004; Hardoon, Derevensky, & Gupta, 2003). Additionally, problem gambling interventions have been criticized in the literature for their insufficient attention to the motivational factors that drive the behavior (Wulfert, Blanchard, & Martell, 2003). Because the TPB emphasizes the determinants of behavioral intentions, which leads to a better understanding of the factors related to behavior change, prevention activities can be designed for individuals or groups either ambivalent about or not motivated to change various behaviors, including gambling.

Further, in comparison to other change models, the TPB has a well-defined procedure for developing preventive interventions. The development of behavior change interventions using the TPB involves the identification of salient attitudes, perceived norms, control perceptions and intentions that explain the variance in the behavior of interest (Fishbein & Ajzen, 2010). This is achieved through qualitative and quantitative empirical research, called *elicitation research*, using samples that are representative of the population under consideration. Elicitation research is critical for the development of effective interventions since it would be counter-productive to target variables that do not account for a significant proportion of variance in behavioral intentions or behavior (Conner & Sparks, 2005), and allows the researcher or practitioner to identify the most culturally relevant variables of the group targeted for intervention (Romano & Netland, 2008). TPB elicitation research also facilitates the identification of subtle or important differences between those who engage in the behavior

and those who do not, and this information can inform the content of the preventive intervention for each group. Much elicitation research has already been conducted and is described within the literature for adolescent gambling behaviors (see Shead et al., 2010; Volberg et al., 2010, for a review of previously identified risk and protective factors).

Although the procedure for designing interventions based on the planned behavior framework is well-described, it is imperative to note that the model does not specify the strategies or techniques to be used to elicit changes in the target behavior; the selection of intervention strategies remains at the discretion of each individual investigator, depending on the nature of the behavior and population, and on the resources available (Fishbein & Ajzen, 2010; Webb et al., 2010). The TPB can therefore be considered more as a valuable framework for the identification of “cognitive targets for change” than as a model providing explicit guidelines on “how these cognitions might be changed” (Hardeman et al., 2002, p. 149). One proposed solution is to draw upon existing research that identifies the techniques judged to be most effective in changing behavioral determinants (Webb et al., 2010). While this approach remains in its infancy, certain techniques have been proposed as appropriate for changing specific TPB behavioral determinants (see Abraham & Michie, 2008; Hardeman et al., 2005; Michie, Johnston, Francis, Hardeman, & Eccles, 2008). Drawing from this literature, we provide in Table 2 a list and brief description of techniques that would be relevant to adolescent problem gambling prevention.

A second limitation of the TPB that has been increasingly acknowledged in the literature is the framework’s focus on the rational, cognitive processes for all health-related decision-making and action (Conner & Sparks, 2005). Researchers have suggested that a potential shortcoming of the theory is its failure to take into account emotional processes (Richard, de Vries, & van der Pligt, 1998; van der Pligt & de Vries, 1998), especially given evidence to suggest that anticipated affective reactions can influence behavioral decision-making (Josephs, Larrick, Steele, & Nisbett, 1992; Simonson, 1992). Negative anticipatory emotions (i.e., regret, guilt), in particular, are presumed to influence participation in high-risk or potentially addictive activities. Individuals are assumed to be motivated to avoid negative post-

behavioral feelings, and consequently tend to make decisions that they anticipate will minimize the potential of experiencing subsequent negative emotions (Sandberg & Conner, 2008). Negative anticipatory emotions therefore have an important motivational effect in deterring individuals from making risky behavior choices without consideration of their potential affective consequences (Janis & Mann, 1977). Findings from a small body of empirical studies provide support for the significance of anticipated negative emotions in gambling decision-making and intentions (Li et al., 2010; Risen & Gilovich, 2007; Wolfson & Briggs, 2002). Results from other studies further demonstrate the importance anticipatory regret in the prediction of intentions to initiate or continue gambling participation over and above the effects of other proximal determinants of behavior, such as attitudes and subjective norms (Sheeran & Orbell, 1999; Zeelenberg & Pieters, 2004). However, while this body of research does reveal the importance of anticipated negative emotions in gambling decision-making and gambling intentions, the predictive utility of anticipatory emotions in explaining excessive gambling behavior remains unclear, and is an area for future prevention research.

Concluding Remarks

Researchers, mental health professionals, and public policy makers have increasingly acknowledged the necessity for adolescent problem gambling prevention initiatives given the widespread availability of opportunities to gamble and the serious consequences of excessive gambling for adolescents’ psychological and socio-emotional health. In response to this need, several school-based prevention initiatives have been developed. Their importance notwithstanding, many existing preventive interventions have been developed in the absence of a guiding theoretical framework. Among those that have been designed using such a framework, the majority are based on the social inoculation/cognitive model, which involves providing youth with necessary knowledge to prevent excessive gambling behavior, or the cognitive-behavioral model, which features problem-solving, decision-making, and self-control methods for limiting excessive play (Evans, 2003). However, evidence for sustained changes in adolescent gambling behavior is

Table 2 Intervention techniques for changing TPB behavioral determinants from Abraham and Michie (2008), Hardeman et al. (2005), Michie et al. (2008)

TPB behavioral determinant	Technique	Description
1. Attitudes towards behavior	a. Provide information regarding the desired behavior and outcomes	i. Deliver information about the antecedents, costs, and benefits of performing the desired behavior, as well as the connections between antecedents and consequences
	b. Persuasive communication	ii. Explicitly present and defend arguments in favour of the desired behavior via credible sources
2. Subjective norms regarding behavior	c. Provide information about others' approval	iii. Deliver information about what non-expert others think about the behavior and whether they would approve or disapprove of any proposed change in behavior
	d. Modeling or demonstration of behavior by others	iv. Provide opportunities for observing non-expert others performing the desired behavior (e.g., during group learning, using a video, via a case study)
3. Perceived control over the behavior/self-efficacy	e. Prompt self-monitoring of behavior	v. Require the individual to track and record performance of specified behavior(s) (e.g., in a diary)
	f. Provide feedback regarding behavior	vi. Provide data regarding recorded or self-monitored behavior, and/or evaluate performance of behavior in relation to a set of standards or others' performance
	g. Prompt self-talk	vii. Encourage the use of self-instruction or planned self-statements (aloud or silently) to support implementation of desired behavior
	h. Prompt practice or rehearsal	viii. Encourage the rehearsal and repetition of desired behavior
4. Intentions to perform the behavior	i. Prompt intention formation	ix. Encourage decisions regarding actions or the setting of a general goal (e.g., make a behavioral resolution to not gamble beyond limits)
	j. Increase decision-making and problem-solving skills	x. Prompt for the detailed planning of performance of desired behavior or goal setting, as well as prompt for identification of alternative courses of actions and weigh the pros and cons of each
	k. Motivational interviewing	xi. Elicit self-motivating statements and evaluations of own behavior to minimize resistance to behavioral change

limited. Consideration of other theoretical models for the development of problem gambling preventive interventions is therefore warranted.

The TPB is a potentially viable framework for the development of school-based youth problem gambling prevention initiatives. Despite restricted knowledge about the applicability of the TPB to younger adolescents' gambling-related intentions and behaviors, a growing body of research provides supportive evidence for the significance of attitudes towards, family and peer subjective norms related to, and perceptions of control over gambling in the prediction of youth intentions to initiate and continue participation in gambling activities. The TPB has also been demonstrated as an effective framework in intervention design for several youth risk and addictive behaviors.

Finally, the TPB offers advantages over other cognitive and behavior change models. As previously noted, the TPB provides important information about the primary beliefs that influence behavioral intentions, and therefore allows for the selection of appropriate targets for intervention. It is plausible that the effectiveness of existing youth problem gambling prevention programs is limited, because they fail to target the most salient attitudes, subjective norms, and control perceptions found to influence gambling intentions and behaviors. Additionally, the TPB offers a framework for eliciting systemic change among groups with low motivation for change. Further, it provides a well-defined procedure for individualizing prevention initiatives for specific population groups or sub-groups. The need for empirical research

investigating the utility of the TPB in the design of school-based youth problem gambling prevention initiatives remains clear.

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Compliance With Ethical Standards

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Conflict of interest The authors declare that they have no conflict of interest, and that the manuscript does not contain clinical studies or patient data.

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