Correction of Erroneous Perceptions Among Primary School Students Regarding the Notions of Chance and Randomness in Gambling

Robert Ladouceur, Francine Ferland, and Patricia-Maude Fournier

ABSTRACT

This study evaluated the effectiveness of a gambling prevention program that aimed to correct the notions of chance and randomness among primary school students. The relative effectiveness of two prevention programs aiming to modify erroneous perceptions of gambling as well as the teacher's and specialist's on the psychology of gambling efficiencies to deliver the prevention programs were compared. Results showed that the program administered by a specialist of the psychology of gambling was more effective at decreasing erroneous perceptions than that provided by the teacher. The discussion raises the practical implications of these results for preventing gambling problems among primary school students, as well as the potential role that teachers could play in the implementation of such programs.

Gambling creates interests and passion in most societies. Adults participate in these activities as much as adolescents and children do. In fact, gambling now figures among the recreational activities of youths (Ladouceur, Boudreault, Jacques, & Vitaro, 1999; Ladouceur, Jacques, Ferland, & Giroux, 1998; Georges & Schoeder, 1998). Studies conducted by Ladouceur et al. (1999) and Ladouceur, Dubé, and Bujold (1994) revealed that 87% of youths aged 8 to 18 years have already bet money over the course of their lifetime, and 13.4% of adolescents do so daily (Ladouceur et al., 1999).

Gambling habits begin early and can have an impact on the present and future lives of young people. Several studies showed that a large proportion of adult pathological gamblers began gambling before the age of 10 years (Griffiths, 1990; Ide-Smith & Lea, 1988; Wynne, Smith, & Jacobs, 1996). There is a relationship between the age at which gamblers are initiated to gambling and the eventual severity of their addiction (Griffiths, 1990). Considering that gambling habits develop at a young age and that the risk for addiction is associated with participating in gambling activities, it is important to implement effective prevention programs for gambling among youths.

Few gambling prevention programs targeting primary school students have yet been developed and evaluated. Our knowledge of the psychology of gambling could provide a theoretical framework for the creation of such programs. It is known that most gamblers pursue their gambling activities despite repeated monetary losses. This behavior seems to be mainly explained by the erroneous perceptions they hold regarding the notion of chance (Ladouceur & Walker, 1996). The erroneous perception most often encountered among gamblers is their inability to take into account the independence of events (Ladouceur, 1994;

The authors are with the School of Psychology at Laval University, Quebec, Canada, G1K 7P4; E-mail: robert.ladouceur@psy.ulaval.ca.

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Ladouceur & Walker, 1996). In gambling situations this erroneous perception leads individuals to use the results of previous trials in attempts to master the activity and therefore attempt to increase their chances of winning. Gamblers' erroneous perceptions thus tend to encourage them to persist in gambling (Caron & Ladouceur, 2003).

It is not surprising to find such perceptions among primary and secondary school students (Carroll & Huxley, 1994; Derevensky, Gupta, & Cioppa, 1996; Ferland, Ladouceur, & Vitaro, 2002; Gupta, Hardoon, & Derevensky, 2001). Considering that the correction of erroneous perceptions is one of the most important components in the treatment of pathological gambling among adults(Ladouceur, Sylvain, Boutin & Doucet, 2002), correcting these perceptions before they are strongly rooted within youths' way of thinking may prevent the development of problematic gambling habits.

The present study evaluated the effectiveness of a prevention program specifically developed to explain the notion of chance and randomness to primary school students. The first phase of the study aimed to establish the effectiveness of the intervention, and the second phase compared two different prevention programs administered by a specialist or a regular teacher. As prevention programs are usually developed with the goal of being applied in the class by teachers, it was considered informative to compare the relative effectiveness of the same program administered by either a regular classroom teacher or a specialist. To assess that goal, some exercises targeting the same topic were drawn from the program Count Me Out, developed by Groupe Jeunesse (2000) and three experimental conditions were compared in that second phase: (1) the teacher provided the exercises of the Count Me Out awareness program, (2) a gambling specialist presented the exercises of the Count Me Out awareness program, and (3) a gambling specialist presented the exercises used in the first phase.

It was predicted that students in Group 3 would have a better understanding of the notion of chance and randomness than students in the other two groups. We also postulated that students in Groups 2 and 3 (programs delivered by a gambling specialist) would have a better understanding of the notion of chance and randomness than students in Group 1.

METHODS

Participants

The first phase comprised 153 students (44% girls) from three primary schools in the Quebec City region. Students were in grades 5 (N=66) and 6 (N=87), and classes were randomly distributed to the experimental and control groups. The control group included 71 children, whereas the experimental group comprised 82 children. Chi-square tests showed no significant differences between groups with regard to gender or academic level (p>.05).

The second phase of the study included 356 additional students (51% girls) in the same grades. Classes were randomly distributed between the experimental conditions. The C-T group (exercises from the Count Me Out program administered by the teacher) included 95 students, the C-S group (Count Me Out exercises administered by a gambling specialist) comprised 122 children, and the E-S group (exercises from first phase of the study administered by a gambling specialist) consisted of 139 students. Academic level showed a significant difference between groups ($\chi^2(2, N=356)=31.35$; p<.05) and was thus used as a covariate in further analyses.

Instrument

Gambling Questionnaire. This questionnaire evaluated one's understanding of the notion of chance and randomness. It included 18 items, of which 10 evaluated knowledge relating to the notion of chance, and 7 measured the extent of gambling habits. This questionnaire was developed for a previous study. A factorial analysis revealed a two-factor structure. The first factor corresponded to knowledge about gambling (eigenvalue=3.54, accounting for 18.6% of the variance) and the second factor corresponded to misconceptions about gambling (eigenvalue=2.44, accounting for 12.9% of the variance). The reliability of the knowledge scale is very good, with Cronbach's alpha at 0.74, whereas the reliability of the misconception scale is moderate, with Cronbach's alpha at 0.58.

Procedure

The intervention took place during a regular class period. In the first phase of the study, children in the experimental group completed the questionnaire before receiving the program, which lasted approximately 60 minutes. After this intervention was completed, they completed the questionnaire a second time. Students in the control group also completed the questionnaire at the beginning of the period, but instead of receiving the program they pursued their regular academic activities with their teacher for 60 minutes and then filled out the questionnaire a second time.

During the second phase, all participants completed the questionnaire a first time before receiving one of the interventions, which lasted 60 minutes. Once the preventive activities were finished, students completed the posttest questionnaire. It should be noted that for both phases of the study, the teacher and the gambling specialist were always present within the classroom while the activities were being conducted, whether they were conducting the session or not. If they were not involved in conducting the activities, they sat at the back of the class.

Preventive Activities

Exercises in the C-T Condition were drawn from the awareness raising program Count Me Out were administered by the teacher. A few weeks before the experimentation, teachers were informed of the prevention program that they would conduct with their class. They received a copy of the exercises to be presented and a copy of a teaching guide to assist them in their task. The "question–problem" exercise addressed the notions of chance, luck, and personal competency. The "unifying action" exercise sensitized students to not letting chance

guide their choices, and the "superstitious, on your mark!" exercise was concerned with myths and superstitions surrounding chance.

The exercises for the C-S condition were the same as in the C-T condition, except that the exercises were administered by a gambling specialist. In the E-S condition, three exercises were created and administered by a specialist in the psychology of gambling. Those exercises were used in both phases of this study.

Exercise 1, The Draw

The objective of this exercise was to illustrate the notion of independence of events and to clarify the concept of chance. All students first wrote their names on a piece of paper that was then put into a draw-box. Before drawing a name, the experimenter asked the students whether they believed they could guess which name would be drawn, even if all of the names had the same chances of being drawn. A name was then drawn, and the experimenter explained that it was impossible to guess the result, because chance is the only determinant of the result and all of the students' names had the same chance of being drawn. Once the explanations were made, the experimenter placed the name drawn back into the draw-box containing all of the students' names. She then asked the students if they believed that the name drawn the first time had more or fewer chances of being drawn a second time. It was explained that the name had as many chances of being chosen in this second draw as in the first draw, because each draw was a new game and chance had no memory.

Exercise 2, The Dice Game

This exercise demonstrated that tricks, strategies, lucky charms, and practice do not allow one to predict and control the results of a gambling activity. Chance and randomness are the only factors explaining the outcome of gambling. The entire class was invited to play dice. A die with three colors (red, green, and blue) was used. The experimenter divided the class into three groups and assigned one of the three colors to each group. During the activity the red group had to use tricks to attempt to outplay chance (examples: crossing their fingers, thinking hard that they will win, blowing on the dice). The green group was given five practice throws before the game began, and the blue group could not use practice throws or strategies. One student per group threw the die, each of them taking turns. At the end of the activity the experimenter explained that the outcomes of the game, regardless of prior practice or strategies, were determined by chance. Lucky charms and practice did not increase the students' control over chance.

Exercise 3, Lottery 5/42

This exercise aimed to demonstrate that no one can control chance. A bingo ball machine was used to conduct a lottery draw. The experimenter explained that the activity in which the students would participate was similar to Lottery 6/49. She briefly explained how the draw worked and asked each student to choose 5 numbers between 1 and 42 that were likely to make a winning combination. Students were asked to explain how they chose their five numbers. The experimenter then presented her own combination to the students, made of the following numbers: 1, 2, 3, 4, and 5. She asked the students whether they believed the latter combination had fewer chances of winning. The draw was made using a ball machine. She wrote the winning 5 numbers on the board and asked the students how many obtained all of the numbers, 4 of the numbers, 3 of the numbers, and so on. She used the class's results and comments to illustrate that strategies do not improve our performance in gambling: Chance and randomness are the only determinants of the outcome of the game.

RESULTS

A repeated measures analysis of variance conducted on the number of erroneous perceptions obtained in the first phase of the study indicated significant effects for time (F (1, 151)=20.05; p<.05), group (F (1, 151)=8.24; p<.05) and a *time* x *group* interaction (F (1, 151)=13.90; p<.05). These results suggested that the intervention enabled students in the experimental group to reduce their number of erroneous perceptions significantly more than did those in the control group.

Also in the first phase of the study, a second analysis was conducted with participants who made three erroneous perceptions or more at the pretest. Within this category, 21 were in the experimental group and 18 were in the control group. As the groups were nonequivalent for grade (χ^2 (1, N=40)=4.82; p<.05) this variable was used as a covariate. The analysis of covariance (ANCOVA) for repeated measures showed a significant *time* x *group* interaction effect (F (1, 37)=6.46; p<.05) confirming that the intervention created by the gambling specialists is effective in reducing the number of erroneous perceptions even for the students who made more erroneous perceptions than average. The means and standard deviations for the number of erroneous perceptions obtained by the first phase of the study are presented in Table 1.

Table 1. Mean Number of Erroneous Perceptions: Phase 1

	Evaluations	
	Preintervention *M* (SD)	Postintervention *M* (SD)
All students		
Experimental group	1.63 (1.74)	0.71 (1.36)
Control group	1.86 (0.57)	1.77 (1.52)
Three or more errors		
Experimental group	4.32 (1.34)	1.74 (2.33)
Control group	3.86 (1.06)	3.33 (1.49)

Note: N=153 for all students and 39 for those with three or more errors.

Table 2. Percentages of Error for Each Experimental Condition

	C-T Condition		C-S Condition		E-S Condition	
	Pre (%)	Post (%)	Pre (%)	Post (%)	Pre (%)	Post (%)
When I'm betting, I must know the tricks and strategies if I want to win.	68.4%	29.5%	63.9%	18.9%	64.0%	16.5%
If I gamble often at a game of chance and money, I can become good and win more money.	23.2%	13.7%	35.2%	11.5%	25.9%	0.7%
I don't have more chances to win at the lottery if I choose my numbers myself.	29.5%	16.8%	42.6%	16.4%	24.5%	8.7%
Betting is a good way to obtain money quickly.	14.7%	9.6%	21.3%	13.1%	12.9%	12.2%
Buying lottery tickets is a type of gambling.	15.8%	13.7%	22.1%	9.0%	13.7%	5.8%
It is impossible to predict chance.	15.8%	8.4%	29.5%	11.5%	20.9%	11.5%
When I play bingo, I have more chances of winning if I bring my lucky charm with me.	12.6%	8.4%	17.2%	3.6%	10.8%	3.6%
Dreaming that I win the lottery increases my chances of winning	10.5%	6.3%	13.1%	9.8%	5.0%	4.3%
It is impossible to predict the winner or the loser at any gambling activity.	0%	9.5%	4.9%	3.6%	3.6%	0.7%
If I lose while gambling, it's because I played badly.	11.6%	23.2%	16.4%	36.8%	10.9%	27.3%

Notes: N=95 for the C-T condition; N=122 for the C-S condition; N=139 for the E-S condition.

The number of erroneous perceptions obtained in the second phase of the study was also used as a variable to evaluate the efficiency of the three experimental conditions. Because analyses showed a significant group difference at the pretest (F (2, 350)=7.32; p<.05), the number of erroneous perceptions was used as a covariate. The ANCOVA conducted on this variable indicated a significant difference between the groups at posttest (F (2, 346)=3.83; p<.05). Contrast analyses showed that the E-S condition was significantly more efficient than the C-T and C-S conditions (p<.05) to decrease the number of erroneous perceptions, whereas the preventive exercises administered by the specialist on the psychology of gambling (C-S and E-S) were significantly more efficient than when delivered by the teachers (C-T; p<.05). In addition, the preventive exercises developed by the specialists on the psychology of gambling (E-S) were also more efficient than the exercises drawn from the Count Me Out program (C-S and C-T; p<.05). These results showed that the exercises created by the gambling specialists had a significantly bigger impact on the number of erroneous perceptions than exercises drawn from the Count Me Out program. The percentages of students who demonstrated erroneous perceptions on each item of the questionnaire are presented in Table 2.

A second analysis was also conducted for participants who had made three erroneous perceptions or more during the pretest. For those analyses the C-T condition included 32 students, the C-S condition included 65, and the E-S condition included 42 students. The repeated measures ANCOVA conducted on the number of erroneous perceptions indicated a significant *time* x *group* interaction effect, F (2, 134)=6.63; p<.05. The contrast analysis revealed that the C-S condition was significantly more efficient than the C-T condition in decreasing the number of erroneous perceptions (p<.05). Similarly, the

Table 3. Mean Number of Erroneous Perceptions: Phase 2

	Evaluations	
	Preintervention *M* (SD)	Postintervention *M* (SD)
All students		
C-T Condition	2.02 (1.51)	1.39 (1.72)
C-S Condition	2.64 (1.78)	1.39 (1.54)
E-S Condition	1.90 (1.60)	0.91 (1.13)
Three or more errors		
C-T Condition	3.75 (1.05)	2.58 (2.16)
C-S Condition	4.02 (1.19)	1.69 (1.59)
E-S Condition	3.94 (1.16)	1.86 (1.70)

Note: *N*=356 for all students and 74 for those with three or more errors.

C-S condition was also significantly more efficient than the E-S condition ($p<.05$). The means and standard deviations for the number of erroneous perceptions obtained during the second phase of the study are presented in Table 3.

DISCUSSION

This study aimed to evaluate the effectiveness of various prevention activities targeting primary school students, according to whether those activities were conducted by a regular teacher or a specialist on the psychology of gambling. Three activities drawn from the awareness-raising program Count Me Out (Groupe Jeunesse, 2000), were compared to prevention activities based on a cognitive model developed by specialists in the psychology of gambling. Both interventions targeted the correction of erroneous perceptions toward chance and randomness.

The hypothesis that students assigned to prevention exercises developed by gambling specialists would have a better understanding than those assigned to the exercises drawn from the Count Me Out program (Groupe Jeunesse, 2000), after intervention was confirmed. In fact, the exercises corrected a greater number of erroneous perceptions than those from the Count Me Out program. These results were observed for the entire student sample only, whereas the second hypothesis, which stipulated that children would benefit more from a program delivered by a gambling specialist than by their regular teacher, was also confirmed. In fact, results showed that when the preventive intervention was delivered by a specialist on the psychology of gambling, the intervention had a significant effect on the correction of erroneous perceptions, regardless of the exercises used. The advantage of a specialist could be related to the quality of the theoretical content transmitted during the class intervention. It is quite possible that the specialist was less biased and better able to delimit the problem than the teacher. Because most people entertain erroneous perceptions regarding how chance works (Ladouceur, Paquet, Lachance, & Dubé, 1996), it is very likely that some teachers also entertain erroneous perceptions themselves. Accordingly, they may be inadvertently transmitting false beliefs to their students, instead of teaching them how chance truly functions. A teacher who has chosen the same lottery combination for the past several years may have difficulty explaining the uselessness of his or her method to a group of students.

It should also be noted that the teachers only drew on the theoretical content that they transmitted from the teaching guide accompanying the prevention exercises. On the other hand, the gambling specialists possessed a theoretical knowledge that enabled them to go beyond the contents of the teaching guide to add supplementary explanatory elements that provided the students with a more refined comprehension. The teachers relied entirely on the content of the guide, which although generally well written, could not foresee all of the students' questions. Consequently, the specialist in the psychology of gambling seemed actually the best person to adequately correct erroneous perceptions of chance and randomness. The results of the current study, therefore, clearly showed the importance of correcting teachers' erroneous perceptions before assigning them to teach gambling prevention programs for children.

It is important to note that teachers' skills at conducting prevention programs are not being questioned here. According to us, their training as teachers and their great experience among youths make them the people who are best placed to intervene among youths. However, their knowledge about gambling and the strong probability that they hold erroneous conceptions about chance and randomness lead us to believe that they would improve the quality of their interventions if they could benefit from a training session. This training session should focus on the psychology of gambling to allow teachers to deepen their knowledge of gambling activities and to correct their own erroneous perceptions toward gambling.

This study was the first to compare different preventive activities regarding gambling and the person who delivers them. Although the results obtained here were positive, some limitations should be noted. First, it would have been interesting to include an experimental condition in which teachers delivered the activities created by the gambling specialists. Second, it is important to note that different teachers were included in this study and the total amount of time they allocated to prepare for their presentation varied. This preparation could have made a difference in performance and in the efficiency of the teacher interventions. Third, from previous research we know that most individuals have erroneous perceptions about gambling, but unfortunately we did not evaluate whether the teachers involved in our study had any. Knowing that

information would have allowed us to compare the performance based on the number of erroneous perceptions. This comparison would have been helpful in understanding the real impact of erroneous perceptions on teaching students about chance and randomness.

Despite the aforementioned limitations, the results of the present study revealed that, like adults (Ladouceur et al., 1996), the majority of primary school students hold erroneous beliefs concerning the notions of chance and randomness. Although supporting the results previously obtained by Frank (1989), and Derevensky et al. (1996), the present study also demonstrated that the use of prevention exercises significantly reduced the number of erroneous perceptions regarding the notion of chance. It is hoped that preventive interventions with primary school students will develop a more realistic attitude toward chance and may also decrease, in the long run, the number of youths who develop gambling problems.

This study also indicated that a short intervention (60 minutes) can be effective in modifying erroneous perceptions held by primary school students about the notions of chance and randomness. A preventive intervention involving several short sessions, each targeting a particular theme, could thus help modify most erroneous conceptions that youths entertain concerning chance. Such an intervention may help youths to make a more informed choice about their eventual participation in gambling activities.

The prevention of gambling has just begun to be addressed with youths. Only a few prevention programs are actually available, and most of them were created to be used in a school setting. Teachers are therefore the best persons to use those programs and to implement them in their own classrooms. But as this study showed, it is important to inform all teachers and to correct their own erroneous perceptions about chance and randomness before they can deliver all prevention programs efficiently.

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