



Predictors of adverse gambling related consequences among adolescent boys



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ARTICLE INFO

Article history:

Received 19 February 2016

Received in revised form 8 June 2016

Accepted 8 June 2016

Available online 09 June 2016

Keywords:

Gambling

Adolescents

Problem gambling

Gambling consequences

Predictors

ABSTRACT

Although gambling is illegal for minors, adolescents do gamble and even higher proportions of adolescents than adults are at risk to become problem gamblers. Moreover, many adolescents suffer from a wide range of gambling related harms, and this study sought to examine what predicts different adverse consequences of adolescent gambling. Our aim was to test whether various cognitive, motivational and behavioural factors were associated with psychosocial consequences and loss of control, and with interpersonal and financial consequences of gambling, as measured by the Canadian Adolescent Gambling Inventory, the only instrument developed specifically for use on adolescents. The data was collected on a convenience sample of 1330 male Croatian students ($M_{age} = 16.58$, $SD_{age} = 1.16$) from all three types of secondary education in Croatia. Results show that a high proportion of adolescents gamble, and that almost half of them are either at risk or can already be considered problem gamblers. Sport betting, VLT machines and betting on virtual horse races were the most frequent gambling activities for Croatian high-school boys. Hierarchical regression models showed that psychosocial consequences and loss of control can be predicted by higher frequency of gambling, previous experience with winning money and a specific motivation to earn money gambling, to become a better gambler and with having a drive to continue gambling after winning. On the other hand, interpersonal and financial consequences were predicted again by a higher frequency of gambling, the motive to be a better gambler and the drive to continue gambling after winning, but also by specific motivation to relax and feel better. Having more cognitive distortions, specifically having poorer understanding of chance and probabilities and more superstitious beliefs, as well as engagement in general risky and antisocial behaviour also predicted more interpersonal and financial consequences. Findings are discussed in the context of practical implications for prevention programs of adolescent gambling.

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1. Introduction

Even though in most countries around the world adolescents under the age of 18 do not have legal access to any sort of gambling activities, numerous research shows that they do gamble, and that their over-involvement in gambling leads to mental health problems, family problems, problems in school, disrupted interpersonal relationships etc. (Derevensky & Gilbeau, 2015). Furthermore, previous studies have identified adolescents (especially adolescent boys) as a high-risk group for developing severe gambling problems and consequences (Derevensky & Gilbeau, 2015) since they have trouble recognizing their gambling has potential negative consequences (Derevensky, Gupta, & Winters, 2003) and they do not seem to perceive gambling as a high risk activity (Spurrier & Blaszczynski, 2014). Therefore, it is not surprising that the incidence of adverse consequences and

problematic gambling is higher in adolescents than in adults (Derevensky & Gupta, 2000; Gupta & Derevensky, 1998; Jacobs, 2004; Shaffer & Hall, 1996, 2001; Wilber & Potenza, 2006) making adolescents an especially vulnerable group and research on consequences of their gambling important. This study tries to extend previous literature in the field by focusing on correlates of specific kinds of consequences of gambling among adolescent boys.

Gambling and games of chance have been present and popular throughout history and are known as one of the earliest forms of entertainment. In the past twenty years, gambling has undergone a mass expansion all over the world, primarily under the influences of globalization and technology development. Types of games of chance are more and more diverse and, therefore, attractive to potential consumers, especially adolescents. Moreover, with the introduction of online gambling, it has gone from being site specific to entering cyberspace – global, accessible and available 24 h a day (Griffiths, 1999).

A large body of research indicates that its increased accessibility is correlated with increases in the number of gambling activities and problem gamblers, both among adults (Jacques, Ladouceur, & Ferland, 2000;

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Ladouceur, Jacques, Ferland, & Giroux, 1999; Shaffer, LaBrie, & LaPlante, 2004; Volberg, 2002) and adolescents (Welte, Barnes, Tidwell, & Hoffman, 2009). This trend is especially noticeable in countries with liberal gambling regulation such as Croatia. More than a decade ago, Croatia turned from state monopoly to market regulation of gambling and betting which was allowed by liberal legislation regarding games of chance. As a result, the offering and promotion of games of chance (primarily sports betting) escalated in such a way that today we have approximately ten to fifteen times more places registered for gambling in comparison to 15 years ago (Ricijas & Dodig, 2014). Therefore, it is not surprising that gambling activities in Croatia are widespread.

The results of the national general population survey ($N = 4756$; 15 to 65 years of age) showed that 67% of respondents reported participation in gambling activities at least once in their lifetime, 38.3% reported participation in gambling activities in the last year, and 32.5% in the last month. Prevalence of participation in gambling activities was greater among men than women (Glavak Tkalic & Miletic, 2012).

What is particularly concerning is that Croatian minors, although gambling is illegal under the age of 18, evidently access different types of games of chance. Results from a prevalence research study conducted on a representative sample of Croatian high-school students ($N = 1952$, $m = 47\%$, $f = 53\%$) show that 83% of them report having ever gambled during their life-times. When it comes to *life-time* prevalence of different games of chance, they are also highly represented: sports betting = 42.7%; lotto = 36%; scratch cards = 50.9%, gambling on VLT machines = 26.2%, betting on virtual races = 22% (Ricijas, Dodig, Huić, & Kranzelic, 2011). Also, data from the same prevalence study show that almost a third of them can already be classified as at risk or problem gamblers, and over 90% of them are boys (see also Dodig, 2013). This confirms international trends showing the same high participation of adolescents, especially adolescent boys, in gambling activities around the world (Volberg, Gupta, Griffiths, Olason, & Delfabbro, 2010).

Volberg et al. (2010)'s review also points out that research on adolescent gambling in European countries, although existing, has been rare compared to North America and Australia. The handful of studies that have been conducted in Central and Eastern Europe, usually focus on prevalence data and only on demographic and family/peer related factors as predictors of adolescent problem gambling behaviour. At the same time they ignore the individual level of the gambler and his/her cognitive and motivational factors so more research is needed to investigate their importance in countries outside of North America and Australia. In a different review of adolescent gambling Blinn-Pike, Lokken Worthy, and Jonkman (2010) make a similar point, adding to it the importance of measuring gambling activities and consequences with reliable and valid instruments developed especially for use on adolescents.

A growing body of research shows that a variety of different characteristics and constructs are correlated with gambling related problems among youth (see Derevensky & Gilbeau, 2015 for the most recent review). Along with already mentioned community level factors such as availability and access to gambling activities, at an individual level specific cognitions and motivational factors have been found especially important (Delfabbro, Lambos, King, & Pugliese, 2009; Derevensky, Gupta, & Baboushkin, 2007; Dodig, 2013). Adolescent problem gamblers have poorer understanding of odds and probabilities (Delfabbro, Lahn, & Grabosky, 2006), hold erroneous beliefs about their chance of winning (Joukhador, Maccallum, & Blaszczyński, 2003), are vulnerable to illusions of control over gambling (Moore & Ohtsuka, 1999; Orgaz, Estevez, & Matute, 2013), and foster superstitious beliefs with regard to gambling (Donati, Chiesi, & Primi, 2013).

Furthermore, adolescents gamble for a variety of different reasons some of which have been linked to more adverse consequences and more problem gambling, such as gambling to earn money (Moore & Ohtsuka, 1999; Delfabbro & Thrupp, 2003) and the motivation to become better at gambling (Derevensky & Gilbeau, 2015). Moreover, research both on adults (Wood & Griffiths, 2007) and adolescents

(Gupta & Derevensky, 1998) shows that some people use gambling as a coping activity to alleviate stress so it is of no surprise that adolescents gamble for reasons of feeling better and relaxing, with these motivations being linked to more problematic gambling (Yip et al., 2011). Moreover, having an experience of winning a large sum of money seems to motivate higher gambling frequency and leads to more problem gambling (Ricijas & Dodig, 2014; Turner, Zangeneh, & Littman-Sharp, 2006).

In addition to cognitive and motivational factors, behavioural factors such as gambling frequency and risky behaviour in general also play important roles in adolescent gambling. Several studies showed higher gambling frequency to be tied to gambling problems and more harm (Boldero, Bell, & Moore, 2010; Raisamo, Halme, Murto, & Lintonen, 2013). The link between risky or anti-social behaviour, and problem gambling has also been well-documented (Gupta & Derevensky, 1998; Ricijas, Dodig, Hunderic, & Kranzelic, 2015; Stinchfield, 2000; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001) even in nationally representative samples (Welte et al., 2009) and longitudinal studies (Wanner, Vitaro, Carbonneau, & Tremblay, 2009).

However, studies done so far usually focus only on a narrow set of consequences used to differentiate between those who develop gambling-related problems and those who don't and a lot is known about what kind of cognitive, motivational and behavioural factors differentiate them. However, gambling leads to a variety of different adverse consequences for the individual. These include harms at an intraindividual level such as cognitive preoccupation with gambling, loss of control and different emotional problems. But it also leads to relational level harms such as impairments in close relationships with parents and peers. Finally, adolescent gamblers lose a lot of money gambling. More specifically they lose money that is not theirs and they usually (especially in Croatia) do not have jobs that would allow them to have a constant influx of that money. They need to redirect their allowance, which is usually spent on food, drinks, transport and leisure, to their gambling activities. This all leads to adolescents also experiencing financial costs and problems because of their gambling. Although some authors have called for more research into risk factors associated with specific types of consequences (e.g. Raisamo et al., 2013), to the best of our knowledge no study so far has examined whether different factors are associated with different kinds of consequences.

Furthermore, only a handful of studies use instruments that adequately capture adolescent problem gambling. Researchers (Stinchfield, 2010) have questioned the use of screening and diagnostic instruments that have simply been adapted from conceptualizations of adult gambling such as the widespread SOGS-RA (Winters, Stinchfield, & Fulkerson, 1993), DSM-IV-J (Fisher, 1992) and its revision the DSM-IV-MR-J (Fisher, 2000). Also, our knowledge of the nature of youth problem gambling has been continuously evolving together with our understanding of its correlates and risk factors (Derevensky & Gilbeau, 2015). At the same time, only one instrument was developed specifically for adolescents – the Canadian Adolescent Gambling Inventory – CAGI (Tremblay, Stinchfield, Wiebe, & Wynne, submitted for publication). Its authors recognized the need to screen for all potential consequences that adolescents might experience as a result of their gambling and which can be observed in relation to individual's psychosocial functioning and financial costs. Such a conceptualization is also visible from problem gambling definitions (Korn, 2000) which all emphasize preoccupation and loss of control as well as psychological, social and financial consequences of gambling.

2. Current study

The purpose of the present study was twofold. First, we wanted to examine the prevalence of different sorts of consequences among a large sample of Croatian adolescent boys. Investigating Croatian adolescents is an important contribution since only a handful of studies have investigated youth gambling outside of Western countries. Also, studies

so far have shown that boys not only engage in gambling activities more than girls, but they are also more likely to be classified as at-risk or problem gamblers (Shead, Derevensky, & Gupta, 2010; Ricijas et al., 2011) making the male gender a risk factor in adolescent gambling, and research conducted on gender specific samples not only interesting but a necessity.

Second, we aimed to test a model in which additive effects of different cognitive, motivational and behavioural factors were examined as predictors of different sets of gambling consequences. Following the procedure of Donati et al. (2013) we integrated the various factors into the same model. By doing that, and examining different types of consequences, our study is in line with previously stated conceptualizations of youth gambling behaviour which emphasize multidimensionality. This can provide a more complete description of different types of gambling consequences and give insight into how they are maintained. It can also inform intervention and treatment efforts by painting a more nuanced picture of the adolescent gambler. Focusing research efforts on predictors of specific consequences is of special importance since studies show that adolescents are not particularly aware of those same consequences, and there are differences in which consequences they do/do not expect. Several studies showed they do expect to lose control of their gambling behaviour, but not that their behaviour will lead to social consequences or money problems (Wickwire, Whelan, & Meyers, 2010; Wong & Tsang, 2012). So it is worth examining whether two different types of consequences, namely (1) psychological consequences and loss of control and (2) social and financial consequences have different or specific predictors.

Also, we aim to extend current knowledge of adolescent specific gambling consequences by using the recently developed CAGI, which not only has validity for use on adolescent populations, but is multidimensional and allows us to investigate different types of consequences.

3. Method

3.1. Participants

A convenience sample of 1330 male high-school students from 7 Croatian cities participated in the study. The sample represents all three types of secondary education in Croatia, with percentages from each category roughly representing the national distribution of the number of students enrolled in these high-school programs. Classes in each school were selected randomly and all the students who attended school that day, completed the questionnaire (no one refused to participate in the study). All four high-school grades were represented equally (with a slightly lower number of 4th grade students because of the 3-year vocational schools that do not have a 4th grade). The 7 cities varied in size (from large cities to smaller towns) comprising a rather heterogeneous sample. Basic socio-demographic characteristics are presented in Table 1.

3.2. Instruments

Frequency of gambling was measured by one part of the Gambling Activities Scale (Ricijas et al., 2011). We listed six games of chance (sports betting, lotto, scratch cards, VLSs/slot machines, electronic roulette and betting on virtual races) focusing on those organized by official providers and those which are the most widely spread. Informal gambling (such as betting with friends) was excluded since previous research has shown poor representation of these activity (Ricijas et al., 2011), along with on-line gambling since it's only a modality of playing all aforementioned games of chance, and not a game by itself. Respondents were asked to think about their gambling activities and to indicate how often they play each of the games of chance for money (0 = never; 1 = once a year or less; 2 = approximately once a month; 3 = approximately once a week; 4 = few times a week; 5 = every day or almost every day). Alongside the information about the frequency of each

Table 1

Sample description and basic socio-demographic characteristic (N = 1330 male high-school students).

City/Town	Zagreb	Split	Rijeka	Osijek	Koprivnica	Sl. Brod	Vinkovci
n (%)	165 (12.4%)	216 (16.2%)	245 (18.4%)	289 (21.7%)	141 (10.6%)	147 (11.1%)	127 (9.5%)
Type of school	3-year vocational school		4-year vocational school		Gymnasium		
n (%)	385 (28.9%)		565 (42.5%)		380 (28.6%)		
Grade	1st	2nd		3rd	4th		
n (%)	354 (26.6%)		357 (26.8%)		381 (28.7%)		234 (17.6%)
Age	M = 16.58 (SD = 1.16) Min. 14–Max. 21						

individual activity we averaged the results for all activities to get a total indicator of gambling frequency. The total indicator ranges from 0 to 5 and higher results indicate more frequent gambling. Reliability of such an index is high ($\alpha = .76$).

The *Canadian Adolescent Gambling Inventory (CAGI)* (Tremblay et al., 2010) was used to measure adverse psychosocial consequences of gambling. The 24 items that focus on different psychosocial consequences of gambling/betting were used. For each consequence respondents answered, with a 4-response option (0 = never; 1 = sometimes or 1–3 times; 2 = most of the times or 4–6 times; 3 = almost always or 7 or more times), how often they experienced it because of their gambling/betting in the last 3 months.

Its authors report that CAGI is composed of four factors (1. Psychological consequences; 2. Social consequences; 3. Financial consequences; 4. Preoccupation and impaired control). However, previous Croatian studies did not confirm this factorial structure, but found it to be two-dimensional (Ricijas, 2014). The first factor named "Psychological consequences and loss of control" comprises of 14 items from the original CAGI factors psychological consequences and loss of control, while the second factor named "Interpersonal and financial consequences" comprises of 10 items from the original CAGI factors social and financial consequences. Examples of items are "How often have you felt bad about the way you gamble/bet or what happens when you gamble/bet?" (F1) and "How often have you taken money that you were supposed to spend on lunch, clothing, movies, etc. and used it to gamble/bet or to pay off your gambling/betting debts?" (F2). This study confirmed the two-factor solution. Both factors have excellent reliability – $\alpha_{F1} = .91$ and $\alpha_{F2} = .85$. Individual scores are averaged to form a total score on each factor with a theoretical range of 0–3. Higher results indicate more adverse consequences.

CAGI also provides a general measure of psychosocial consequences related to gambling. This composite measure, General Problem Severity Subscale (GPSS), consists of 9 items ($\alpha = .85$) distributed through the four factors composing CAGI and provides us with information on the severity of gambling related problems by classifying respondents into three categories: (1) no problem ("green light"), (2) low to moderate severity ("yellow light"), and (3) high severity ("red light").

The *Gambling Beliefs Scale* (Ricijas et al., 2011) was used to assess cognitive distortions associated with gambling. This scale contains 18 items and respondents indicate their level of agreement with each statement on a five-point scale (1 = strongly disagree; 5 = strongly agree). The scale consists of two factors: "Superstition and incorrect understanding of chances and probability" (10 items, $\alpha = .80$) and "Illusion of control" (6 items, $\alpha = .76$). Examples of items are "Gambling in several games of chance increases the probability of a win in at least one of them." for the first factor and "Focusing thoughts on winning makes it more likely to happen." for the second. The item scores are averaged to form a total score for each factor separately (theoretical range = 1–5). Higher results on both factors indicate more cognitive distortions.

Risk and delinquent behaviour was assessed with a self-report scale by Atlanta, Dahlberg, Toal, Swahn, and Behrens (2005) which measures

general intensity of such behaviour. On this 24 items scale participants indicated how many times in their lives have they done something or behaved in a certain way by using a four-scale response options (0 = never, 1 = 1–2 times, 2 = 3–4 times, 4 = 5 or more times). A total score is formed by averaging responses on all items. Cronbach's Alpha for this scale is $\alpha = .89$. Higher results indicate more involvement in risk and delinquent behaviour.

Motivation for gambling was assessed with a part of the Motives for Gambling Check-List (Ricijas et al., 2011). In this study we used four motives that answer the question “Why do you gamble/bet?” – to relax, to feel better, to earn money, to become better in gambling. We decided on these four motives because previous studies showed them to be particularly relevant for problematic gambling. For each motive participants indicated how often they gamble because of a certain motive, giving their answers on a four-point scale (0 = never because of that; 4 = always because of that).

Experiences while gambling were assessed with two indicators that capture the participants' feelings of experiencing reinforcement while gambling – (1) “How often have you had an experience of winning a large sum of money by gambling?” (1 = never; 4 = many times), and (2) “When winning a large sum of money by gambling it encourages me to continue gambling.” (1 = not at all true for me; 5 = completely true for me).

4. Procedure and ethics

Research was conducted in a group setting (classes in high-schools). Data collection was coordinated with the schools and has received all the relevant documentation (written support from Croatian Ministry of Education, Science and Sport, Croatian Teacher Training Agency and Ethics committees).

In accordance with the Code of Ethics for Research with Children (Ajduković & Kolesaric, 2003) all participants were informed about the research topic and general aim, and gave their consent to participate. They had an opportunity to decline participation at any point, with no consequences. Participation in the research was completely anonymous and participants were encouraged to provide honest answers and to share their experience and beliefs. All schools that participated in the research received a descriptive summary report of results on a group level.

5. Results

5.1. Gambling activities and adverse psychosocial consequences among male high-school students

Based on the six investigated gambling activities, as much as 66.2% of boys report having gambled at least once in their lifetime. In order to examine how often boys play these six gambling activities we categorised the frequency of playing into three groups: (1) never – (2) occasionally – (3) regularly, where frequent/regular gambling implies gambling weekly or more (based on the criteria proposed by Felsher, Derevensky, & Gupta, 2004). Results (see Table 2) clearly indicate that most boys have experience in sports betting (65.6%) and that sports betting is the most frequently played game of chance, while other games are not as frequent. Scratch cards, lotto and electronic roulette are played the least. The average frequency of playing these six games indicates that Croatian high-school boys gamble around once a year ($M = 0.845$, $SD = 0.832$). This might not seem like a lot, however, a third of high-school boys bet on sport once a week or more often, and one fifth bets on virtual races and plays VLT machines, which still points to a high frequency of gambling at least among some of them. Also, the CAGI general problem severity index shows that, only about half of the boys can be classified as social gamblers that do not have any adverse consequences because of their gambling (“green light” – 49.2%), with the rest distributed between occasional gamblers with low to

Table 2
Frequency of gambling ($N = 1.330$).

	Never (%)	Occasionally (%)	Regularly (%)
Sports betting	34.4	29.0	36.6
Lotto	68.0	26.8	5.1
Scratch cards	55.3	40.8	3.9
VLT/slot machines	63.8	23.6	12.6
Electronic roulette	82.8	10.9	6.3
Betting on virtual races	63.8	22.7	13.5

moderate consequences (“yellow light” – 27.1%), and problem gamblers with serious consequences (“red light” – 23.7%). So further in depth examination of predictors of specific consequences is warranted. The CAGI percentages should be viewed as prevalence data and information about how many of the entire sample experiences certain adverse consequences. However, because the main goal of our paper is to investigate predictors of specific consequences of gambling, which cannot be experienced unless a person gambles at least occasionally, all subsequent analyses are done on a subsample of those boys who, according to their life-time prevalence data, gambled at least once ($N = 880$).

Table 3 Presents descriptives and correlations between main study variables. As expected, high-school boys experience adverse consequences of their gambling, both psychological consequences and loss of control, and social and financial consequences. Also, correlations between the variables of interest were all significant and in the expected direction. Different forms of consequences were associated with more risk and delinquent behaviour, more cognitive distortions related to gambling (more superstitious beliefs, more illusion of control and more incorrect perception of probabilities and chance), more motivation to gamble in order to relax, feel better, earn money and become better at gambling, more frequent gambling, more experience of winning large sums of money and a stronger drive to gamble when that happens. However, the constructs are also correlated themselves, so further regression analyses are needed to control for this shared variability. This will also allow us to examine which of these constructs, when put into a joint model, predict different gambling consequences. It is important to note that the two dimensions of adverse gambling consequences are themselves correlated (.664). However, we can see they share only 44% of shared variance. Therefore, it makes sense to examine the predictive power of different cognitive, motivational and behavioural factors for each dimension separately.

5.2. Predictors of adverse psychosocial consequences

Two five-step hierarchical regression analyses were used to determine which predictors can best explain two types of adverse psychosocial consequences related to gambling: 1. Psychological consequences and loss of control, and 2. Interpersonal and financial consequences. The logic was to first enter variables that are more distant to gambling itself (risk and delinquent behaviour in step 1) and move to more proximal variables (gambling related cognitions and motives in steps 2 and 3, experiences while gambling in step 4 and frequency of gambling in step 5).

As presented in Table 4, the first regression model explains around 56% of variance of psychological consequences and loss of control. Although the predictors are correlated, we found no multicollinearity issues (all VIF's < 3). Each step significantly improved prediction, and most of the individual variables proved to be significant predictors when added to the model. However, not all of them remained significant in the last step. When looking at the entire model, psychological consequences and loss of control can be primarily predicted by more intensive frequency of gambling, having the experience of winning a large sum of money and feeling a drive to continue with gambling after winning. Motives to earn money through gambling and to become better in gambling also predict more adverse psychological consequences and

Table 3
Descriptives and correlations between study variables ($N = 880$; high-school boys who gambled at least once in their life-time).

	CON1	CON2	RISK	COGDIS1	COGDIS2	M1	M2	M3	M4	Experience1	Experience2	FG
Psychological consequences and loss of control (CON1)	–	.664**	.329**	.295**	.178**	.362**	.354**	.503**	.446**	.593**	.531**	.643**
Interpersonal and financial consequences (CON2)		–	.376**	.331**	.185**	.412**	.368**	.331**	.456**	.443**	.422**	.592**
Risk and delinquent behaviour(Risk)			–	.172**	.199**	.176**	.140**	.299**	.247**	.312**	.258**	.398**
Superstition and incorrect understanding of chances and probability (COGDIS1)				–	.470**	.326**	.334**	.242**	.343**	.263**	.330**	.259**
Illusion of control (COGDIS2)					–	.207**	.251**	.317**	.288**	.224**	.309**	.200**
Motive to relax (M1)						–	.543**	.216**	.411**	.287**	.312**	.338**
Motive to feel better (M2)							–	.294**	.392**	.228**	.332**	.283**
Motive to earn money (M3)								–	.301**	.468**	.451**	.430**
Motive to be better in gambling(M4)									–	.252**	.363**	.346**
Experience of winning a large sum of money (Experience1)										–	.413**	.608**
Drive to continue with gambling after winning a large sum of money (Experience2)											–	.446**
Mean frequency of gambling (FG)												–
Mean	0.50	0.18	1.81	1.85	2.77	1.46	1.51	2.73	1.42	2.11	2.32	0.84
SD	0.55	0.35	0.50	0.66	0.90	0.80	0.81	1.14	0.79	1.07	1.34	0.85
Minimum	0	0	1	1	1	1	1	1	1	1	1	1
Maximum	2.82	2.40	4	4.7	5	4	4	4	4	4	5	1.43
Theor. range	0–3	0–3	1–4	1–5	1–5	1–4	1–4	1–4	1–4	1–4	1–5	0–5

loss of control. Risk and delinquent behaviour, although a significant predictor by itself, was no longer significant after adding mean frequency of gambling in the last step. Furthermore, motives to relax and feel better predicted more adverse consequences on their own, but lost significance after adding experience with winning money and the drive to continue gambling in the next step. Superstitious beliefs and incorrect understanding of chance and probability was also a significant predictor when added, but lost significance after adding experience related variables. We have to note that illusion of control, although not a significant predictor on its own, still has an important statistical effect, serving as a suppressor in the model allowing for the optimal prediction by other variables.

The same set of predictors was used in hierarchical regression analysis with interpersonal and financial consequences as a criterion (Table 4). Again, there were no multicollinearity issues (all VIF's < 3). This model explained 47.1% of variance. Also, all steps significantly improved prediction of the criterion, and almost all individual variables proved to be significant predictors. However, again some of them lost their significance by the last step. When looking at the entire model, we can say that more adverse interpersonal and financial consequences of gambling are predicted by more risky and delinquent behaviour, poorer understanding of chance and probability and more superstitious beliefs,

motives to relax, to feel better and to become a better gambler, the drive to continue gambling when winning a large sum of money and more frequent gambling. We can see that this set of consequences has somewhat different predictors than psychological consequences and loss of control. Interestingly, although at first glance we would expect that the motivation to earn money should predict more adverse interpersonal and financial consequences, this motive is no longer significant once we add the experience of winning a large sum of money to the model. Also, once we add frequency of gambling, even the experience of winning a large sum of money stops being a significant predictor. Again, cognitive distortions related to illusion of control were not a significant single predictor, but had a suppressor effect on other variables in the model.

6. Discussion

This study confirms previous findings that gambling is a widespread activity among Croatian high-school boys (see Dodig, 2013; Ricijas et al., 2015). Although the mean frequency of gambling is rather low, it should be viewed in the context of other data showing that a third of high-school boys bet on sport once a week or more often, and a fifth of them regularly play VLTs and bet on virtual horse races. What is of

Table 4
Results of hierarchical regression analyses – predicting (1) psychological consequences and loss of control and (2) interpersonal and financial consequences.

	Psychological consequences and loss of control					Interpersonal and financial consequences				
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 1	Step 2	Step 3	Step 4	Step 5
	β	β	β	β	β	β	β	β	β	β
1 Risk and delinquent behaviour	.305***	.266***	.117***	.061**	.011	.367***	.326***	.228***	.194***	.132***
2 Superstition and incorrect understanding of chances and probability		.247***	.099**	.046	.043		.290***	.144***	.111***	.108***
3 Illusion of control		.015	–.111***	–.132***	–.0118***		–.011	–.086**	–.100***	–.083**
Motive to relax			.126***	.058	.031		.176***	.134***	.101**	
Motive to feel better			.067*	.060	.056		.091**	.086*	.081*	
Motive to earn money			.370***	.193***	.164***		.121***	.010	–.026	
Motive to be better in gambling			.225***	.195***	.169***		.229***	.209***	.176***	
4 Experience of winning a large sum of money				.319***	.215***				.193***	.065
Drive to continue with gambling after winning a large sum of money				.198***	.166***				.133***	.093**
5 Mean frequency of gambling					.274***					.337***
Total model										
R	.305	.395	.634	.717	.746	.367	.463	.604	.639	.687
Adj. R ²	.093	.156	.401	.514	.556	.135	.214	.365	.409	.471
ΔR^2		.063***	.245***	.113***	.041***		.080***	.150***	.044***	.063***

Note. β = standardized beta coefficient; R = multiple correlation coefficient; Adj. R² = the adjusted coefficient of determination; ΔR^2 = R² change; * $p < 0.050$; ** $p < 0.010$; *** $p < 0.001$.

particular concern is that as much as 24% of male high-school students have already developed severe psychosocial consequences related to gambling. Again, these seem to be tied specifically to sports betting, VLTs and virtual betting, confirming previous studies that show these three games to be particularly risky. These are the types of games with high event frequency and have been strongly associated with problem gambling (Reith, 2006). Furthermore, sports betting, as the most frequently played game, is characterized as a game with a perceived element of knowledge/skills and the “near misses” component, which is a characteristic that adds to its addictive potential (Griffiths, 2000). Hence, such a high prevalence of adverse psychosocial consequences among Croatian adolescent boys is not surprising.

Our study further shows that psychological consequences and loss of control are predicted by higher frequency of gambling, the experience of winning a (subjectively) large amount of money, the drive to continue gambling when winning and a certain type of gambling motivation (to earn money and to become a better gambler). These results are expected, and in accordance with other research in the field. Previous research showed that the drive to continue with gambling after winning and the experience of winning a (subjectively) large amount of money is associated with problematic gambling (Turner et al., 2006), so it is not surprising they predict this set of gambling consequences.

At first glance, our finding that the experience of winning large and the drive to continue gambling after winning are important predictors of psychological consequences and loss of control seem to be at odds with previous studies showing the central role that “chasing losses” and the motivation to continue gambling in order to recover from losses play in pathological and problem gambling (Breen & Zuckerman, 1999). However, we feel that both drives are in their essence a manifestation of a person's loss of control which is, undoubtedly, one of the key elements of problem gambling, contained in all the definitions and criteria of problem gambling. A person can easily lose control over one's gambling behaviour because losing money is motivating them to gamble more, or because winning money is motivating them to gamble more. However, future research might try to detangle the effects of the drive to continue gambling to chase losses and the drive to continue gambling after winning, by comprehensively studying the role of both and the exact mechanisms leading to loss of control over one's gambling. This might have important practical implications since some definitions (such as Australian national definition) specifically define problem gambling as behaviour characterized by difficulties in limiting time and/or money spent on gambling which leads to adverse consequences for the gambler, others, or for the community (Neil, Delfabbro, & O'Neil, 2005), and that problem gamblers in general are less likely than other gamblers to endorse any type of monetary limit-setting prior to play (Nower & Blaszczynski, 2010).

Since it is difficult to imagine that an individual could develop complex personal, economic and social problems inherent to problem gamblers without constantly gambling, it was expected that the overall frequency of gambling proved to be a significant predictor. Logically, the more the individual is involved in gambling, the more it impairs his or her psychosocial functioning. This has been shown in numerous previous studies and is reflected in all the definitions of pathological/gambling (APA, 1994, 2013; Korn, 2000).

Specific motivation to gamble in order to earn money and become a better gambler also predicted more adverse psychological consequences and loss of control. It seems that psychological consequences and loss of control are tied to a pattern of motivation and behaviour associated with more frequent gambling in order to become better at it and to earn money, and with the drive to continue gambling after winning and after experiencing large wins (probably because of the expectation that one will win even more money and become better at gambling). However, given the cross-sectional nature of our study it is impossible to say which of these factors influences this set of consequences. It is probable that the observed pattern is cyclical and future

studies should employ path analyses and longitudinal designs in order to investigate the issue further.

Although previous studies found poor probabilistic reasoning and superstitious beliefs to be associated with problematic gambling (Toneatto, 1999), it seems that they are not predictive of psychological consequences and loss of control. This is probably due to the fact that this dimension emphasizes emotional troubles related to one's gambling, so it is possible that cognitive factors like these distortions are not important. Also, our finding is in line with a study of Australian high-school students which showed problem gamblers not to have poorer understanding of probabilities (Delfabbro et al., 2006).

Furthermore, beliefs about the illusion of control did not prove to be a significant predictor when added to the model. This is not in accordance with studies showing that greater illusions of control are tied to more severe gambling related problems (Ladouceur, 2004a; Sharpe, 2002; Steenbergh, Meyers, May, & Whelan, 2002). However, it is in accordance with studies showing no or little relation between illusion of control and gambling problems (see Goodie, 2005 for review). Nevertheless, it seems that illusion of control still has an important role in predicting both sets of consequences, by acting as a suppressor variable increasing the predictive power of motivational predictors. This is reflected in the fact that after it was not significant when added to the model, but that it became a significant predictor later on after adding motivational variables. Since its significant negative association is a statistical artefact it is futile to interpret it. Still, it is still worth discussing why illusion of control in particular serves a suppressor in this model.

It seems that to fully understand the impact of illusion of control, one has to consider motivational factors. As both Presson and Benassi (1996) and Stefan and David (2013) note in their meta-analyses of experimental studies, illusion of control is used as a proxy for several related, but distinct phenomena. One of these is the motivation for a successful outcome to occur (e.g. the cognitive bias involved in expectancies of success after performing certain actions which are under our control). The latter meta-analysis even found larger effects when illusion of control influences one's expectancies of success, than when it influences one's estimation of real control over the outcome (Stefan & David, 2013).

Thompson, Armstrong, and Thomas (1998) in their proposal of illusion of control as a control heuristic, also emphasize its dependence on motivational factors. If the outcome is highly desirable or people have a strong need for it, then they are more likely to convince themselves that the outcome will occur. Several studies further strengthen the mentioned interplay of cognitive biases and motivation by showing strong reinforcements (like winning a large sum of money in our study) lead to greater illusion of control (see also Thompson et al., 2007).

Correlational studies, although scarce, also show the interconnected nature of cognitive biases and motivational factors. When exploring the contribution of motivation, impulsivity and gambling cognitions, Marmurek, Switzer, and D'Alvise (2014) found gambling related cognitions and money motivation to predict gambling severity in tandem. Delfabbro et al. (2006) also found that believing that skill plays an important role in gambling goes together with beliefs about the profitability of gambling. When assessing different types of beliefs about control over gambling among young people, Moore and Ohtsuka (1999) found perceived need for money and belief in the system to be the strongest predictors of gambling problems, while general illusion of control did not predict problem gambling rates. Rather it only predicted gambling frequency.

Strength and type of motivation can clearly vary between individuals, but studies reveal that stronger endorsement of most gambling motivations is associated with higher gambling involvement (Delfabbro, 2012). In this context, our results suggest that motivational elements, as well as experience of winning a large sum of money that reinforces their drive to continue gambling might even over-ride the illusion of control. It seems that cognitive and motivational factors leading to more severe gambling consequences are highly interconnected,

and that future studies should examine the interplay between cognitive biases and motivational factors while at the same time taking special care not to confound the two.

One other factor that limits our findings is that we used a self-report measure of cognitive distortions in a so called “cold” situation and not within a gambling context. Delfabbro et al. (2006) note that while results suggest that problem gamblers appear to share much of the same cold knowledge as others, they differ in how they utilise or evaluate this information. Therefore, during the process of gambling, specific idiosyncratic beliefs (e.g. that one can control the outcomes, or that certain numbers are luckier than others) come to over-ride more objective considerations, and this appears to occur to much greater extent among problem gamblers. This is why many research also indicates a need to study cognitive distortions in an experimental setting with the “thinking-aloud method” (Gaboury & Ladouceur, 1988). Compared to self-reports, due to the effects of situational factors, this method captures the phenomenology and the influence of erroneous cognitions in a more naturalistic setting and leads to larger effects (Ejova, Delfabbro, & Navarro, 2015; Sevigny & Ladouceur, 2003). Before reaching any firm conclusions future studies should employ observational and experimental designs and implicit measures of cognitive distortions.

The second set of gambling related harms, interpersonal and financial consequences, were predicted by almost all individual predictors. Due to the fact that this factor is content-oriented at describing the disruption of important interpersonal relationships (family, friends), illegal activities in order to provide money for gambling, the accumulation of debts, and the neglect of school and extracurricular activities, it is not surprising that risky and delinquent behaviour contribute significantly to the explanation of this criterion. Moreover, research continuously confirms a strong connection between risk and delinquent behaviour and problem gambling (Mishra, Lalumiere, Morgan, & Williams, 2011; Ricijas et al., 2015; Welte et al., 2009).

Again higher frequency of gambling, the drive to continue gambling after winning money and the motive to become a better gambler predicted more interpersonal and financial consequences. This pattern again corresponds to a previously mentioned behavioural pattern which leads to loss of control and negative consequences.

Moreover, cognitive distortions seem to be important in predicting Interpersonal and financial consequences. Unlike in the case of psychological consequences and loss of control, poor understanding of probability and superstitious thinking remained a significant predictor in the last step of the model. However, the illusion of control again served as a suppressor. As we stated earlier future studies should examine the interplay of cognitive distortions and motivational factors more in depth, and seek answers to whether they have a direct or indirect effect on various types of gambling consequences.

It also seems that different motives are related to different sets of consequences. As previously stated, psychological consequences and loss of control were predicted by the motives to earn money and be better at gambling, while interpersonal and financial consequences are predicted by motives to relax and feel better, and to become better gamblers. Previous research into gambling motivation often distinguishes different categories of gamblers regarding the severity of their gambling related problems – some gamble to escape from problems, some to deal with depression, some to relax and some to socialize. (Lee, Chae, Lee, & Kim, 2007; Ricketts & MacAskill, 2004; Rockloff & Dyer, 2006). Similarly, the pathways model (Nower & Blaszczynski, 2004), as the leading theoretical model explaining the development of problem gambling, asserts three major pathways leading to problem gambling, i.e. three different types of problem gamblers. They all share similar common processes (such as exposure to gambling and behavioural reinforcement provided by gambling), but are also distinguished by empirically testable differences in vulnerability factors, demographic features and etiological processes (Nower & Blaszczynski, 2004). Our finding complements these studies by showing that the motives to relax and feel better primarily predict interpersonal and financial

consequences of gambling, while the motivation to be a better gambler is associated with both dimensions of gambling consequences. It is important to note that both in the case of psychological consequences and loss of control and interpersonal and financial consequences, motivation to gamble explained the largest proportion of variance (25% and 15% respectively) attesting to the importance of their role for gambling related harms. Future studies should examine the motivation to gamble in depth and employ more sophisticated path analyses in order to test both its direct and indirect effects.

7. Limitations

This study, however, is not without limitations. We used a cross-sectional design which impedes any causal conclusions about the nature of our results. The cognitively distorted and specific motivational mind-set we found to be related with specific gambling consequences could be leading to more problematic gambling, but it is just as likely that more frequent and problematic gambling leads to more cognitive distortions and more motivation to gamble. More comprehensive, longitudinal designs that follow both adolescents who are at risk and who are not at risk well into adulthood are the only kind of studies that can settle these questions of causality.

Also, we only examined adverse gambling consequences among adolescent boys, and not girls. Although very scarce, some research done so far has shown that different factors lead to more severe gambling consequences among adolescent boys and girls. Donati et al. (2013) found cognitive and motivational factors such as understanding of probabilities and the perception of economic profitability of gambling to be specific predictors of problem gambling among boys, but not girls. What complicates the examination of girl adolescent gambling is the fact that girls gamble very rarely. Previous Croatian research showed that there are hardly a couple of girls among those who can be considered problematic gamblers (“red lights” according to CAGI screening) (Ricijas et al., 2011). The small incidence of girls makes them hard to compare to the sample of boys, which was one of the reasons why this research was conducted only on boys. However, it would be extremely interesting to find comparable samples of adolescent boys and girls and examine whether their problematic gambling is determined by the same factors.

One other possible caveat of our study is that we chose not to include on-line gambling in our study. However, on-line gambling is just a modality of gaming, and not a game by itself. So we feel that our questions about gambling activities still capture the adolescent gambling experience. However, we do note that data showing the prevalence of gambling activities might be understated because we did not ask our participants about card playing (e.g. poker), which could be the on-line game of choice for them (since they do not have legal access to casinos or similar places). Still, data from the already mentioned Croatian study suggest that poker playing is not the game of choice for Croatian teens. Future studies should distinguish between different modalities of playing, especially since it seems that internet gambling leads to more severe gambling consequences than non-internet gambling (Griffiths, Wardle, Orford, Sproston, & Erens, 2009).

8. Conclusion

This study again confirms the necessity to employ a multidimensional approach when studying factors related to gambling consequences, by showing that in order to explain gambling related harms we need to investigate various cognitive, motivational and behavioural factors (see also Donati et al., 2013). Even when studying different behavioural and motivational factors together, we still confirmed the importance of gambling frequency, the specific motivation to be better at gambling and the drive to continue playing after winning for the development of various kinds of gambling consequences – psychological, interpersonal, financial and loss of control. In line with other research and

theoretical models, behaviour and experience most closely related to gambling itself had the most important role. We also extended previous findings that “chasing losses” is a particularly dangerous gambling behaviour (Breen & Zuckerman, 1999), by showing the important role that the drive to continue gambling after winning money plays for different sets of adverse gambling consequences. Specific cognitions and behaviour were also important predictors, but in different ways for different sets of consequences. For example, in explaining interpersonal and financial consequences, cognitive distortions related to superstition and poor understanding of probability and chance, alongside the manifestation of other risky and delinquent behaviours showed to be especially important. We also found different motivations to lead to different sets of consequences – the motivation to earn money leading to more psychological consequences and loss of control, and the motivation to relax and feel better leading to more interpersonal and financial consequences.

Although the design and self-report nature of our study prevents us from making any causal conclusions it still makes important contributions to studying adolescent gambling. We found much the same factors related to gambling consequences of Croatian high-school boys as found in other North American, Australian and European cultures. We also showed that although all young people grow up in an environment where gambling is very available and accessible (regardless of the legal prohibition), it is the specific cognitions, motivations and behaviour of adolescents that seem to lead to different types of problems young people develop because of their gambling. Therefore, these findings provide a practical and useful guide in planning treatment and prevention interventions.

Acknowledgments

The authors would like to thank all the participants who generously and with no personal benefit gave their time to participate in this research.

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