

Country- and individual-level determinants of probable problematic gambling in adolescence: a multi-level cross-national comparison

Sabrina Molinaro¹, Natale Canale², Alessio Vieno², Michela Lenzi², Valeria Siciliano¹, Mercedes Gori¹ & Massimo Santinello²

National Research Council, Clinical Physiology Institute, Pisa, Italy¹ and Department of Developmental and Social Psychology, University of Padova, Padova, Italy²

ABSTRACT

Aims To estimate the role of family and socio-economic indicators of welfare state in accounting for probable problem gambling during adolescence in a representative sample of students living in nine European countries. **Design** Data from the 2011 European School Survey Project on Alcohol and Other Drugs (ESPAD) Study were used for cross-sectional analyses of adolescent probable problem gambling. **Setting** Representative surveys in nine European countries. **Participants** A total of 31 236 16-year-old students. **Measurements** Respondents' probable problem gambling, socio-demographic characteristics and parenting (regulation, monitoring and caring) were measured individually. Indicators of wealth (gross domestic product per capita, GDP), expenditure on public health (% GDP) and benefit in kind for families/children (% GDP) were obtained from national public databases. **Findings** Students who perceived more parental caring [odds ratio (OR) = 0.92, 95% confidence interval (CI) = 0.85–0.98] and monitoring (OR = 0.57, 95% CI = 0.53–0.62) reported less involvement in probable problem gambling. Moreover, students who perceived stronger parental regulation (OR = 1.16, 95% CI = 1.09–1.23) were more likely to be possible problematic gamblers. At the country level, expenditure on public health was associated negatively with probable problem gambling (OR = 0.87, 95% CI = 0.78–0.97), whereas GDP per capita (OR = 1, 95% CI = 1.00–1.00) and the benefits in kind for families/children (OR = 1.16, 95% CI = 0.89–1.51) showed no association with probable problem gambling. **Conclusions** Family characteristics and expenditure on public health may play a key role in explaining probable problem gambling among adolescents in Europe.

Keywords Family, gambling, health expenditures, multi-level analysis, students.

Correspondence to: Sabrina Molinaro, Institute of Clinical Physiology, Italian National Research Council—CNR, Via Moruzzi, 1, 56124 Pisa, Italy. E-mail: molinaro@ifc.cnr.it

Submitted 30 April 2014; initial review completed 4 July 2014; final version accepted 14 August 2014

INTRODUCTION

Adolescent gambling has become a popular form of recreation. Although legislative statutes generally prohibit youth from participating in legalized forms of gambling, a review of youth gambling studies across three continents, Australia, Europe and North America, found that 2–13% of youth meet diagnostic criteria for problem gambling [1].

Beyond the prevalence, adolescent gambling is recognized increasingly as an important public health issue [2–4]. Being involved in gambling during

adolescence can lead to adverse consequences such as strained relationships, delinquency and criminal behaviour [5], depressive symptoms [6], greater risk for suicide ideation and attempts, increased risk for other addictions [2] and poor general health [7]. Such negative outcomes have short- and long-term implications and other significant implications for the individual as well as for society at large [8]. In light of these negative consequences, and considering that adolescents move quickly from social to problem gambling, more interest needs to be directed towards the study of adolescent gambling [2,4].

Recently, several forms of severity as well as frequency of gambling have also been referred to as 'harmful gambling' [9]. Abbott and colleagues [9] presented a comprehensive conceptual framework of harmful gambling that moves beyond a symptom-based view of harm and addresses a broad set of factors related to population risk, community and societal effects. In addition, Reith [10] has sustained that although gambling is an intrinsically social activity, studies relating to its social contexts and meanings remain scarce. Thus, it is important to adopt a broader perspective in the consideration of pathological gambling, focusing on the role of social relationships (e.g. family, friends) and environmental context (social, economic and political forces) [11]. In this direction, Barnes *et al.* [12] adapted their conceptual framework for the development of adolescent alcohol misuse to the study of the co-occurrence of gambling behaviours and alcohol use in youth, given the lack of theoretically derived adolescent gambling research. This theoretical model addressed youth behaviours from both individual and socio-environmental levels by identifying socio-demographic factors such as socio-economic indicators of the welfare state (contextual level), and parental socialization factors such as modelling and parenting (individual level), as predictors of adolescent gambling. The present study aimed to examine the role of family and socio-economic indicators of the welfare state in explaining probable problem gambling during adolescence.

Family environment can be both a risk and a protective factor for adolescent gambling behaviours (for a review, see [13]). With regard to general family climate, Hardoon *et al.* [14] showed that non-gamblers and social gamblers had significantly higher mean scores on family support (emotional, informational, feedback and reciprocal support) compared with risk and pathological gamblers. Moreover, parental care expressed as empathy, closeness, emotional warmth and affection was associated with lower scores in the gambling outcomes [15]. As well as the importance of parental warmth, during adolescence parenting behaviours more focused upon autonomy development gain greater relevance [16]. Parental knowledge, for example, including the use of behavioural control strategies such as setting rules [17] and monitoring of behaviour [18], has been found to reduce youth risky behaviours [17] and positively affects adolescent adjustment [19,20]. Parental monitoring has also been found to be one of the strongest protective factors for adolescent gambling [21,22]. A longitudinal study tracking children into young adulthood found that low and/or declining parental monitoring of children between the ages of 11 and 14 years was associated with problem gambling when those children reached

adulthood [23]. Conversely, inadequate disciplinary practices, such as hostile parenting, have been related to heightened levels of adolescent gambling problems [24].

Besides proximal contexts such as family environment, various macro-level factors may shape addictive as well as gambling behaviours. Among country-level characteristics influencing adolescent health behaviours, we considered social determinants of health with a key feature of the ecological context: socio-economic indicators of welfare. Socio-economic differences in health and health behaviour among adolescents between countries are recognized increasingly as an important field of research [25]. Previous studies have shown that adolescents from countries with lower welfare benefits have worse subjective and objective health outcomes [26–28]; for instance, individuals from countries characterized by lower social protection expenditure showed lower levels of perceived health [29]. However, there has been poor direct attention to the role of country-level characteristics in influencing adolescent health [30]. Viner and colleagues reviewed available data on the effects of macro-level determinants of health in adolescence and provided a novel ecological analysis of the relations between these determinants and country variations in adolescent health outcomes (mortality, HIV, teenage births, injuries, violence, bullying, smoking). Higher national wealth was associated strongly with lower mortality, HIV, teenage births and bullying, while national health spending per person was not related to any outcomes after adjustment for national wealth [30]. To our knowledge, to date no study has examined the association between socio-economic indicators of welfare state and adolescent gambling. Cross-national variations in adolescent problem gambling may be attributable to systematic differences in public expenditures on health and social protection (family benefit). Indeed, public health expenditure may provide more funding to gambling prevention and intervention programmes, and family/children benefits may support families, thus making youth less likely to engage in gambling activities.

Our main research question is therefore: to what extent is cross-national variation in adolescent probable problem gambling explained by governmental expenditure in health and social protection, above and beyond family characteristics? We hypothesized that adolescents perceiving more parental caring and parents' monitoring–regulation are less problematic gamblers [15,21,24]. We also expected that national wealth [gross domestic product (GDP)], national expenditure in health and benefits in kind for children and family show a negative association with probable problem gambling [29,30]. In addition, few studies have considered how the social

context of early gambling behaviour may interact with factors such as social and environmental networks [11]. Thus, another purpose of the current study is to explore possible interactions between family characteristics and country-level variables. We hypothesized that lower benefit in kind for families/children may also affect the way in which families deploy social and economic resources, such as the need to earn income which, in turn, might limit parents' ability to support and protect young people [30], including less parental caring and less parents' monitoring–regulation.

Data were drawn from the 2011 European School Survey Project on Alcohol and Other Drugs (ESPAD), a cross-national survey performed in 39 European countries, representative of the student population (aged 16 years) in each country. The European countries collected data on school students according to common methodological guidelines. The target population consisted of students aged 15–16 years at the time of the survey. Data were collected using standard questionnaires, completed on a voluntary basis in the school classroom. Details of sampling and survey methods in each country, and other information including response rates, can be found in Hibell *et al.* [31]. The ESPAD study, developed primarily for monitoring alcohol and other substances use in recent years, is expanding to new addictive behaviours (e.g. gambling), adding optional screening instruments to the questionnaire [31].

In this study, hierarchical linear modeling (HLM) [32] was used to evaluate the impact of the parenting (regulation, caring and monitoring: individual-level) and country (GDP, expenditure on public health, family/children benefits: country-level) influences on adolescent probable problem gambling.

METHOD

Data set

The nine countries included in the present study, with a total data set of 31 236 students, were those who chose to administer the optional items aimed to investigate probable problem gambling: Albania, Cyprus, Denmark, Finland, Italy, Lithuania, Romania, Serbia and the United Kingdom. Of 31 236 participants, 29 952 ($n = 14\ 136$ males, $n = 15\ 816$ females) responded consistently to the optional questions.

We performed a secondary analysis on World Bank data from 2012, complemented with country-level data from the United Nations Development Programme, 2012. Additionally, we obtained country-level information on families/children benefits from other sources (EUROSTAT, 2010; Albania Institute of Statistics, 2010).

Measures

Dependent variables

We assessed probable problem gambling using a screening instrument, the LIE-Bet Questionnaire [33]. This includes two items: 'Have you ever lied to family and friends about how much money you have spent on gambling?' and 'Have you ever felt that you needed to gamble for more and more money?', both with the response categories 'yes' and 'no'. Responses were given a value of 1 for 'yes' and 0 for 'no', and the Lie/Bet sumscore thus ranged from 0 to 2. According to previous studies [34,35], students who scored 0 or 1 were considered to be non-possible problem gamblers (coded 0) and students with scores of 2 were considered to be possible problem gamblers (coded 1) [36].

Individual-level variables

Parental regulation was measured by two questions: 'My parent(s) set definite rules about what I can do at home' and 'My parent(s) set definite rules about what I can do outside the home' (responses on a five-point scale from 'almost never' to 'almost always'). On the basis of $\alpha = 0.79$, responses were averaged to obtain a synthetic measure. Parental caring was measured by two questions: 'I can easily get warmth and caring from my mother and/or father' and 'I can easily get emotional support from my mother and/or father' (responses on a five-point scale from 'almost never' to 'almost always'). On the basis of $\alpha = 0.88$, responses were averaged to obtain a synthetic measure. Parental monitoring was measured by three questions: 'My parent(s) know who I am with in the evenings', 'My parent(s) know where I am in the evenings' (responses on a five-point scale from 'almost never' to 'almost always') and 'Do your parents know where you spend Saturday evenings?' (response on a four-point scale from 'usually don't know' to 'always know'). On the basis of $\alpha = 0.81$, responses were averaged to obtain a synthetic measure.

Several control variables were included. Participants' gender was coded 1 for males and 2 for females. Level of parental education was measured by the question: 'What is the highest level of schooling your father/mother completed?'. The coding comprised: 'completed primary school or less', 'some secondary school', 'completed secondary school', 'some college or university' and 'completed college or university'. On the basis of $\alpha = 0.74$, responses were averaged to obtain a synthetic measure. Family structure was obtained by recoding the responses to the question: 'Which of the following people live in the same household with you?' to indicate living with both parents (0 = 'no'/1 = 'yes').

Country-level variables

Three country-level variables were included in the analysis: (i) GDP per capita, i.e. the GDP converted to international dollars using purchasing power parity rates; (ii) expenditure on public health (% of GDP), the current and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and non-governmental organizations) and social (or compulsory) health insurance funds, expressed as a percentage of GDP; and (iii) benefit in kind for families/children (% GDP).

Data analysis

We analysed these data using the multi-level logistic regression analysis through HLM6 [32], with students at the first level and countries at the second level. In model I (empty model), we did not include any explanatory variables. In model II (within-country model), we estimated the links between the individual variables and probable problematic gambling for individual I in country J. In model III (between-country model), we estimated the influence of the country variables on country-level probable problematic gambling. In order to study the determinants of probable problem gambling, we calculated odds ratios (ORs) and 95% confidence intervals (CIs) through two-level logistic regression models. The random-effect factor (country) was needed in all models to allow for possible heterogeneity.

RESULTS

Preliminary analyses

Descriptive statistics for the individual and country variables are shown in Table 1. On average, the reported levels of problematic gambling were 3.7% (total sample prevalence). In particular, Danish adolescents were the least involved in probable problem gambling (1.6%), whereas Albanian youth had the highest prevalence (5.3%) (Fig. 1).

Indicator variables of probable problem gambling at individual and national levels

The HLM models are shown in Table 2. A preliminary step in HLM involves fitting an unconditional model (model I) and comparing the empty model at one level with the empty model at two levels. This comparison showed a significant main effect of the countries, with a random coefficient reliability of 0.934. The γ_{00} represented the average log odds of probable problem gambling in a country. The population-average estimate, $\gamma_{00} = -3.26$, means that for a country with a random

effect $u_{00} = 0$, the expected odds of being involved in some form of probable problem gambling is 0.036. Given the estimate of $\tau_{00} = 0.158$, we expected 95% of the countries have a probability of probable problem gambling between 0.017 and 0.077.

The within-country model (model II) includes family and the demographic variables. In the total sample model, females were less likely to be problematic gamblers. Among family variables, students who perceive more parental caring and monitoring reported less involvement in probable problem gambling. Moreover, students who perceive stronger parental regulation were more likely to be possible problematic gamblers. Finally, there were no associations of probable problem gambling with the level of parental education and family structure.

The between-country model (model III) includes country variables. In those nine European countries, expenditure on public health was associated negatively with probable problem gambling. Thus, students who live in a country in which the expenditure on health is higher have a lower likelihood of being involved in probable problem gambling. However, GDP per capita and benefits in kind for families/children showed no association with probable problem gambling. Various parallel multi-level regression models (performed with health expenditure as a fixed variable and entering our two-country variables one step at a time) showed that our results have been fairly stable. Finally, in order to verify the possible different effects of family characteristics among youth living in different countries, we performed parallel analyses at an exploratory level by verifying the variability of those effects. Only in the case of family structure ($\chi^2_{(8)} = 21.86$, $P = 0.005$) did we verify variability, but none of the country-level predictors explained this variability.

DISCUSSION

This study investigated the role of family and socio-economic indicators of the welfare state in explaining probable problem gambling during adolescence in a representative sample of students living in nine European countries. Our principal aim, using multi-level analysis, was to examine adolescent probable problem gambling as a function of individual and contextual characteristics. Two main results emerged from our study.

First, parents' levels of schooling and family structure were not related to probable problem gambling. These findings are in line with previous results reported in the literature that found no relationships between family socio-demographic characteristics and adolescent gambling behaviours [37,38]. Similarly to what has been found on substance abuse, family structural characteristics may be less influential in affecting problem gambling compared to family relational characteristics [39,40].

Table 1 Descriptive statistics for the individual and country variables by gambling status (Nppg: non-possible problem gambler = 28 836; Ppg: possible problem gambler = 1116).

Country	Level 1 individual										Level 2 country level				
	Male (%)		Level of parents' schooling#		Living with both parents (%)		Parental regulation		Parental caring		Parental monitoring		Expenditure on public health (% of GDP)	Benefit family/children (% of GDP)	GDP per capita
	Nppg	Ppg	Nppg	Ppg	Nppg	Ppg	Nppg	Ppg	Nppg	Ppg	Nppg	Ppg	(% of GDP)	(% of GDP)	
United Kingdom	48.9	83.3	3.42 (0.88)	2.94 (0.84)	64.2	63.9	3.33 (1.11)	3.20 (1.44)	4.18 (1.05)	3.77 (1.29)	3.72 (0.94)	3.28 (1.13)	8.1	1.80	35 299
Denmark	44.3	88.2	3.31 (0.95)	3.31 (0.97)	73.7	70.6	2.77 (0.90)	3.00 (1.12)	4.57 (0.77)	4.04 (1.11)	4.19 (0.64)	3.74 (0.80)	9.7	4.30	40 600
Finland	46.6	83.7	3.26 (0.94)	3.20 (0.99)	70.9	66.5	3.49 (0.97)	3.53 (0.96)	4.20 (0.85)	3.82 (0.92)	3.85 (0.76)	3.30 (0.90)	6.7	3.30	36 030
Lithuania	47.8	89.4	4.05 (1.02)	3.88 (1.03)	68.6	76.9	3.08 (1.12)	3.27 (1.19)	4.28 (0.94)	4.08 (0.97)	3.75 (0.90)	3.13 (1.00)	5.2	2.20	18 022
Romania	44.2	76.5	3.06 (1.08)	3.04 (1.11)	77.2	74.2	2.51 (1.24)	2.63 (1.33)	4.17 (1.04)	4.02 (1.19)	3.83 (0.97)	3.33 (1.19)	4.4	1.70	14 531
Serbia	44.5	86.4	3.51 (0.98)	3.56 (0.95)	84.3	85.2	2.85 (1.22)	2.96 (1.31)	4.45 (0.89)	4.07 (1.10)	4.15 (0.79)	3.41 (1.11)	6.4	1.30	11 421
Italy	49.1	89.0	4.04 (0.94)	4.03 (1.0)	83.8	74.8	3.45 (1.07)	3.11 (1.25)	4.34 (0.91)	3.85 (1.16)	3.98 (0.84)	3.21 (1.21)	7.4	1.30	32 110
Albania	42.1	83.3	3.21 (1.03)	3.23 (1.16)	92.6	91.9	3.40 (1.15)	3.26 (1.18)	4.50 (0.84)	4.09 (1.08)	4.13 (0.79)	3.45 (1.08)	2.6	0.20	8631
Cyprus	44.8	85.1	3.58 (1.12)	3.43 (1.23)	82.8	63.4	3.11 (1.18)	3.15 (1.23)	4.29 (1.01)	3.70 (1.24)	4.10 (0.79)	3.38 (0.99)	2.5	2.10	30 307
<i>n</i>	13 191	945	26 388	987	22 802	835	28 636	1106	28 588	1107	28 747	1113	9	9	9
Total	45.8	84.7	3.53 (1.05)	3.42 (1.11)	79.4	75.6	3.12 (1.17)	3.14 (1.23)	4.34 (0.93)	3.94 (1.11)	4.00 (0.83)	3.34 (1.06)	5.89 (2.44)	2.02 (1.19)	25 216.78 (12 041.64)

#1 = completed primary school or less; 2 = some secondary school; 3 = completed secondary school; 4 = some college or university; 5 = completed college or university.

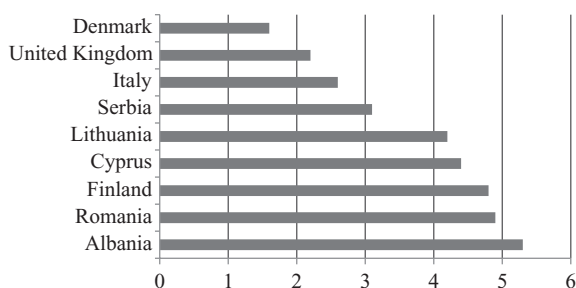


Figure 1 Life-time prevalence of problem gambling in the countries under study

In this respect, our analyses showed that living in a family environment where parents are supportive and monitor their children's behaviours is associated negatively with probable problem gambling. In accordance with past studies, family support displayed a negative relation to the probable gambling problem [14], because they may have more social resources to turn to when they get into trouble. In addition, having parents who are more aware of how and with whom their children spend free time is associated negatively with gambling activities [21,22]. Finally, high levels of disciplinary parental rules (i.e. external rules) were related to higher levels of adolescent probable problem gambling. Our findings are in line with the psychological and communication literature pointing out the importance and effectiveness of self-regulation in the identification, assessment and treatment of behavioural excesses [41].

Regarding cross-country comparisons, the reported levels of probable problematic gambling behaviour show a variation, ranging from 1.6% (Denmark) to 5.3% (Albania). However, our findings pointed out that part of the variation in adolescent probable problem gambling can be attributed to country-level characteristics. The results from the between-country model explain the cross-national variation in adolescent probable problem gambling in two ways. On one hand, higher health expenditure was associated with lower levels of gambling problems even after controlling for the influence of the GDP. Interestingly, the effect of health expenditure on probable problem gambling is net of the effect of GDP. In line with Richter *et al.* [27] and Bartlett [42], it is possible that living in southern, eastern and Balkan countries—where health service provisions and benefits are limited—has a negative impact on gambling behaviours. Thus, welfare regimes with less substantial welfare services and less redistributive welfare provision seem to have a negative effect on young people's health [26,28]. On the other hand, adolescent probable problem gambling was not associated with countries' expenditure on benefits in kind for children and family. Thus, greater family spending was not related to a decreased rate of

probable problem gambling. Contemporary public health practice should act on multi-level responses, focusing upon upstream interventions based on structural response, including appropriate legislative frameworks addressing on health and wellbeing issues such as expenditure on health.

However, it seems that addressing expenditure on health should not necessarily mean conferring benefit on the family/children: those benefits show no association with probable problem gambling. It is noted that family income and increased wellbeing do not follow the same track: increasing benefit income, while taking no other proactive action, could push the family further into dependency, increasing the chance that young people will follow the same path as adults.

Finally, contrary to what we expected, we did not find any cross-level interaction between benefit in kind for families/children and the parental characteristics in participant countries. Future multi-level research explaining the conditional link between family characteristics and other socio-economic indicators of welfare concerning adolescent gambling should be considered.

This study presented some limitations. First, findings were based on self-report data. Secondly, our assessment of problem gambling was not completely satisfactory, mainly because it consisted of two items. Although the two-item Lie/Bet questionnaire may be useful to classify possible problem gamblers [36], other extensive instruments are most frequently used and can capture the phenomenon more clearly. Otherwise, a screening test such as Lie/Bet is more appropriate when we refer to youth, because it is focused upon less severe gambling problems. In this perspective, regarding validity assessment of the Lie/Bet screen, comparisons have been made with DSM-IV criteria. Götestam *et al.* [43] found that in an adolescent sample the Lie/Bet screen, compared to the use of the full DSM-IV, is fairly close. It is concluded that in normal community samples the Lie/Bet Screen may function as a useful screening device for probable gambling problems. Although the Lie/Bet test, having a life-time frame, may yield a higher prevalence estimate of gambling problems if compared to other instruments such as the South Oaks Gambling Screen revised for adolescents (SOGS-RA) and DSM-IV multiple response-juvenile (MR-J) [44], by analysing this behaviour among students aged 16 years we are confident that life-time prevalence was similar to recent instruments.

Thirdly, we included a relatively small number of countries in our sample with respect to existing studies employing a hierarchical linear model. Research performed with a large number of countries is needed in order to explain more clearly the cross-national variations in adolescent problem gambling (i.e. clustering of countries in different welfare state regimes).

Table 2 Correlates of probable problem gambling (0 = no probable problem gambling, 1 = probable problem gambling).

Variables	Model i (empty model)			Model ii			Model iii#		
	Coeff. (SE)	P-value	OR (95% CI)	Coeff. (SE)	P-value	OR (95% CI)	β (SE)	P-value	Exp (β) (95% CI)
<i>Fixed effect</i>									
Intercept				1.24 (0.25)	0.002		1.20 (0.27)	0.003	
<i>Individual level</i>									
Gender (1 = male)				-1.77 (0.09)	0.001	0.17 (0.14-0.20)	-1.77 (0.09)	0.001	0.17 (0.14-0.20)
Level of parents' schooling				-0.04 (0.03)	0.06	0.96 (0.90-1.02)	-0.04 (0.02)	0.06	0.96 (0.92-0.99)
Family structure				-0.15 (0.08)	0.27	0.85 (0.73-1)	-0.16 (0.14)	0.27	0.85 (0.64-1.13)
Parental regulation				0.15 (0.03)	0.001	1.16 (1.09-1.23)	0.15 (0.09)	0.001	1.16 (1.09-1.23)
Parental caring				-0.08 (0.03)	0.02	0.92 (0.85-0.98)	-0.08 (0.07)	0.02	0.92 (0.85-0.98)
Parental monitoring				-0.55 (0.04)	0.001	0.57 (0.53-0.62)	-0.55 (0.07)	0.001	0.57 (0.54-0.60)
<i>Country level (n = 9)</i>									
Expenditure on public health (% of GDP)							-0.13 (0.04)	0.02	0.87 (0.78-0.97)
GDP per capita							-0.00 (0.00)	0.14	1 (1.00-1.00)
Benefit family/children (% of GDP)							0.15 (0.10)	0.20	1.16 (0.89, 1.51)
<i>Random effect</i>									
Variance components	0.15 (0.39)	$\chi^2_{(8)} = 119.44, P < 0.001$		0.18 (0.42)	$\chi^2_{(8)} = 125.57, P < 0.001$		0.04 (0.20)	$\chi^2_{(5)} = 29.06, P < 0.001$	

#df = 5. The final model was as follows: probable problematic gambling = $\gamma_0 + \gamma_1$ (gender) + γ_2 (parental education) + γ_3 (family structure) + γ_4 (parental regulation) + γ_5 (parental caring) + γ_6 (parental monitoring). $\gamma_0 = \beta_{00} + \beta_{01}$ (expenditure on health public) + β_{02} (GDP per capita) + β_{03} (family/children benefit). SE = standard error; GDP = gross domestic product; OR = odds ratio; CI = confidence interval.

Finally, our study focused upon individual- and country-level characteristics, but other settings (e.g. psychology, peers, school and community) impacting upon addictive behaviours may also influence problem gambling. Moreover, at country-level, some other characteristics may play a role in shaping adolescent gambling (i.e. education and training).

These limitations notwithstanding, our multi-level study has deepened our understanding of the complex set of indicator variables of probable problem gambling. We investigated the importance of taking into account family characteristics and welfare state benefits in gambling research and preventive interventions. Our findings underlined that, while country wealth does not protect from gambling, gambling is indeed influenced by the way in which countries decide to allocate public resources. Future research should focus increasingly upon explaining the impact of welfare regimes on adolescent gambling. According to our findings, prevention efforts should target parents' awareness of the impact on their children of their parenting practices, while future social welfare policies should introduce or maintain stronger health insurance funds, thus decreasing adolescent gambling and other risk behaviours.

Declaration of interests

None.

Acknowledgements

The author would like to thank Lucia Fortunato for her support. Data for this paper were provided by the European School Survey Project on Alcohol and Other Drugs (ESPAD) led by Björn Hibell and funded by the Swedish Council on Information on Alcohol and Other Drugs (CAN). The international data set of the 2011 ESPAD survey was compiled by Thoroddur Bjarnason, supported by a team of ESPAD researchers. National collaborating people (including Principal Investigators), funding agencies and supportive organizations are listed in Hibell *et al.* ([31], pp. 172–173).

References

- Volberg R. A., Gupta R., Griffiths M. D., Olason D., Delfabbro P. H. An international perspective on youth gambling prevalence studies. *Int J Adolesc Med Health* 2010; **22**: 3–38.
- Blinn-Pike L., Worthy S. L., Jonkman J. N. Adolescent gambling: a review of an emerging field of research. *J Adolesc Health* 2010; **47**: 223–36.
- Neal P. N., Delfabbro P. H., O'Neil M. G. *Problem Gambling and Harm: Towards A National Definition*. Melbourne: National Gambling Research Program Working Party, 2005; 2005.
- Ariyabuddhiphongs V. Adolescent gambling: a narrative review of behavior and its predictors. *Int J Ment Health Addict* 2013; **11**: 97–109.
- Derevensky J., Gupta R., Messerlian C., Gillespie M. Youth gambling problems: a need for responsible social policy. In: Derevensky J., Gupta R., editors. *Gambling Problems in Youth: Theoretical and Applied Perspectives*. New York: Kluwer Academic Publishers; 2004, pp. 231–52.
- Bonnaire C., Bungener C., Varescon I. Subtypes of French pathological gamblers: comparison of sensation seeking, alexithymia and depression scores. *J Gambl Stud* 2009; **25**: 455–71.
- Potenza M. N. The neurobiology of pathological gambling and drug addiction: an overview and new findings. *Phil Trans R Soc Lond B Biol Sci* 2008; **363**: 3181–9.
- Derevensky J. L., Gupta R., Winters K. Prevalence rates of youth gambling problems: are the current rates inflated? *J Gambl Stud* 2003; **19**: 405–25.
- Abbott M., Binde P., Hodgins D., Korn D., Pereira A., Volberg R. *et al.* Conceptual Framework of Harmful Gambling: An International Collaboration. Guelph, ON: Ontario Problem Gambling Research Centre; 2013.
- Reith G. Beyond addiction or compulsion: the continuing role of environment in the case of pathological gambling. *Addiction* 2012; **107**: 1736–37.
- Reith G., Dobbie F. Beginning gambling: the role of social networks and environment. *Addict Res Theory* 2011; **19**: 483–93.
- Barnes G. M., Welte J. W., Hoffman J. H., Dintcheff B. A. Gambling and alcohol use among youth: influences of demographic, socialization, and individual factors. *Addict Behav* 1999; **24**: 749–67.
- McComb J. L., Sabiston C. M. Family influences on adolescent gambling behavior: a review of the literature. *J Gambl Stud* 2010; **26**: 503–20.
- Hardoon K. K., Gupta R., Derevensky J. L. Psychosocial variables associated with adolescent gambling. *Psychol Addict Behav* 2004; **18**: 170–9.
- Floros G. D., Siomos K., Fisoun V., Geroukalis D. Adolescent online gambling: the impact of parental practices and correlates with online activities. *J Gambl Stud* 2013; **29**: 131–50.
- Barber B. K., Stolz H. E., Olsen J. A. Parental support, psychological control, and behavioral control: assessing relevance across time, culture, and method. *Monogr Soc Res Child Dev* 2006; **70**: 1–137.
- Crouter A. C., Head M. R. Parental monitoring and knowledge of children. In: Bornstein M. H., editor. *Handbook of Parenting*, 2. vol. 3. Mahwah, NJ: Erlbaum; 2002, pp. 461–84.
- Vieno A., Nation M., Pastore M., Santinello M. Parenting and antisocial behavior: a model of the relationship between adolescent self-disclosure, parental closeness, parental control, and adolescent antisocial behavior. *Dev Psychol* 2009; **45**: 1509–19.
- Pettit G. S., Laird R. D., Dodge K. A., Bates J. E., Criss M. M. Antecedents and behavior-problem outcomes of parental monitoring and psychological control in early adolescence. *Child Dev* 2001; **72**: 583–98.
- Lahey B. B., Van Hulle C. A., D'Onofrio B. M., Rodgers J. L., Waldman I. D. Is parental knowledge of their adolescent offspring's whereabouts and peer associations spuriously associated with offspring delinquency? *J Abnorm Child Psychol* 2008; **36**: 807–23.
- Chalmers H., Willoughby T. Do predictors of gambling involvement differ across male and female adolescents? *J Gambl Stud* 2006; **22**: 373–92.

22. Magoon M. E., Ingersoll G. M. Parental modeling, attachment, and supervision as moderators of adolescent gambling. *J Gambl Stud* 2006; **22**: 1–22.
23. Lee G. P., Stuart E. A., Ialongo N. S., Martins S. S. Parental monitoring trajectories and gambling among a longitudinal cohort of urban youth. *Addiction* 2014; **109**: 977–85.
24. Vachon J., Vitaro E., Wanner B., Tremblay R. E. Adolescent gambling: relationships with parent gambling and parenting practices. *Psychol Addict Behav* 2004; **18**: 398–401.
25. Bogt T. F., Looze M., Molcho M., Godeau E., Hublet A., Kokkevi A. Do societal wealth, family affluence and gender account for trends in adolescent cannabis use? A 30 country cross-national study. *Addiction* 2014; **109**: 273–83.
26. Holstein B. E., Currie C., Boyce W., Damsgaard M. T., Gobina I., Kökönyei G. *et al.* Socioeconomic inequality in multiple health complaints among adolescents: international comparative study in 37 countries. *Int J Public Health* 2009; **54**: 260–70.
27. Richter M., Rathman K., Gabhainn S. N., Zambon A., Boyce W., Hurrelmann K. Welfare state regimes, health and health inequalities in adolescence: a multilevel study in 32 countries. *Sociol Health Illn* 2012; **34**: 858–79.
28. Zambon A., Boyce W. F., Cois E., Currie C., Lemma P., Dalmaso P. *et al.* Do welfare regimes mediate the effect of SES on health in adolescence? A cross-national comparison in Europe, North America and Israel. *Int J Health Serv* 2006; **36**: 309–29.
29. Sarti S., Alberio M., Terraneo M. Health inequalities and the welfare state in European families. *J Sociol Soc Welf* 2013; **40**: 103–30.
30. Viner R. M., Ozer E. M., Denny S., Marmot M., Resnick M., Fatusi A. *et al.* Adolescence and the social determinants of health. *Lancet* 2012; **379**: 1641–52.
31. Hibell B., Guttormsson U., Ahlström S., Balakireva O., Bjarnason T., Kokkevi A. *et al.* *The 2011 ESPAD Report. Substance Use among Students in 36 European Countries*. Stockholm: CAN; 2012.
32. Raudenbush S. W., Bryk A. S. *Hierarchical Linear Models*, 2nd edn. London: Sage; 2002.
33. Johnson E. E., Hammer R., Nora R. M., Tan B., Eistenstein N., Englehart C. The lie/bet questionnaire for screening pathological gamblers. *Psychol Rep* 1988; **80**: 83–8.
34. Rossow I., Hansen M. Underholdning med bismak. Ungdom og pengespil. Report no. 1/03. Norsk Institutt for forskning om oppvekst, velferd og aldring. Nova [Entertainment with an after-taste. Money gambling among youths.] Oslo, Norway: Norwegian Social Research Institute; 2003.
35. Carneiro E., Tavares H., Sanches M., Pinsky I., Caetano R., Zaleski M. *et al.* Gambling onset and progression in a sample of at-risk gamblers from the general population. *Psychiatry Res* 2014; **216**: 404–11.
36. Rossow I., Molde H. Chasing the criteria: comparing SOGS-RA and the Lie/ Bet screen to assess prevalence of problem gambling and 'at-risk' gambling among adolescents. *J Gambl Issues* 2006; **18**: 57–71.
37. Vitaro E., Ferland F., Jacques C., Ladouceur R. Gambling, substance use, and impulsivity during adolescence. *Psychol Addict Behav* 1998; **12**: 185–94.
38. Langhinrichsen-Rohling J., Rohde P., Seeley J. R., Rohling M. L. Individual, family, and peer correlates of adolescent gambling. *J Gambl Stud* 2004; **20**: 23–46.
39. Coombs R. H., Paulson M. J. Contrasting family patterns of adolescent drug users and nonusers. *J Chem Depend Treat* 1988; **1**: 59–72.
40. Velleman R. D. B., Templeton L. J., Copello A. G. The role of the family in preventing and intervening with substance use and misuse: a comprehensive review of family interventions, with a focus on young people. *Drug Alcohol Rev* 2005; **24**: 93–109.
41. Bandura A., Caprara G. V., Barbaranelli C., Gerbino M., Pastorelli C. Role of affective self-regulatory efficacy in diverse spheres of psychosocial functioning. *Child Dev* 2003; **74**: 769–82.
42. Bartlett W. *The Political Economy of Welfare Reform in the Western Balkans*, Springer New York. 2013: 245–59.
43. Götestam K. G., Johansson A., Wenzel H. G., Simonsen I. E. Validation of the lie/bet screen for pathological gambling on two normal population data sets. *Psychol Rep* 2004; **95**: 1009–13.
44. Fisher S. Developing the DSM-IV criteria to identify adolescent problem gambling in non-clinical populations. *J Gambl Stud* 2000; **16**: 253–73.