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ORIGINAL ARTICLE

Social constraints associated with excessive internet use in adolescents: the role of family, school, peers, and neighbourhood

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Abstract

Objectives Excessive internet use (EIU) has been studied predominantly within the context of individual risk factors. Less attention has been paid to social factors, especially in a fashion complex enough to include the multiple domains of adolescent socialization. This study examined the relationship between EIU and constraints within family, school, peer groups, and neighbourhoods, while controlling for emotional and behavioural difficulties.

Methods This study was based on survey data from the Health Behaviour in School-aged Children study, which was conducted in Slovakia in 2018. The sample of representative adolescents totalled 8400 (mean age: 13.44 years; SD_{age} = 1.33; 50.9% boys).

Results Multiple-step linear regression revealed that, after controlling for sociodemographic factors and emotional and behavioural difficulties, peer problems had the least effect, while the constraints related to family and neighbourhood stood out as especially problematic. Combined variables explained 20% variance of EIU.

Conclusions Social constraints proved to be important factors in adolescent EIU. The important role of a problematic neighbourhood is a novel finding and suggests that it should be targeted in prevention.

Keywords Excessive internet use · Internet addiction · Adolescents · Social constraints · Problematic neighbourhood

Introduction

The internet brings numerous opportunities, challenges, and even risks to adolescents (Kalmus et al. 2014). One of the risks is the addictive use of the internet. It has attracted the attention of both the general public and the research community. A number of terms exist to describe this issue, including internet addiction (Young 2004), problematic internet use (Shapira et al. 2000), and pathological internet use (Morahan-Martin and Schumacher 2000). However, these can often be used interchangeably because they are typically based on symptoms that correspond to criteria for behavioural addiction in general (Griffiths 2005). It is conceptualized as a problem that manifests with (1) preoccupation, (2) positive mood changes, (3) withdrawal symptoms, (4) difficulties with limiting time online, (5) relapses into problematic behaviour, and (6) subsequent conflicts and problems as a result of excessive use. Excessive internet use (EIU), the term used in this paper, may also be understood to be an umbrella term for other specific online behaviours, such as excessive online gaming (Kuss et al. 2013; Blinka et al. 2015) and social

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networking (Müller et al. 2016). The phenomenon has mostly been studied from the perspective of individual risk factors. Dominant models, such as the Cognitive-Behavioural Model of Pathological Internet Use (Davis 2001) and the Interaction of Person-Affect-Cognition-Execution Model (I-PACE, Brand et al. 2016), assume that individual factors, like social anxiety, higher impulsivity, and dysfunctional coping styles, play crucial roles in the development of EIU, while the role of social factors, if mentioned at all, is attenuated.

However, there are several reasons to assume that the social factors related to EIU at a young age are underresearched and that they deserve more attention. Environment and socialization play significant roles in the shaping of adolescent behaviour (Bandura 1977). More specifically, the widely recognized theories of adolescent problematic behaviour, such as the Problem-Behaviour Theory (PBT, Jessor and Jessor 1977) and the Social Development Model (SDM, Catalano et al. 1996), acknowledge the importance of environment in the occurrence of issues like delinquency, alcohol use, and conduct problems. The research has shown that problematic behaviour and EIU in adolescents are related (Ko et al. 2008), and that they share some psychological and personality characteristics (Wang et al. 2017; Müller et al. 2017). Thus, the models that describe problematic behaviour are potentially applicable to the understanding of EIU. PBT postulates that the problem occurs within the triad of personality, behaviour, and the environment. The environment, and how it is perceived by an individual, can be more distant (i.e. culture) as well as more proximal (e.g. teachers, friends, the family; Jessor and Jessor 1977). SDM states that problematic behaviour arises from individual factors, the position in the social structure, and the inclusion of external (i.e. environmental) constraints that may be posed by the family, peers, school, and community.

The role of various social and socializing factors in EIU has been investigated in several empirical studies. However, these studies usually did not consider several environmental domains and their interactions, as suggested in SDM. More precisely, available systematic review studies have shown that the largest amount of research attention has been paid to the role of family and various family-related factors (Schneider et al. 2017). On one hand, this research focus is not surprising because the family is the central setting for child development (Bronfenbrenner 1979). On the other hand, this may be too narrow because adolescence is a period of development that is typical for an increasing need for independence, though the need for closeness with caregivers still exists. In adolescence, the importance of peer relationships increases, indicating that they may play an important role in socialization and development. For instance, the popularity of online social networking, which is also a significant means for connection with peers, was found to be a risk factor for EIU (Durkee et al. 2012; Müller et al. 2016). Moreover, peer relationships may constitute a source of distress and a risk factor for EIU when they are associated with perceived peer pressure (Liu and Kuo 2007). Research that would consider school to be a predictor for EIU in adolescents is less common. Mostly, EIU has been studied with respect to decreased school results and decreased school satisfaction because the adverse consequences of overuse is an essential part of addictive behaviours, per se (Griffiths 2005). However, several studies also found a negative relationship between EIU and the school environment (Li et al. 2016; Jia et al. 2017; Xin et al. 2018), indicating that the quality of the school milieu may be a relevant predictor for EIU as, for example, school may be an important source of stress with which the adolescent needs to cope. There is no research to our knowledge that concerns general environmental factors, such as community and its relationship to EIU. This is surprising because a substantial body of literature has indicated that adolescents who live in a problematic community or neighbourhood are at risk for conduct problems, depression, and anxiety (Xue et al. 2005; Dorsey and Forehand 2003). At the same time, an unsafe and problematic neighbourhood does not provide enough opportunities for meaningful ways for spending free time and thus adolescents living in such environments may be more prone to boredom, which may lead to the excessive use of digital devices.

Also, there is only a limited number of studies on the social predictors of EIU that included more than two social domains at the same time. These studies usually indicate that the domains are in a mutual relationship and that they are all associated with EIU. Studies by Zhu et al. (2015) and Li et al. (2020) indicate that the parents still had the biggest influence on their children's EIU (e.g. their higher tendency towards rejection and punishment), but the effect is also supported by the school environment (e.g. school pressure, climate) and relationships with peers (e.g. connections with problematic peer groups).

With respect to the social factors of EIU, our knowledge is limited to the family context. Less is known about the role of relationships and the school environment, while the role of community and neighbourhood in the development of EIU is neglected completely. Also, only a limited number of studies researched more than two social domains in relation to EIU. Thus, drawing upon the assumptions made by theories about adolescent problematic behaviour, namely that of PBT and SDM, we use a holistic approach and aim to explore four social factors in association with EIU. Also, we examine their moderating role in the relationship between EIU and both psycho-emotional internalization and behavioural externalization

because the literature suggests that the effect of individual risk factors on adolescent problematic behaviour may be amplified by the dysfunctional social milieu (Jones et al. 2016).

Methods

Sample and procedure

We used data from the Health Behaviour in School-aged Children (HBSC) study that was conducted in Slovakia in 2018. To obtain a representative sample of school children aged 11–15, two-stage sampling was used. First, we invited 140 elementary schools located in both rural and urban areas from all regions of Slovakia to participate. They were selected through weighted random selection (i.e. type of school, region) from a list of all eligible schools in Slovakia ($N = 1616$), which was obtained from the Slovak Institute of Information and Prognosis for Education. The school response rate (RR) was 73.6%. Second, schools which decided to participate had one class per grade within the target group randomly selected. Consequently, we obtained data from 8402 adolescents (mean age: 13.44 years; $SD_{age} = 1.33$; 50.9% boys) from the fifth to ninth grades of elementary/secondary schools and *prima* to *quarta* (i.e. first year to fourth year) of eight-year grammar schools in Slovakia.

The data were collected anonymously with an electronic questionnaire that was administered in the school by a team of trained administrators and in the absence of teachers. Parental informed consent for their child's involvement in the HBSC research was obtained through the school administration. They had the opportunity to refuse participation if they disagreed with their child's involvement. The study was approved by the Ethics Committee of the Medical Faculty at the Pavol Jozef Safarik University in Kosice (16N/2017).

Measures

Data for the present analyses were collected with questionnaires from the standardized research protocols for the 2017/2018 WHO-collaborative HBSC study (Inchley et al. 2018). HBSC followed the strict methodology of the survey, which also applied to the translation process. All of the measures used in the study were translated from English to Slovak using the back-translation procedure. Moreover, back-translations are also independently checked by a translation team within the HBSC network, which was specifically established for this task. For this study, we used the following measures:

Excessive internet use (EIU) was measured with the excessive internet use scale (EU Kids Online network; eukidsonline.net). This scale was validated in 25 European countries (Škařupová et al. 2015). It includes five items that cover five of the six factors of the components for the model of behavioural addiction (Griffiths 2005): salience ('I have gone without eating and sleeping because of the internet'); withdrawal symptoms ('I have felt bothered when I cannot be on the internet'); tolerance ('I have caught myself surfing when I am not really interested'); relapse ('I have tried unsuccessfully to spend less time on the internet'); and conflict ('I have spent less time than I should with either family, friends, or doing schoolwork because of the time I spend on the internet'). Using a four-point scale (that ranged from 1 = 'never' to 4 = 'very often'), participants rated how often they had experienced the symptoms in the preceding 12 months. The final variable was created as a sum of the five items, with higher scores representing more excessive internet use.

The scale was reliable. Cronbach's alpha equalled 0.79.

Social constraints

Constraints related to peer support was assessed with four items adapted from the Multidimensional Scale of Perceived Social Support (Inchley et al. 2018; Zimet et al. 1988). Using a seven-point scale that ranged from absolutely disagree (= 1) to absolutely agree (= 7), respondents were asked to evaluate statements such as 'friends try to help' and 'I can count on friends while experiencing problems'. The scale was reversed so that a higher sum score represented more constraints. The scale Cronbach's alpha was good, 0.91.

Constraints related to school support was constructed as a sum score of six items measured on a five-point scale that ranged from strongly agree (= 1) to strongly disagree (= 5). This scale was developed to measure the quality of classmate and teacher support that has been validated in previous HBSC surveys (see Inchley et al. 2018). Sample items included statements that concerned classmates and teachers (e.g. students/classmates enjoy being together, students are kind and helpful, the teacher accepts me and I trust the teachers). The scale Cronbach's alpha was 0.80.

Constraints related to family support was measured using four items with a seven-point scale that ranged from absolutely agree (= 1) to absolutely disagree (= 7). The scale was adapted upon the Multidimensional Scale of Perceived Social Support (Inchley et al. 2018; Zimet et al. 1988). Questions were about family support (e.g. does the family try to help the individual, does the student get needed emotional support and help from family). The scale

was reversed so that a higher sum score represented more constraints. Reliability was 0.94.

Constraints related to problematic neighbourhood was assessed by three questions that measured neighbourhood characteristics on a three-point scale that ranged from a lot (= 1) to none (= 3). The scale was constructed as a sum of scores from items that examined whether there was a group of young people who caused problems; whether garbage, litter, or broken glass were commonplace; and whether there were dilapidated houses or buildings. The scale was reversed so that a higher sum represented more constraints. The internal consistency was sufficient. Cronbach's alpha equalled 0.70. This measure has been consistently used across HBSC surveys and has been developed in response to the need to extend the conceptual framework for the study of the health behaviour of school children (Inchley et al. 2018).

Individual and control characteristics

Emotional and Behavioural Difficulties were assessed using the *Strengths and Difficulties Questionnaire* (SDQ; Goodman 1997), which includes 20 items on emotional problems, peer problems, behavioural problems, and hyperactivity. Three options ranged from absolutely disagree (= 1) to absolutely agree (= 3). Five items were rescaled so that the scale could be constructed as a sum of scores from the items, with higher scores representing more emotional and behavioural difficulties. The scale was reliable. Cronbach's alpha equalled 0.77.

Perceived family wealth corresponds to a subjective indicator of families' economic position and was measured using a single item 'How well-off do you think your family is?' The five response options were 'very well-off (= 1)'; 'quite well-off (= 2)'; 'average (= 3)'; 'not so well-off (= 4)'; and 'not at all well-off (= 5)', with higher scores representing poorer family wealth. This measure has shown to be a good indicator of family affluence (Schnohr et al. 2008).

Statistical analysis

The data were analysed using IBM SPSS Statistics 25 software. There were missing values for the study variables (except for age and gender), with the highest non-response for the item about the presence of dilapidated houses or buildings in the respondents' neighbourhood (34.5%), which was likely the result of this question being at the end of the questionnaire. Little's Missing Completely at Random (MCAR) test was significant ($\chi^2(26{,}710) = 35{,}106.12$; $p < 0.001$), indicating that the missing data were completely random. Therefore, multiple imputation was conducted to estimate the values for the missing data points in the study variables with fully conditional specification (on $m = 5$ imputed data sets). This is an iterative Markov chain Monte Carlo (MCMC) method. It predicts the missing values for a variable using all the other available variables included in the model; the number of iterations used was 10. Two cases were excluded from the imputation procedure due to missing values for all of the studied variables. Spearman's correlation coefficients were calculated for all of the variables. To determine the associations among EIU, social constraints, and emotional and behavioural difficulties, we conducted a hierarchical multiple regression that controlled for the gender and age of the participants, and the family wealth. Variables were entered into the regression in four steps with the Enter method: 1, the controlled variables (i.e. age and gender as the known predictors EIU; Blinka et al. 2015; Su et al. 2019), and family wealth as a potential confounding factor for social constraints; 2, emotional and behavioural difficulties; 3, all of the social constraints; and 4, interaction terms (i.e. social constraints in association with emotional and behavioural difficulties (moderation)). The variables included in the interactions were mean-centred to facilitate the interpretation of beta coefficients (Aguinis and Gottfredson 2010). Thanks to a sufficiently large sample, regression analysis provided valid results, even with respect to non-normally distributed variables (Lumley et al. 2002). Assumptions of linearity were verified and multicollinearity was checked using the variance inflation factor (VIF). VIF values were less than 1.32, indicating that there was no multicollinearity. The residuals were uncorrelated (Durbin–Watson coefficient = 1.99) and approximately normally distributed. We conducted the regression analysis on the original data, the results were comparable to the results from the pooled data (see supplementary material 1).

Results

On average, participants reported lower scores for EIU ($M = 7.87$, SD = 3.14) (see Table 1).

Spearman's rank correlation coefficients showed significant positive associations between EIU and the other main constructs, with the strongest relationship between EIU and emotional and behavioural difficulties (see Table 2). Higher EIU scores were linked to more social constraints.

The outcomes of the hierarchical linear regression showed that the first three models of the stepwise regression analyses all improved the explained variance of EIU (see Table 3). The fourth step (i.e. adding the interaction terms) did not significantly increase the explanatory power. The third step explained about 20% of the variance of the

Table 1 Descriptive statistics of the variables in the pooled data set, Health Behaviour in School-aged Children study, Slovakia, 2018

	Mean	Standard deviation	Minimum	Maximum	Cronbach's alpha
Excessive internet use	7.87	3.14	5.00	20.00	0.79
Family wealth	2.06	0.87	1.00	5.00	
Constraints related to					
Peer support	11.72	7.11	4.00	28.00	0.91
School support	14.45	4.59	6.00	30.00	0.80
Family support	11.26	7.49	4.00	28.00	0.94
Problematic neighbourhood	4.99	1.64	3.00	9.00	0.70
SDQ	31.76	5.68	20.00	58.00	0.77

SDQ = Emotional and behavioural difficulties

Table 2 Spearman's rank correlations of the study variables (pooled data), Health Behaviour in School-aged Children study, Slovakia, 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excessive internet use (1)	–	0.14**	0.15**	0.14**	0.19**	0.23**	0.25**	0.38**
Age (2)		–	0.14**	0.00	0.14**	0.08**	0.08**	0.09**
Family wealth (3)			–	0.11**	0.20**	0.19**	0.09**	0.19**
Constraints related to								
Peer support (4)				–	0.29**	0.27**	0.07**	0.20**
School support (5)					–	0.22**	0.12**	0.34**
Family support (6)						–	0.17**	0.25**
Problematic neighbourhood (7)							–	0.24**
SDQ (8)								–

**$p < 0.01$; *$p < 0.05$; SDQ = Emotional and behavioural difficulties

dependent variable. In the first step, only higher age and perceived family wealth was significantly associated with higher scores on the EIU scale. In the second step, more emotional and behavioural difficulties ($\beta = 0.35$) predicted EIU. In the third step, higher levels of constraints related to peer support and family support, and neighbourhood predicted higher levels of EIU. The effect of peer constraints was, however, negligible ($\beta = 0.05$). The fourth step showed that the association between emotional and behavioural difficulties and EIU did not vary by constraints related to peers, school, family, and neighbourhood.

Discussion

This study examined problematic social environments—namely perceived constraints in family, school, peer relationships, and neighbourhood—in relation to adolescent excessive internet use (EIU). The findings showed that, after controlling for the perceived family wealth, the strongest social factors were the family and a problematic neighbourhood, while the effect of peer constraints was negligible. Emotional and behaviour difficulties were found to be the strongest predictor, which is in line with the literature and theoretical models, like I-PACE (Brand et al. 2016), that mostly operate with individual risk factors for internet addition. The social constraints did not moderate the relationships between both emotional and behavioural difficulties and EIU. This indicates that these two groups of predictors have rather independent associations with EIU, and the quality of the social milieu may play a relevant role in adolescent EIU. There were a consistent effect from higher age and a suppressor effect from gender on EIU. While older adolescents have been usually shown to be more at risk for EIU, the effect of gender was found to be less consistent across countries (Durkee et al. 2012; Su et al. 2019).

One of the most important results of this study was the positive association between a problematic neighbourhood and EIU. This is a new finding that reflects changes in associations between EIU and a problematic neighbourhood that is usually associated with increased incidents of problematic behaviour and with the lower socioeconomic status of the people living there (Kalff 2001). More than a decade ago, the relationship between the quality of the neighbourhood and the patterns of internet use was rather the opposite—adolescents from problematic areas had lower digital screen time compared to those from more educated and wealthier areas and families (Calvert et al. 2005). This discrepancy was attributed to phenomenon

Table 3 Hierarchical linear regression predicting excessive internet use (pooled data), Health Behaviour in School-aged Children study, Slovakia, 2018

z	Model 1			Model 2			Model 3			Model 4		
	B	SE	*β* 95% CI [LL, UL]	*B*	SE	*β* 95% CI [LL, UL]	*B*	SE	*β* 95% CI [LL, UL]	*B*	SE	*β* 95% CI [LL, UL]
(Constant)	3.97	0.39		5.53	0.38		5.86	0.36		5.86	0 .35	
Gender	− 0.10	0.07	− 0.02 [− 0.04, 0.01]	− 0.36	0.07	− 0.06*** [− 0.08, 0.04]	− 0.21	0.07	− 0.03** [− 0.06, − 0.01]	− 0.21	0.07	− 0.03** [− 0.06, − 0.01]
Age	0.24	0.03	0.10*** [0.08, 0.13]	0.19	0.03	0.08*** [0.06, 0.10]	0.16	0.03	0.07*** [0.05, 0.09]	0.16	0.02	0.07*** [0.05, 0.09]
Family wealth	0.38	0.06	0.11*** [0.07, 0.14]	0.15	0.06	0.04* [0.01, 0.08]	0.06	0.06	0.02 [− 0.02, 0.05]	0.06	0.06	0.02 [− 0.02, 0.05]
SDQ				0.20	0.01	0.35*** [0.33, 0.38]	0.15	0.01	0.27*** [0.24, 0.29]	0.15	0.01	0.26*** [0.24, 0.29]
Peer support							0.02	0.01	0.05*** [0.03, 0.07]	0.02	0.01	0.05*** [0.03, 0.08]
School support							0.00	0.01	0.00 [− 0.02, 0.03]	0.00	0.01	0.00 [− 0.02, 0.03]
Family support							0.05	0 .01	0.13*** [0.09, 0.16]	0.05	0.01	0.13*** [0.09, 0.16]
Problematic neighbourhood							0.34	0 .02	0.18*** [0.15, 0.20]	0.33	0.02	0.17*** [0.15, 0.20]
Peer support × SDQ										0.00	0.00	− 0.01 [− 0.03, 0.01]
School support × SDQ										0 .00	0.00	− 0..01 [− 0.03, 0.01]
Family support × SDQ										0.00	0.00	0.02 [− 0.01, 0.05]
Problematic neighbourhood × SDQ										0 .01	0.01	0.03 [− 0.01, 0.06]
R Square		0.02***			0.14***			0.20***			0.20***	

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; *B* = unstandardized regression coefficients; SE = standard error; *β* = standardized regression coefficients; LL = lower and UL = upper limit of a confidence interval; SDQ = Emotional and behavioural difficulties

such as the digital divide (i.e. the division between those with and without access to the internet; Becker 2000). However, by 2010, the vast majority of European adolescents had daily access to the internet (Livingstone et al. 2011), largely irrespective to the wealth of their family. In Slovakia in 2018, daily use was reported for adolescents on smartphones (70%), computers (43%), and tablets (24%), with an average of about three hours a day online (Šmahel et al. 2020). A problematic neighbourhood has fewer opportunities to meaningfully spend leisure time (Wegner and Flisher 2009). In this respect, due to the proliferation of affordable internet use, it may represent the most available source for handling the possible boredom to which children in such areas may be prone. Boredom, usually considered to be a trait, is indeed an important predictor of EIU (Skues et al. 2015). However, our results may suggest the importance of boredom as induced by the characteristic of the environment. Another explanation may be the tendency of some parents from such areas to keep children safely indoors. This could be supported by a recent finding that higher EIU was associated with both parental overprotection (Faltýnková et al. 2020) and the lower social-economic status of the family (Bitto-Urbanova et al. 2019; Faltýnková et al. 2020; Petruzelka et al. 2020). The fact that a problematic neighbourhood influences adolescent EIU has an important implication—usually, EIU is addressed by school prevention programmes (Vondráčková and Gabrhelik 2016). Our findings suggest that this phenomenon should also be addressed by larger societal units, like municipalities, and with similar approaches as those proposed to prevent other problematic adolescent behaviours.

Our findings corroborate prior studies that showed that there are psychological risk factors that predict EIU at large (Lam 2014; Kuss et al. 2014; Fumero et al. 2018). More specifically, that emotional and behavioural difficulties are associated with EIU (Kormas et al. 2011; El Asam et al. 2019**).** However, this study does not provide evidence that social constraints moderate the relationships among emotional and behavioural difficulties and EIU. This might be counterintuitive since the quality of the social milieu is often expected to strengthen or weaken the associations between psychological vulnerability and problematic behaviour (Brofenbrenner 1979; Jessor and Jessor 1977). One explanation could be that the construct of emotional and behavioural difficulties is very broad and the moderation effect may come into play when very specific and severe psychological risk factors for EIU, such as ADHD (Wang et al. 2017), are taken into consideration.

At the same time, it should be noted that the explained variance of EIU in our study of both the social and individual factors was rather low (20%). This finding corroborates prior research in which the combined model of social and psychological variables explained a similarly low variance of EIU (e.g. 19% in Savcı and Aysan 2016). The fact that the unexplained proportion of the variance of EIU is higher than the explained variance is a long-term issue and should be addressed in further studies. Despite many identified contributing factors, we still do not have a clear and detailed picture. One of the reasons in our study could be that, when assessing social constraints, we used only brief scales that explored just the overall phenomena, which means that the explained variance could be higher upon more thorough investigation. For example, while the social constraints added only 6% of the explained variance in the present study, in another recent study, a thorough investigation of family factors alone explained 14% of the variance of adolescent EIU (Faltýnková et al. 2020). This suggests that, despite many studies that identified individual factors as more important, social factors should not be underestimated in the development of EIU.

There are several limitations for this study that need to be considered. First, the data were only obtained using subjective self-report questionnaires, so various biases might affect the responses. Another limitation is the cross-sectional design of our study. Conclusive statements about the causality between our variables could not be inferred based on our findings. In consequence, a longitudinal design should be applied in future studies. Second, the dependent study variable, EIU, is a continuum without differentiation from healthy, unproblematic, and pathological internets users. Third, the scale has not been validated for discriminative purposes and it only consists of five items that measure generalized EIU and not the role of specific online behaviour, like gaming or social networking site use. The concept of generalized internet addiction has been criticized and assumed that, rather than existing by itself, it is comprised of various specific internet addictions (e.g. gaming, social networking; Starcevic and Aboujaoude 2017). Regardless of these limitations, the key strength of this study is the large national representative sample that was oriented towards the general population and its high response rate. Consequently, a selection bias is not likely in this research sample. Despite these limitations, this study showed that the social constraints proved to be important factors in adolescent EIU and their roles should be addressed in prevention efforts, with a specific focus on problematic neighbourhoods and family.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The study was approved by the Ethics Committee of the Medical Faculty at the Pavol Jozef Safarik University in Kosice (16N/2017).

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