Smoking among Slovak Schoolchildren. Evaluation of the Effectiveness of the Unplugged Programme

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BACKGROUND: Health promotion in schools is a highly relevant means for reducing the high prevalence of smoking. AIMS: This study aimed to explore the prevalence of smoking in the past 30 days among schoolchildren during the implementation of the Unplugged drug prevention programme. **DESIGN AND MEASUREMENTS:** It was carried out as a cluster randomized controlled trial with five measurement points. The data was collected before the implementation of the programme (T1), immediately after its implementation (T2), and then three months (T3), 12 months (T4), and 18 months (T5) after its implementation. The effect of Unplugged was explored after adjusting for gender, baseline smoking, perceived parental knowledge, descriptive normative beliefs, and the perceived availability of cigarettes. **SAMPLE:** The sample included 1283 schoolchildren (M = 11.52; 46.8% boys) from 63 different schools. **RESULTS:** The results obtained suggest that the 30-day prevalence of smoking rose from 1.7% vs. 3.0% to 9.7% vs. 8.2% in the experimental vs. the control group over the 22 months. The effect of time on the prevalence of smoking was found to be significant and gender differences were seen to disappear during the period that was explored. Furthermore, a direct effect of Unplugged was found at T4 and the effect of the programme was found to be moderated by gender at T2 and at T4, showing a stronger effect for the girls. Partial indirect effects of Unplugged on smoking through changes in descriptive normative beliefs were found at T4 among the girls. Finally, the findings showed that better parental knowledge about the girls' whereabouts was also important in preventing smoking. **CONCLUSIONS:** The findings obtained generally emphasize the necessity of a gender-specific approach when implementing prevention programmes, with particular attention being paid to the school class-based social system, as well as parental engagement in prevention efforts.

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● 1 BACKGROUND

Tobacco smoking is a well-known global health-related problem. In Slovakia, the results of the European School Project on Alcohol and other Drugs (ESPAD) have provided an opportunity to identify the trends in smoking tobacco among young adolescents. The ESPAD report for 2015 indicates that on average, 4% of adolescents begin smoking daily at the age of 13 or younger and Slovakia is one of the countries with the highest rates. Cigarette use in the last 30 days was reported by 31% of adolescents in Slovakia, compared to the overall ESPAD average of 21%. From the gender perspective, Slovakia belongs among the countries with a relatively high smoking rate among girls (34–40%). It has also been shown that the lifetime prevalence of cigarette use followed a decreasing pattern between 1995 and 2015 in all European countries except one. However, in Slovakia this decrease followed an initial increase which lasted until 2003.

Health promotion in schools is a highly relevant way of reducing the high prevalence of smoking. Health promotion, along with education on the prevention of the use of alcohol, tobacco, and drugs conducted in collaboration with teachers at both the individual and group/population levels has been recognized as an important aspect of school health services (WHO, 2014). The accessibility of school-based substance use prevention programmes is especially important for schoolchildren from the former Eastern Bloc (Nociar, Sieroslawski, & Csemy, 2016).

The current study explored a model of the predictors of early smoking among schoolchildren, specifically the effect of the school-based Unplugged prevention programme, gender, baseline smoking, schoolchildren's perception of parental knowledge regarding their behaviour, descriptive normative beliefs, and the perceived availability of cigarettes. These predictors were selected for the following reasons: (1) high-quality data-based substance use prevention programmes should target schoolchildren before they reach their teens. In the present study, we focus on the Unplugged prevention programme and its effectiveness in preventing smoking among 12–14-year-old girls and boys; (2) the individual perception of norms, descriptive normative beliefs, and the availability of tobacco were identified as the strongest individual-level predictors of substance use in early adolescence (Chilenski, Greenberg, & Feinberg, 2010); (3) research-based findings confirmed the context of differing parent-adolescent perspectives on the components of parenting style, as well as that schoolchildren's perception of parental knowledge regarding their behaviour may prevent preadolescents from engaging in risky behaviours in the future (Yu, Clemens, Yang, et al., 2006).

1.1 The Unplugged programme and normative beliefs

According to the World Health Organization (2015), in 2010 the highest rate of smoking among men and women was seen in the 15–24 age group, and therefore the implementation of a prevention programme before the prevalence of smoking increases seems to be crucial. The Unplugged programme targets the 12–14 age group. It is a school-based prevention programme with a strong interactive component comprising training in personal and social skills, with a specific focus on normative beliefs (Vadrucci, Vigna-Taglianti, Kreeft, et al., 2016). Several units of Unplugged use reflection on normative beliefs concerning behaviours, the correction of misperceptions of substance use among peers and adults, and changing normative beliefs. The Problem Behaviour theory was applied throughout the individual units of the programme (Vadrucci, Vigna-Taglianti, Kreeft, et al., 2016). Previous literature highlights the importance of the investigation of both the direct and indirect impacts of the Unplugged programme via descriptive normative beliefs about smoking (Sanchez, Valente, Fidalgo, et al., 2019; Giannotta, Vigna-Taglianti, Galanti, et al., 2014).

1.2 The availability of cigarettes

Situational factors such as a lack of supervision, the availability of alcohol, and a lack of enforcement contribute to increased drug use in adolescence (Lipperman-Kreda, Gruenewald, Grube, et al., 2017). Reducing access to cigarettes and alcohol and their availability has become one the key elements in prevention policies (Tjelta, Ritchie, & Amos, 2016; Lipperman-Kreda, Gruenewald, Grube, et al., 2017). Indeed, the direct and significant association between easy access to substances and substance use among schoolchildren has spurred investigations into ways to change the perceptions of access to alcohol and other substances in order to prevent their use (Warren, Smalley, & Barefoot, 2015). Similarly, previous studies have confirmed that there is a significant association between access to, and the availability of cigarettes and adolescent smoking (DiFranza, 2012). It is believed that the availability of tobacco could be an important factor in the onset of tobacco use (Forster, Wolfson, Murray, et al., 1997). It has been found that the availability of cigarettes was the most robust predictor of smoking (Roberts, Colby, & Jackson, 2015).

1.3 Parental monitoring

Parental monitoring has been shown to be related to youth substance use, which has been supported by substantial empirical findings (Kiesner, Poulin, & Dishion, 2010). In particular, parental knowledge seems to play a prominent role in this relationship. The term 'parental knowledge' was introduced by Stattin and Kerr (2000), who pointed out that previous conceptualizations of parental monitoring actually assess the level of parental knowledge about children's whereabouts rather than the monitoring activity of the parents. A high level of parental knowledge has been found to be mainly associated with spontaneous disclosure and only to a lesser extent with parental monitoring, rule setting, and parental solicitation (Stattin & Kerr, 2000; Kapetanovic et al., 2017). In the context of health behaviour,

greater parental knowledge about children's activities outside direct parental supervision has been associated with a lower prevalence of smoking (Lippold, Coffman, & Greenberg, 2014). However, further research is needed to improve the understanding of adolescent smoking behaviour. This knowledge is essential to increase the effect of prevention efforts. Thus further research should continue to evaluate the contribution of individual factors such as the perceived availability of cigarettes, but also pay close attention to variables such as parental monitoring and parental knowledge and acknowledge gender differences in perceived parental knowledge (Lindfors, Minkkinen, Katainen, et al., 2019). Overall, this may be a crucial factor in delivering the programme's effect.

● 2 AIMS

This study aims to explore (i) the 30-day prevalence rates of smoking among schoolchildren according to gender and groups (experimental/control) at the baseline and at four follow-up measurements during 22 months, as well as the change in the prevalence of smoking between the baseline and each of the four follow-up measurements, (ii) the direct effect of Unplugged, adjusted for significant covariates (gender, baseline 30-day prevalence rates of smoking, perceived parental knowledge, descriptive normative beliefs, and the perceived availability of cigarettes) on smoking at the four follow-ups, (iii) whether the direct effect of Unplugged is moderated by gender and the baseline characteristics of smoking, (iv) whether the direct effect of parental knowledge on smoking is moderated by gender, and (v) the indirect effect of Unplugged on the prevalence of smoking through changes in descriptive normative beliefs at the four follow-ups.

● 3 DESIGN AND MEASUREMENTS

3.1 Research Design

This study is a cluster randomized controlled trial with data collection immediately before the implementation of Unplugged (T1), immediately after the implementation of Unplugged (T2), and three months (T3), 12 months (T4), and 18 months (T5) after the implementation of Unplugged. The schools were randomly selected and assigned to either the experimental or the control group. The sampling used a list of primary schools in Slovakia in 2011 retrieved from the Institute of Information and Prognosis of Education. The schools were selected from different cities on the basis of their geographical locations in East, Central, and West Slovakia with six clusters based on the size of the population.

3.1.1 The Unplugged programme and study population

The Unplugged school programme for the prevention of substance abuse was designed and tested within the EU-Dap trial (Vadrucci et al., 2016). Unplugged integrates several theories, and this theoretical background allowed

normative beliefs to be targeted as the mediator of the Unplugged programme.

3.2 Research sample

The sample consisted of 1283 participating schoolchildren (*mean age* 11.52; 46.8% boys) at the baseline. Sixty-three elementary schools participated in the study; 32 schools were allocated to the experimental group (*n* = 622) and 31 served as the control group (*n* = 661). In each school, a single class of sixth-graders was involved in this research. The experimental group was exposed to the Unplugged programme. Twelve lessons of Unplugged were carried out once a week during the 2013/2014 school year in this study. Unplugged was delivered via lectures by teachers who underwent a three-day training course. The protocol of this study was reviewed and approved by the Ethics Committee of the Faculty of Arts of PJ Šafárik University. The committee reviewed the content of the protocol and concluded that it met the required ethical standards. This study was carried out with the support of the Ministry of Education, Science, Research, and Sport of the Slovak Republic. The consent of the parents was obtained as a basic requirement for the schoolchildren's involvement in this study. The parents were presented with an opportunity to "opt out" of the study if they did not wish their child to take part in the study. All the collected data was anonymized.

3.3 Measures

A Slovak version of the 2011 ESPAD questionnaire (Hibbel, Guttormsson, Ahlström, et al., 2012) was used to collect the demographic data, normative beliefs, perceived availability, parental knowledge, and outcome variables. The outcome variables measuring 30-day prevalence rates of smoking were assessed on a dichotomous level. Descriptive normative beliefs (*Table 1*) about smoking among friends were explored using the question: "In your estimation, how many of your friends smoke cigarettes?" These items were assessed on a five-point scale from 1 – None to

	PK	PA	DNB	
			SmokingEG	SmokingCG
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
T1	1.41 (0.80)	1.74 (1.26)	1.50 (0.78)	1.53 (0.81)
T2	1.46 (0.89)	2.15 (1.44)	1.70 (1.29)	1.67 (0.85)
T3	1.51 (0.91)	2.29 (1.53)	1.69 (0.86)	1.79 (0.93)
T4	1.53 (0.94)	2.59 (1.60)	1.79 (0.89)	1.95 (0.98)
T5	1.50 (0.88)	2.96 (1.64)	1.98 (0.98)	1.99 (0.99)

Table 1 | Descriptive characteristics of the sample
Notes: PK = Parental knowledge, PA = Perceived availability, DNB = descriptive normative beliefs, EG = Experimental group, CG = Control group, T1 = baseline measure, T2 = immediately after implementation of the Unplugged programme, T3 = three months after implementation of the Unplugged programme, T4 = 12 months after implementation of the Unplugged programme, T5 = 18 months after implementation of the Unplugged programme

5 – All. The changes in descriptive normative beliefs were based on the difference between the baseline measurement and the follow-up. Regarding the perceived availability of cigarettes, the respondents were asked to indicate it using the question: "How difficult do you think it would be for you to get cigarettes if you wanted to?" which was measured on a six-point scale: 1 Impossible, 2 Very difficult, 3 Fairly difficult, 4 Fairly easy, 5 Very easy, 6 Don't know. The "don't know" answers were excluded from the analyses (see *Table 1*). Parental knowledge regarding the schoolchildren's behaviour was explored using the question "Do your parents know where you spend Saturday nights?", with a four-point response scale from 1 – Always know to 4 – Usually don't know. The answers were recoded in such a way that a higher score indicated more knowledge (see *Table 1*). The self-report questionnaires were completed under the supervision of a trained research assistant in less than 90 minutes. Unique participant codes allowed the researchers to match the individual questionnaires across the follow-ups and protect the respondents' confidentiality.

3.4 Statistical Processing

Chi-square tests were used to identify the differences in smoking between groups (experimental and control) and genders. The Cochran Q and McNemar post-hoc tests were used to identify the changes in smoking from the baseline throughout the follow-ups.

The logistic regression models for every follow-up measure were used to build models for predicting the most important factors associated with the prevalence of smoking among schoolchildren.

The main aim of this study was to strengthen the data-based drug use school prevention policy and find an equation that could predict the probability of smoking. Furthermore, it aimed to improve the understanding of the effect of the school-based Unplugged programme as one of the independent variables of the equation that contained the strongest individual-level predictors of early adolescent substance use. In general, logistic regressions were performed to analyse the impact of Unplugged adjusted for covariates (gender, baseline 30-day prevalence of smoking, perceived parental knowledge, descriptive normative beliefs, and perceived availability of cigarettes) on smoking at the four follow-ups. The respondents were compared with regard to the number of waves in which they participated. Firstly, descriptive analysis showed that 5% of the respondents participated only in one wave, 7.4% in two waves, 16% in three waves, 31.3% in four waves, and 40.3% of the respondents participated in all five waves. There were no significant differences in smoking, normative beliefs, the availability of cigarettes, and parental monitoring between the respondents who took part in different numbers of waves (i.e. participated only in the first wave, or up to all five waves).

In order to explore the moderating role of gender, the baseline characteristic of smoking, and parental knowledge, the

interactions were included in the regression models. Repeated regression analyses were carried out and only the significant interaction effects were included in the final regression models. The indirect effects of the Unplugged programme on smoking at the four follow-ups through changes in the descriptive normative beliefs were explored using *Hayes' PROCESS tool*, controlling for the 30-day prevalence of tobacco smoking at the baseline. In order to explore whether the indirect effect was moderated by gender, separate analyses were performed on each respective part of the data. The analyses were conducted using SPSS 23.

● 4 RESULTS

4.1 Time trends in 30-day prevalence of smoking

The prevalence rates of smoking at the follow-ups increased from 1.7% vs. 3.0% at the baseline to 3.9% vs. 5.1% T2, 5.1% vs. 5.2% T3, 8.9% vs. 9.4% T4, and 9.7% vs. 8.2 T5 in the experimental vs. the control group (*Figure 1*). Statistically significant differences were found neither at the baseline nor at the follow-ups between the schoolchildren in the experimental and control groups (*Table 2*).
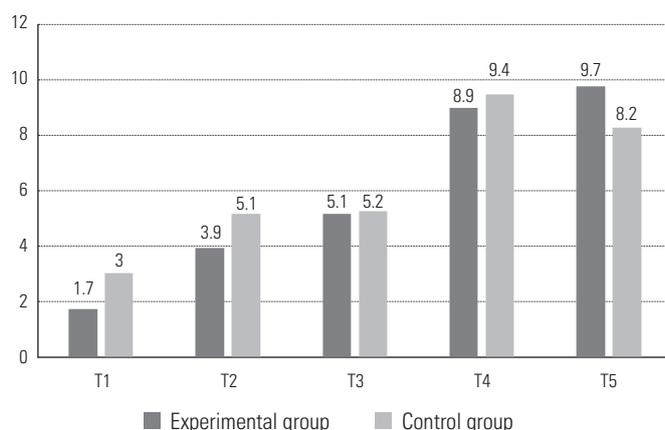

Figure 1 | 30-day prevalence of tobacco smoking in the experimental group and control group from baseline (T1) to follow-ups (T2 = immediately after implementation of the Unplugged programme, T3 = three months after implementation of the Unplugged programme, T4 = 12 months after implementation of the Unplugged programme, T5 = 18 months after the implementation of the Unplugged programme)

Statistically significant gender differences were found neither at the baseline nor at the follow-ups among the schoolchildren in the control group. Statistically significant gender differences were found neither at the baseline nor at the last two follow-ups among the schoolchildren in the experimental group. It means that 7.7% vs. 1.1% boys vs. girls at the first follow-up and 8.3% vs. 2.5% boys vs. girls at the second follow-up in the experimental group reported smoking, and these gender differences disappeared at the last two follow-ups among the schoolchildren in the experimental group (see *Table 2*).

Statistically significant differences between the experimental and control groups among boys, as well as between the

Upper section (Boys / Girls / Groups, with EG vs CG)

		T1 n Yes/no	T1 % Yes	T1 Chi-square	T2 n	T2 n Yes/no	T2 % Yes	T2 McNemar T1-T2	T2 Chi-square	T3 n	T3 n Yes/no	T3 % Yes	T3 McNemar T1-T3	T3 Chi-square	T4 n	T4 n Yes/no	T4 % Yes	T4 McNemar T1-T4	T4 Chi-square	T5 n	T5 n Yes/no	T5 % Yes	T5 McNemar T1-T5	T5 Chi-square
Boys	EG n=261	6/255	2.30	ns	207	16/191	7.70	p<0.01	ns	229	19/210	8.30	p<0.01	ns	180	19/161	10.60	p<0.001	ns	184	21/163	11.40	p<0.001	ns
Boys	CG n=285	8/277	2.80		224	12/212	5.40	ns		218	14/204	6.40	ns		181	15/166	8.30	ns		167	10/157	6.00	ns	
Girls	EG n=314	4/310	1.30	ns	283	3/280	1.10	ns	5.85 p<0.05	277	7/270	2.50	ns	ns	237	18/219	7.60	p<0.001	ns	258	22/236	8.50	p<0.001	ns
Girls	CG n=322	10/312	3.10		265	13/252	4.90	ns		267	11/256	4.10	ns		246	25/221	10.20	p<0.001		211	21/190	10.00	p<0.01	
Groups	EG n=575	10/565	1.70	ns	490	19/471	3.90	ns	ns	506	26/480	5.10	p<0.01	ns	417	37/380	8.90	p<0.001	ns	442	43/399	9.70	p<0.001	ns
Groups	CG n=607	18/589	3.00		489	25/464	5.10	ns		485	25/460	5.20	ns		427	40/387	9.40	p<0.001		378	31/347	8.20	p<0.01	

Lower section (EG / CG, with Boys vs Girls)

		T1 n Yes/no	T1 % Yes	T1 Chi-square	T2 n	T2 n Yes/no	T2 % Yes	T2 Chi-square	T3 n	T3 n Yes/no	T3 % Yes	T3 Chi-square	T4 n	T4 n Yes/no	T4 % Yes	T4 Chi-square	T5 n	T5 n Yes/no	T5 % Yes	T5 Chi-square
EG	Boys n=261	6/255	2.3%	ns	207	16/191	7.7	14.27 p<0.001	229	19/210	8.3	8.56 p<0.01	180	19/161	10.6	ns	184	21/163	11.4	ns
EG	Girls n=314	4/310	1.3%		283	3/280	1.1		277	2/270	2.5		237	18/219	7.6		258	22/236	8.5	
CG	Boys n=285	8/277	2.8	ns	244	12/212	5.4	ns	218	14/204	6.4	ns	181	15/166	8.3	ns	167	10/157	6.0	ns
CG	Girls n=322	10/312	3.1		265	13/252	4.9		267	11/256	4.1		246	25/221	10.2		211	21/190	10.0	

Table 2 | 30-day prevalence and change in tobacco smoking from baseline to follow-ups
Notes: T1 = baseline measure, T2 = immediately after implementation of the Unplugged programme, T3 = three months after the implementation of the Unplugged programme, T4 = 12 months after implementation of the Unplugged programme, T5 = 18 months after implementation of the Unplugged programme, EG = Experimental group, CG = Control group

experimental and control groups among girls, were found neither at the baseline nor at the follow-ups, with the exception of the difference found between the experimental and control groups among the girls, where 1.1% in the experimental vs. 4.9% in the control group reported smoking at the first follow-up (see *Table 2*).

4.2 The changes in the 30-day prevalence of tobacco smoking

The Cochran Q test determined that there were statistically significant differences in the proportion of schoolchildren in the experimental group ($\chi^2(4) = 25.231$, $p < .001$) and control group (($\chi^2(4) = 18.069$, $p < .001$) who reported smoking over time. A number of differences were identified over time when relatively short-term (T1-T2, T1-T3) and long-term (T1-T4, T1-T5) pairwise comparisons (the McNemar test) were carried out (see *Table 2*). In particular, the short-term comparisons achieved statistical significance (Bonferroni corrected level p<.01) only among the boys in the experimental group who reported a change from not smoking to smoking. Regarding the long-term comparisons, significant differences were found among the girls in both the experimental and control groups. In both groups the girls showed a significant change from not smoking to smoking. Finally, among the boys in the experimental group (T1-T4, T1-T5) a change from not smoking to smoking was observed as well.

4.3 Regression models

Logistic regression analyses (*Table 3*) showed that the effect of the Unplugged programme at the first follow-up (T2) was moderated by gender, with a stronger effect for girls. A direct effect of Unplugged on smoking was found at the third follow-up. Furthermore, the effect was moderated by gender, showing a stronger effect for girls. Logistic regression

	T2				T3				T4				T5		
		95% C.I.for EXP(B)				95% C.I.for EXP(B)				95% C.I.for EXP(B)				95% C.I.for EXP(B)	
	OR	Lower	Upper		OR	Lower	Upper		OR	Lower	Upper		OR	Lower	Upper
Smoking T1	6.438**	1.673	24.779	Smoking T1	4.628*	1.192	17.977	Smoking T1	4.918*	1.027	23.553	Smoking T1	2.01	0.509	7.936
Gender	0.048**	0.005	0.428	Gender	0.383*	0.159	0.921	Gender	0.053**	0.007	0.422	Gender	1.108	0.564	2.179
Unplugged	0.497	0.18	1.368	Unplugged	0.71	0.316	1.595	Unplugged	0.272*	0.092	0.804	Unplugged	0.845	0.428	1.667
PK T2	0.473***	0.329	0.678	PK T3	0.713	0.499	1.02	PK T4	0.473***	0.305	0.734	PKT5	0.640**	0.472	0.868
DNB T2	1.085	0.912	1.291	DNB T3	1.744**	1.185	2.568	DNB T4	2.160***	1.543	3.024	DNB T5	2.688***	1.909	3.784
PA T2	2.113***	1.524	2.93	PA T3	1.724***	1.253	2.373	PA T4	2.238***	1.636	3.061	PA T5	2.601***	1.657	4.081
Unplugged by Gender	20.818*	1.797	241.199					Unplugged by gender	4.995*	1.284	19.434				
								PK T4 by Gender	2.086*	1.145	3.797				
R 2	0.43				0.32				0.44				0.48		

Table 3 | Regression models for 30-days prevalence of tobacco smoking
Notes: PK = Perceived parental knowledge, DNB = descriptive normative belief, PA = Perceived availability
T1 = baseline measure, T2 = immediately after implementation of the Unplugged programme, T3 = three months after implementation of the Unplugged programme, T4 = 12 months after implementation of the Unplugged programme, T5 = 18 months after implementation of the Unplugged programme, *p ≤.05, **p ≤ .01, ***p ≤ .001

analyses controlling for covariates showed that the strongest predictor of smoking was the perceived availability of cigarettes. The schoolchildren reporting a higher level of perceived availability of cigarettes were approximately two times more likely to smoke. Furthermore, a lower level of parental knowledge (at T2, T4, and T5), as well as a higher level of descriptive normative beliefs (at T3, T4, and T5), increased the likelihood of reporting smoking at the follow-up measurements. The effect of parental knowledge was moderated by gender at the third follow-up, with a stronger effect for girls (*Figure 2*).

4.4 Indirect effect of the Unplugged programme

In the final analysis aimed at the partial indirect effects of the programme on smoking through a change in descriptive normative beliefs, an indirect effect was found at the third follow-up measurement but only among girls: b = 0.197, 95% CI (0.044, 0.395).

● 5 DISCUSSION

The findings of this study contribute to the growing literature on gender differences and developmental trends in cigarette use among schoolchildren. The results obtained suggest that the 30-day prevalence of smoking rose from 1.7% vs. 3.0% to 9.7% vs. 8.2 in the experimental vs. the control group over the 22 months. Statistically significant differences between the experimental and control groups were found neither at the baseline nor at the follow-ups, with the exception of a difference found between the experimental and control groups among girls at the first follow-up. This study did not find statistically significant gender differences at the baseline. Similarly, there were no gender differences

at the follow-ups among the schoolchildren in the control group and statistically significant gender differences were not found at the baseline and at the last two follow-ups among the schoolchildren in the experimental group. A significantly higher percentage of boys than girls in the experimental group reported smoking at the first and second follow-ups, and these gender differences disappeared at the last two follow-ups among the schoolchildren in the experimental group. In comparison, the studies from nearby countries showed a more rapid increase in cigarette use in girls as compared to boys in the Czech Republic (Gabrhelik, Duncan, Lee, et al., 2012); gender did not influence smoking
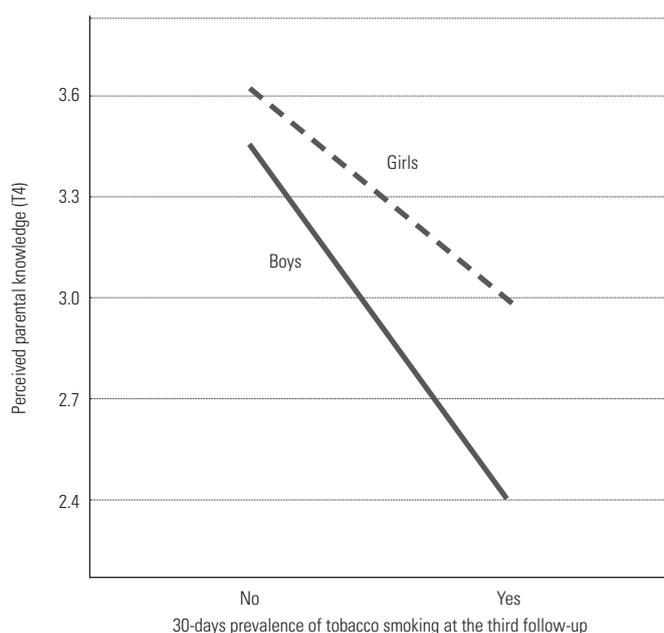

Figure 2 | Interaction of gender and perceived parental knowledge on 30-day prevalence of tobacco smoking at the third follow-up (T4)

among Italian high school students (Bergagna & Tartaglia, 2018) or students in Hungary (Piko, Varga, & Wills, 2015). Gender (males) and older age were positively associated with susceptibility to smoking among students in Poland (Polańska, Wojtysiak, Bąk-Romaniszyn, et al., 2016). A survey carried out in six European cities found small but significant gender differences (unfavourable for boys) in the prevalence of smoking among adolescents (Grard, Kunst, Kuipers, et al., 2018). The results of the Global Youth Tobacco Survey, carried out among early adolescents in Croatia, the Czech Republic, Slovakia, Latvia, Slovenia, and Ukraine, confirmed the mixed effects of gender (Rahman, Ghasemi, & Zhou, 2018). Similarly, it was not found to be a significant factor in the likelihood of smoking among Slovak adolescents. The results of the present study showed gender differences in the prevalence of smoking only among the schoolchildren in the experimental group in short-term measurements and confirmed the disappearance of these gender differences in long-term measurements.

Our study showed a statistically significant increase in smoking. Further analyses revealed differences between short-term and long-term measurements. The short-term comparisons were significant only among the boys from the experimental group, who reported an increase in smoking. However, the differences in smoking between the boys from the experimental and the control group were not significant at the baseline or at any of the follow-ups. Even though gender and peer group dynamics have been seen to influence the outcome of interventions and may contribute substantially to the iatrogenic effects of interventions in general, the findings related to the impact of gender have not been unequivocally consistent (Rhule, 2005; Dishion, Poulin, & Burraston, 2001). When the smoking status was analysed over time according to gender and group, similar trends were observed for both genders and in both groups. These findings provide empirical support for the trends in tobacco smoking among girls. They provide further empirical support for the existence of a decrease in, or even disappearance of, gender differences in smoking throughout the development. There are some possible sources of explanation of these trends in smoking among girls (i) a sex-/gender-specific source (Kalaboka, Piau, King, et al., 2016). (ii) a psycho-social and cultural source (Grard et al., 2018). Furthermore, girls experiencing higher social pressure to smoke from friends were more likely to start smoking, also as a result of parental modelling, and boys were more likely to start smoking when they perceived fewer cons of smoking and a social norm towards non-smoking on the part of their parents (Hoving, Reubsaet, & de Vries, 2007).

The next results of the present study confirmed the direct effect of Unplugged 12 months after its implementation (T4), and the effect of Unplugged was moderated by gender immediately after its implementation (T2) and at the third follow-up (T4), with a stronger effect for girls. These results were not fully consistent with previous reports on the effects of Unplugged. At three months after the implementation of Unplugged in seven European countries (Vigna-Taglianti, Vadrucci, Faggiano, et al., 2009) a significant

association between the programme and a lower prevalence of all behavioural outcomes was found among boys, but not among girls. Another study found positive effects of Unplugged over 18 months for alcohol abuse and for cannabis use, but not for smoking among schoolchildren from seven European countries (Faggiano, Vigna-Taglianti, Burkhart, et al., 2010). Contrary to these findings, our study has not confirmed the effect of Unplugged at the second follow-up measure (three months after the programme) and at the fourth follow-up measure (18 months after the programme) on smoking among Slovak schoolchildren. On the other hand, our study produced similar findings regarding the effect of Unplugged, which was moderated by gender, with a stronger effect for girls immediately and 12 months after the implementation of Unplugged. Gender-specific differences in the effect of this programme (with a stronger effect among girls) were also found among Czech students (Novák, Miovský, Gabrhelík, et al., 2013).

Partial indirect effects of Unplugged on smoking through changes in descriptive normative beliefs were found among the girls 12 months after the implementation of the Unplugged programme (T4). The findings obtained are inconsistent with those of a Brazilian study on the effectiveness of Unplugged (Sanchez et al., 2019), which also reported a lack of evidence regarding the differences in normative beliefs and drug use between the intervention and control groups. On the other hand, Unplugged was found to reduce smoking, episodes of drunkenness, and cannabis use. This reduction was mediated by three common mediating factors, i.e. attitudes, refusal skills, and perception of the prevalence of the behaviour among peers (Giannotta et al., 2014). This effect was confirmed three months after the end of the programme. This study found mediating mechanisms of the programme through normative beliefs 12 months after its implementation only among girls.

As expected, a lack of parental knowledge was one of the strongest predictors of smoking at each follow-up (with the exception of T3). This result is in line with previous findings about the beneficial role of parental knowledge of a child's whereabouts in preventing risk behaviour and substance use (Lippold, Coffman, & Greenberg, 2014; Kapetanovic et al., 2017). Additionally, the effect of parental knowledge was moderated by gender 12 months after the implementation, with a higher level of parental knowledge among girls. Overall, it seems that parents have better knowledge about girls' whereabouts than about boys' (Kapetanovic et al., 2017; Stattin & Kerr, 2000; Keijsers, Branje, VanderValk, et al., 2010). With respect to this finding, our study has shown that better knowledge about where girls spend their time is also an important factor in preventing smoking.

The present study has added to the knowledge on the effectiveness of drug prevention programmes and smoking trends among schoolchildren, focusing on gender differences as well as individual factors. It has provided substantial empirical support for their significance at different stages prior to, and after, the implementation of the Unplugged prevention programme. However, some limita-

tions need to be acknowledged. While, in general, the findings demonstrate the trends observed in other countries and socio-cultural contexts where Unplugged was tested, some effects were only observed for one gender at different stages of the implementation. While this study was able to point out these differences and discuss them, a more thorough explanation requires further exploration, especially by incorporating some contextual factors, e.g. the fidelity of implementation. Secondly, the individual factors which depend to a large extent on family processes such as parental knowledge and monitoring, but also those related to a wider societal context, such as normative beliefs or perceived availability, have been shown to be strongly related to smoking. Additional research is needed to explore these factors in more detail and especially with respect to the implementation of prevention programmes.

● 6 CONCLUSION

The full regression model with a significant contribution of all predictors and two interactions 12 months after the implementation of Unplugged explained 44% of the variance in smoking and confirmed the direct effect of Unplugged 12 months after its implementation (T4), and the effect of Unplugged was moderated by gender immediately after its implementation (T2) and at the third follow-up (T4), with a stronger effect for girls. This study confirmed the importance of gender, baseline smoking, and the individual predictors (perceived parental knowledge, descriptive normative beliefs, and the perceived availability of cigarettes) in explaining smoking among schoolchildren. These results allow the need for gender-specific interventions for smoking prevention programmes to be assumed, with particular attention being paid to the school's class-based social system and social dynamics, as well as parental engagement in prevention efforts.

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