

CLINICAL STUDY

Risk behavioral survey in the sample of Slovak adolescents

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ABSTRACT

OBJECTIVE: The study was aimed to assess risky behavioral factors in the sample of Slovak adolescents.

BACKGROUND: Health-risk behavior contributes to the leading causes of morbidity and mortality among youth and adults.

MATERIALS AND METHODS: The Youth and Parents Risk Factor Behavior Survey (YABS), based on bilateral US-Slovak project, is an ongoing cross-sectional school-based survey initiated in Bratislava as a model region. There were 798 questionnaires for students distributed; the response rate was 64 %. The sample involved 525 adolescents aged 15–19 years from eight selected secondary schools in Bratislava, 38 % boys and 62 % girls. More than 90 % of fathers and mothers were employed, but some families nevertheless experienced a lack of finances (48.1 %), almost 70 % of students were from complete families. **RESULTS:** The study revealed a very high prevalence of risky behavioral characteristics in this pilot sample of adolescents significantly related to age, gender, type of school, completeness of the family and lower parental education.

CONCLUSION: The most important health risk behaviors were identified (tobacco, alcohol, drug consumption, violence, risky sexual behavior, inadequate sleep, physical inactivity, and excessive IT devices use). Targeted intervention proposals will be suggested in future (Tab. 5, Ref. 42). Text in PDF www.elis.sk.

KEY WORDS: school-based survey, adolescents, risk factors, behavioral characteristics.

Introduction

Adolescence is the phase of life stretching between childhood and adulthood and it encompasses elements of biological growth and major social role transitions (1). It is a life phase, in which the opportunities for health are great and future patterns of adult health are established (2). In these developmental stages, profound physical, intellectual, emotional, psychological, and sexual changes occur (3). As in any age group, economic and social conditions influence adolescent health. Adolescence represents a good opportunity to promote good health, but also to improve inappropriate health (4).

Health-risk behaviors contribute to the leading causes of morbidity and mortality among youth and young adults in the United States associated with the leading causes of death among persons aged 10–24 years. In 2016, 74 % of all deaths among persons aged

10–24 years resulted from four major causes: motor vehicle crashes (22 %), other unintentional injuries (20 %), suicide (17 %), and homicide (15 %) (5). Among persons aged ≥ 25 years, 54 % of all deaths in the United States resulted from cardiovascular disease (31 %) and cancer (23 %), similar in Europe for people below 65 years of age (6). The results from the national YRBSS (Youth Risk Behavior Surveillance System) in 2017 indicated that many high school students are engaged in health-risk behaviors. These risk behaviors are established during childhood and adolescence and extend into adulthood (7). The majority of chronic noncommunicable diseases (NCD) have multifactorial etiology. It is important to identify the most prevalent risk factors, but also protective factors at a younger age to decrease the chance of developing NCD later in life. The current status and the trends in major modifiable risk factors reinforce the importance of the prevention, detection, and treatment of risk factors in reducing the burden of NCDs on individuals and society (8).

Although some studies documented the occurrence and relationship among some factors associated with an increased morbidity and mortality and their impact on health, the risk factors in the younger age groups are not well-studied in Slovakia.

The main aim of this study The Youth and Parents Risk Factor Behavior Survey in Slovakia (YABS) is to assess several behavioral factors in the sample of Slovak adolescents and adults (high school students and their parents or legal representatives) according to the model CDC surveys taking into account national

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specificities. The project will identify persons at risk and target the attention of teachers, researchers, policy makers and the general public on these issues.

Methods

The Youth and Parents Risk Factor Behavior Survey in Slovakia, an ongoing cross-sectional school-based survey of students and their parents or legal representatives has been initiated during the years 2015/2016 in Bratislava, the Slovak capital, as a model region. It originates from The Behavioral Risk Factor Surveillance System (BRFSS) and The Youth Risk Behavior Surveillance System (YRBSS), originally designed by CDC, Atlanta, USA (9, 10). The BRFSS was a random telephone survey of US state residents aged 18 and older with the primary focus on such behaviors that include sedentary behavior, physical activity; nutrition, safety (e.g. the use of seatbelts and helmets); using tobacco and alcohol; getting preventive medical care, etc. (9). The YRBSS was developed in 1990 monitoring six categories of priority health-risk behaviors among youth and young adults (aged 15–19 years) in public and private schools in the USA (10).

There were 2,384 questionnaires distributed in total (798 for students; 1,586 for parents), the response rates were 64 % and 46 % respectively. The sample involves 525 adolescents aged

15–19 years old from 8 selected secondary schools in Bratislava from total 101 secondary vocational and grammar schools – there were 22,723 students totally in Bratislava in the 1st January 2016. The separate questionnaires were sent home to parents (in total there were 178,290 adults 40–60 years old living in Bratislava out of 618,380 inhabitants in Bratislava agglomeration in the 1st January 2016).

Only the data from „The Questionnaire for Students“ are presented in this paper. It included questions on a residence, family, school, health and safety, habits and behavior, nutrition, body weight and height, lifestyle and physical activity. The special emphasis was paid to the use of selected telecommunication and other screen devices (TV, non-TV screen devices: PC, personal music players – PMP, mobile phones). From self-reported body weight and height data BMI (Body mass index) was calculated according to formula; $BMI = \text{weight}/\text{height}^2$ ($\text{kg}\cdot\text{m}^{-2}$) (to evaluate overweight and obesity gender, and age specific percentile charts used for students under 18 years old and adult students were classified according to WHO BMI classification) (11).

There were 38 % boys and 62 % girls, 90.9 % of Slovak nationality, the average age of students was 17.18 ± 1 years. Age categories were distributed evenly, with most students aged 16.1 to 17.0 years old (30.4 %). In the urban areas lived 58.5 % of students, 69.8 % of students were from the complete families and 82 % had at least one sibling. Fathers and mothers of students completed mostly secondary education (43 %, 47.9 %); 29.9 % of fathers and 32.7 % of mothers had a university education. More than 90 % of fathers and mothers were employed, but some families nevertheless experienced a lack of finances (48.1 %) (Tab. 1).

The survey was anonymous and voluntary, approved by the Ethical Committee of Faculty of Medicine Comenius University and University Hospital.

Statistical Package for Social Science (SPSS) version 25 was used for the statistical analysis. We used methods of descriptive and analytical statistics; the relations between categorical data were evaluated using bivariable analysis, contingency tables, and chi-square test. Statistical tests were two-sided at a significance level of 5 %.

Results

The occurrence of classical cigarettes smoking in the students' sample was 19.9 %, older students and students from vocational schools smoked significantly more. The experience with different forms of alternative tobacco products (ATP) (except electronic cigarettes – EC) had 63.1 % of students, especially older ones. There were no differences in the experience with vaping EC among age groups – a very high percentage (> 40 %) in both groups (younger and older) (Tab. 2). Majority of students, who are current smokers, have tried to stop smoking (59.2 %: 54.4 % boys, 64.2 % girls). Only 12.5 % would appreciate help from a professional with smoking cessation (17.5 % boys, 7.6 % girls).

We confirmed differences between the smoking status and overall feeling of healthiness as well. From non-smokers, 88.2 %

Tab. 1. Characteristics of the students' sample (n = 525).

Variable		N*	%
Gender	Boys	199	38.0
	Girls	324	62.0
Age groups	15–16y	106	20.5
	16–17y	157	30.4
	17–18y	119	23.0
	more than 18y	135	26.1
Type of school	Grammar schools	210	40.0
	Secondary special schools	186	35.4
	Vocational schools	129	24.6
Nationality	Slovak	477	91.0
	Other	47	9.0
Residence	Urban	306	58.5
	Rural	211	41.5
Family	Complete	361	69.8
	Incomplete	156	30.2
Siblings	Yes	425	82.0
	No	93	18.0
Father's educational level	Primary or vocational school	130	27.1
	High school graduation	206	43.0
	University degree	143	29.9
Mother's educational level	Primary or vocational school	98	19.4
	High school graduation	243	47.9
	University degree	166	32.7
Employment of father	Yes	454	93.8
	No	30	6.2
Employment of mother	Yes	472	91.3
	No	45	8.7
Feeling lack of money	Never	220	43.1
	Sometimes	246	48.1
	Still	45	8.8

*There are some data missing in each variable category.

Tab. 2. Selected behavioral characteristics in relation to age and gender in the sample of adolescents (n = 525).

Variable		Total	Gender		p-value	Age group		p-value
			Boys	Girls		Younger ^a	Older ^b	
Smoking	yes	102/19.9	45/23.0	57/18.1	n.s.	28/ 11.4	74/ 28.5	<0.001
	no	411/80.1	151/77	258/81.9		218/88.6	186/71.5	
Experience with ATP	yes	260/63.1	104/67.5	156/60.9	n.s.	114/ 57.0	145/ 69.4	<0.01
	no	152/36.9	50/32.5	100/39.1		86/43.0	64/30.6	
Experience with EC	yes	209/44.3	91/49.7	117/40.8	n.s.	93/40.6	115/48.3	n.s.
	no	263/55.7	92/50.3	170/59.2		136/59.4	123/51.7	
Alcohol consumption ^c	yes	306/60.1	119/61.0	186/59.4	n.s.	114/ 46.5	189/ 73.3	<0.01
	no	203/39.9	76/39.0	127/40.6		131/53.5	69/26.7	
Drunkenness	yes	277/54.3	51/26.0	65/20.3	n.s.	102/ 41.5	172/ 66.9	<0.05
	no	233/45.7	145/74.0	255/79.7		144/58.5	85/33.1	
Experience with drugs	yes	139/27.3	59/30.3	79/25.2	n.s.	49/ 19.9	88/ 34.2	<0.001
	no	371/72.7	136/69.7	234/74.8		197/80.1	169/65.8	
Sexual intercourse	yes	195/39.0	77/40.7	117/37.9	n.s.	41/ 16.7	152/ 61.3	<0.001
	no	305/61.0	112/59.3	192/62.1		204/83.3	96/38.7	
Listening to PMP ^d	yes	457/90.1	163/ 85.8	292/ 92.7	<0.05	227/92.3	225/88.6	n.s.
	no	50/9.9	27/14.2	23/7.3		19/7.7	29/11.4	
Listening to PMP (min/week)	≤200	210/49.8	70/47.0	140/51.5	n.s.	116/54.5	93/45.1	n.s.
	>200	212/50.2	79/53.0	132/48.5		97/45.5	113/54.9	
Attending PE	yes	396/77.8	153/79.7	241/76.5	n.s.	201/ 81.7	188/ 73.4	<0.05
	no	113/22.2	39/20.3	74/23.5		45/18.3	68/26.6	
Doing sports on regular basis	yes	318/63.1	137/ 72.1	180/ 57.5	<0.01	159/64.9	156/61.7	n.s.
	no	186/36.9	53/27.9	133/42.5		86/35.1	97/38.3	
Sleeping time (Mo-Fri)	≥ 7	348/68.1	138/71.9	209/65.9	n.s.	191/ 77.0	154/ 60.2	<0.001
	< 7	163/31.9	54/28.1	108/34.1		57/23.0	102/39.8	
Sleeping time (Sat-Sun)	≥ 7	490/96.6	179/94.7	309/97.8	n.s.	242/ 98.4	241/ 94.9	<0.05
	< 7	17/3.4	10/5.3	7/2.2		4/1.6	13/5.1	
PC usage daily (Mo-Fri)	< 3	205/40.4	80/42.1	123/38.9	n.s.	114/ 46.0	87/ 34.4	<0.01
	≥ 3	303/59.6	110/57.9	193/61.1		134/54.0	166/65.6	
PC usage daily (Sat-Sun)	< 3	139/27.9	43/23.5	95/30.4	n.s.	72/29.9	66/26.4	n.s.
	≥ 3	359/72.1	140/76.5	218/69.6		169/70.1	184/73.6	
TV watching (Mo-Fri)	< 3	462/91.1	168/88.0	292/93.0	n.s.	223/90.3	232/91.7	n.s.
	≥ 3	45/8.9	23/12.0	22/7.0		24/9.7	21/8.3	
TV watching (Sat-Sun)	< 3	371/73.8	141/74.6	228/73.1	n.s.	171/70.4	195/77.1	n.s.
	≥ 3	132/26.2	48/25.4	84/26.9		72/29.6	58/22.9	

*There are some data missing in each variable category. ^a≤16 years; ^b>16 years; ^c at least 1/month; ^d at least 1/week; ATP – alternative tobacco products; EC – electronic cigarettes; PMP – personal music players; PE – physical education; n.s. – not significant

of students feel well, compared to 69.3 % of smokers ($p < 0.001$), 81.2 % of nonsmokers felt well at school comparing to only 60.4 % of smokers. More than 60 % of students were drinking alcohol at least once in the last month, 19.9 % more than 3 times a month, significantly increasing with age and more from incomplete families (Tabs 2 and 4).

Drunkenness was not rare (54.3 % of students have been drunk during the previous month), it was more apparent among students from higher grades, vocational schools and incomplete families (Tabs 2, 3 and 4). Older students and students from vocational schools had also more experiences with different kinds of drugs (27.3 % totally) (Tabs 2, 3 and 4). The percentage of sexually active high school students in our sample was 39.0 %. More sexual experience had significantly older students, students from vocational schools, from incomplete families, and from families with lower parental education (Tabs 2, 3 and 4). Only 77.8 % of students exercise regularly on compulsory Physical Education

(PE). Absence from PE was more prevalent in older students and students from vocational schools (Tabs 2 and 3). Only 63.1 % of students were doing sports on a regular basis during their spare time. Lack of sports activities was dominant among female students, students from vocational schools and students from less educated families (lower parental education) (Tabs 3 and 4). The average time spend with sedentary activities was 10.53 hours/day among boys and 8.76 among girls.

The percentage of students using PC over 3 hours daily was 59.6 % Monday–Friday and 72 % Saturday and Sunday, watching TV more than 3 hours was 8.9 % Monday–Friday and 26.2 % Saturday and Sunday (Tab. 1). 90.9 % of students listened to personal music players (PMP) on average 405 minutes and used mobile phone 384 minutes per week, significantly more girls. About 50 % of students were listening to PMP more than 200 minutes a week. Those students had a worse lifestyle as well. The tinnitus among them was also present ($p < 0.01$). They smoked, drunk al-

Tab. 3. Selected behavioral characteristics in relation to type of school in the sample of adolescents (n = 525).

Variable		Grammar school	Special school	Vocational school	p-value
		N*/%	N*/%	N*/%	
Smoking	yes	30/ 14.6	30/ 16.5	42/ 33.6	<0.001
	no	176/85.4	152/83.5	83/66.4	
Experience with ATP	yes	103/60.9	87/62.6	70/67.3	n.s.
	no	66/39.1	52/37.4	34/32.7	
Experience with EC	yes	76/39.8	72/44.4	61/51.3	n.s.
	no	115/60.2	90/55.6	58/48.7	
Alcohol consumption ^a	yes	115/55.8	110/62.5	81/63.8	n.s.
	no	91/44.2	66/37.5	46/36.2	
Drunkenness	yes	104/ 50.5	92/ 51.7	81/ 64.3	<0.05
	no	102/49.5	86/48.3	45/35.7	
Experience with drugs	yes	61/ 29.8	34/ 19.0	44/ 34.9	<0.01
	no	144/70.2	145/81.0	82/65.1	
Sexual intercourse	yes	48/ 23.4	69/ 39.7	78/ 64.5	<0.001
	no	157/76.6	105/60.3	43/35.5	
Listening to PMP ^b	yes	187/90.3	164/91.6	106/87.6	n.s.
	no	20/9.7	15/8.4	15/12.4	
Listening to PMP (min/week)	≤200	84/48.6	77/52.0	49/48.5	n.s.
	>200	89/51.4	71/48.0	52/51.5	
Attending PE	yes	179/ 86.5	128/ 71.5	89/ 72.4	<0.001
	no	28/13.5	51/28.5	34/27.6	
Doing sports on regular basis	yes	157/ 76.2	100/ 56.5	61/ 50.4	<0.001
	no	49/23.8	77/43.5	60/49.6	
Sleeping time daily (Mo-Fri)/hours	≥ 7	149/72.0	122/67.8	77/62.1	n.s.
	< 7	58/28.0	58/32.2	47/37.9	
Sleeping time daily (Sat-Sun)/hours	≥ 7	201/ 98.5	175/ 97.8	114/ 91.9	<0.01
	< 7	3/1.5	4/2.2	10/8.1	
PC usage daily (Mo-Fri)/hours	< 3	93/45.6	70/38.9	42/33.9	n.s.
	≥ 3	111/54.4	110/61.1	82/66.1	
PC usage daily (Sat-Sun)/hours	< 3	55/27.1	53/29.8	31/26.5	n.s.
	≥ 3	148/72.9	125/70.2	86/73.5	
TV watching daily (Mo-Fri)/hours	< 3	189/91.7	164/92.1	109/88.6	n.s.
	≥ 3	17/8.3	14/7.9	14/11.4	
TV watching daily (Sat-Sun)/hours	< 3	158/77.5	123/68.7	90/75.0	n.s.
	≥ 3	46/22.5	56/31.3	30/25.0	

*There are some data missing in each variable category. ^a at least 1/month; ^b at least 1/week; ATP – alternative tobacco products; EC – electronic cigarettes; PMP – personal music players; PE – physical education; n.s. – not significant

cohol, used drugs and experienced with ATP significantly more than students listening PMP less than 200 minutes a week. In this group, we observed a higher percentage of PC use especially during Monday through Friday ($p < 0.01$) (12).

More than 31.9 % of students did not sleep enough, sleeping time on Monday–Friday less than 7 hours was more prevalent among older students and students from less educated families (lower parental education) (Tabs 2, 3, 4). During weekends students slept much longer, only 3.4 % of them slept less than 7 hours on Saturday–Sunday. Students from vocational schools slept significantly less than students from grammar and special schools (Tab. 3).

The percentage of students exposed to physical violence was 22.4 % and 11.8 % admitted that they humiliated, amused or physically attacked their classmates.

The occurrence of overweight/obesity according to BMI differed between boys 28.6 % and girls 11.6 % ($p < 0.001$) and did

not significantly vary with age. There were noteworthy gender differences: among obese boys, less than half felt obese, while 77.1 % of obese girls felt obese ($p < 0.001$), 18 % of normal BMI-children reported dieting in the previous year vs 27.3 % among obese children ($p = 0.052$). Obese students reported consuming more energy drinks ($p = 0.023$), exercised less at school ($p = 0.016$), and were participating in fewer extracurricular physical activities ($p = 0.10$). Clear gender differences were apparent, with a tendency among boys to be overweight. Poor body image and dieting behavior were more prevalent among girls (13).

From the bivariable analysis, we can conclude that the majority of risky behaviors are related to age. Especially high and significant odds ratios were calculated for smoking (OR 3.10 (1.92–4.99)), alcohol consumption (OR 3.15 (2.17–4.57)) and sexual intercourse (OR 7.88 (5.17–12.01)). Lower parental education was significantly related to lack of sleep and lack of sport activities and to high sexual intercourse, and father's low educa-

Tab. 4. Selected behavioral characteristics in relation to completeness and education of the family in the sample of adolescents (n = 525).

Variable	Family			Father's educational level			Mother's educational level			p-value
	Complete N ^a /%	Incomplete N ^a /%	p-value	Higher ^a N ^a /%	Lower ^b N ^a /%	p-value	Higher ^a N ^a /%	Lower ^b N ^a /%	p-value	
Smoking	yes	63/17.8	35/24.0	59/17.3	34/26.8	<0.05	78/19.5	22/22.7	n.s.	
	no	291/82.2	111/76.0	282/82.7	93/73.2		322/80.5	75/77.3		
Experience with ATP	yes	169/60.8	82/66.7	170/62.0	66/66.7	n.s.	201/63.8	51/60.7	n.s.	
	no	109/39.2	41/33.3	104/38.0	33/33.3		114/36.2	33/39.3		
Experience with EC	yes	134/41.5	70/51.1	134/43.2	58/48.7	n.s.	169/45.9	38/41.8	n.s.	
	no	189/58.5	67/48.9	176/56.8	61/51.3		199/54.1	53/58.2		
Alcohol consumption ^c	yes	202/57.4	97/66.9	200/59.0	76/59.8	<0.05	236/58.9	61/64.9	n.s.	
	no	150/42.6	48/33.1	139/41.0	51/40.2		165/41.1	33/35.1		
Drunkenness	yes	179/51.0	92/63.0	180/52.9	73/57.5	n.s.	211/52.5	59/62.8	n.s.	
	no	172/49.0	54/37.0	160/47.1	54/42.5		191/47.5	35/37.2		
Experience with drugs	yes	88/25.1	48/32.7	95/28.0	36/28.3	n.s.	112/27.9	25/26.3	n.s.	
	no	263/74.9	99/67.3	244/72.0	91/71.7		289/72.1	70/73.7		
Sexual intercourse	yes	114/33.3	74/51.0	118/35.0	59/49.2	<0.001	137/34.9	56/60.9	<0.001	
	no	228/66.7	71/49.0	219/65.0	61/50.8		256/65.1	36/39.1		
Listening to PMP ^d	yes	39/11.1	11/7.6	33/9.8	13/10.4	n.s.	41/10.4	7/7.4	n.s.	
	no	311/88.9	134/92.4	304/90.2	112/89.6		355/89.6	88/92.6		
Listening to PMP (min/week)	≤200	138/48.3	68/54.8	136/48.7	54/51.4	n.s.	162/49.7	44/51.8	n.s.	
	>200	148/51.7	56/45.2	143/51.3	51/48.6		164/50.3	41/48.2		
PE attendance	yes	281/80.5	104/70.7	280/82.4	88/70.4	<0.05	321/80.5	64/67.4	<0.01	
	no	68/19.5	43/29.3	60/17.6	37/29.6		78/19.5	31/32.6		
Doing sports on regular basis	yes	221/64.1	89/60.5	229/67.8	69/56.1	n.s.	262/66.2	50/53.2	<0.05	
	no	124/35.9	58/39.5	109/32.2	54/43.9		134/33.8	44/46.8		
Sleeping time daily (Sat-Fri)/hours	≥7	241/68.7	96/65.3	247/72.6	78/61.9	n.s.	285/71.3	53/55.8	<0.01	
	<7	110/31.3	51/34.7	93/27.4	48/38.1		115/28.8	42/44.2		
Sleeping time daily (Sat-Sun)/hours	≥7	341/97.7	137/94.5	327/97.6	121/95.3	n.s.	383/97.0	91/94.8	n.s.	
	<7	8/2.3	8/5.5	8/2.4	6/4.7		12/3.0	5/5.2		
PC usage daily (Mo-Fri)/hours	<3	140/40.1	57/39.0	139/41.2	50/39.7	n.s.	162/40.8	38/40.0	n.s.	
	≥3	209/59.9	89/61.0	198/58.8	76/60.3		235/59.2	57/60.0		
PC usage daily (Sat-Sun)/hours	<3	93/27.0	41/29.1	93/28.1	35/28.5	n.s.	109/28.2	27/28.4	n.s.	
	≥3	252/73.0	100/70.9	238/71.9	88/71.5		278/71.8	68/71.6		
TV watching daily (Mo-Fri)/hours	<3	318/91.1	131/90.3	310/91.4	113/90.4	n.s.	363/91.4	86/90.5	n.s.	
	≥3	31/8.9	14/9.7	29/8.6	12/9.6		34/8.6	9/9.5		
TV watching daily (Sat-Sun)/hours	<3	259/74.9	103/71.5	251/74.9	91/73.4	n.s.	287/72.8	74/77.9	n.s.	
	≥3	87/25.1	41/28.5	84/25.1	33/26.6		107/27.2	21/22.1		

^aThere are some data missing in each variable category. ^bHigh school graduation or University degree; ^cVocational school or less; ^dat least 1/month; ^eat least 1/week; ATP – alternative tobacco products; EC – electronic cigarettes; PMP – personal music players; PE – physical education; n.s. – not significant

Tab. 5. Factors associated with selected behavioral characteristics in the sample of adolescents (bivariable analysis) (n = 525).

	Gender (boy)	Age group (>16)	Type of school (vocational)	Family (incomplete)	Father's educational level (low)	Mother's educational level (low)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Smoking	1.34 (0.87–2.01)	3.10 (1.92–4.99)***	1.80 (1.13–2.87)*	1.46 (0.91–2.32)	1.75 (1.08–2.83)*	1.21 (0.71–2.07)
Experience with ATP	1.33 (0.88–2.03)	1.71 (1.14–2.57)**	1.17 (0.8–1.75)	1.29 (0.83–2.01)	1.22 (0.75–1.99)	0.88 (0.54–1.44)
Experience with EC	1.44 (0.99–2.09)	1.37 (0.95–1.97)	1.36 (0.94–1.97)	1.47 (0.99–2.20)	1.25 (0.82–1.91)	0.85 (0.53–1.34)
Alcohol consumption ^a	1.07 (0.74–1.54)	3.15 (2.17–4.57)***	1.35 (0.94–1.94)	1.50 (1.00–2.25)	1.04 (0.68–1.57)	1.29 (0.81–2.06)
Drunkennes ^b	1.17 (0.81–1.67)	2.86 (1.99–4.11)***	1.29 (0.91–1.85)	1.64 (1.10–2.43)*	1.20 (0.80–1.81)	1.53 (0.96–2.42)
Experience with drugs	1.29 (0.86–1.91)	2.09 (1.40–3.14)***	0.81 (0.55–1.20)	1.45 (0.95–2.21)	1.02 (0.65–1.60)	0.92 (0.56–1.53)
Sexual intercourse	1.13 (0.78–1.63)	7.88 (5.17–12.01)***	3.25 (2.19–4.83)***	2.09 (1.40–3.10)***	1.80 (1.18–2.74)**	2.91 (1.82–4.64)***
Listening to PMP ^c	0.48 (0.26–0.86)*	0.65 (0.35–1.19)	0.96 (0.53–1.75)	1.53 (0.76–3.07)	0.94 (0.48–1.84)	1.45 (0.63–3.35)
Absence from PE	0.83 (0.54–1.29)	1.62 (1.06–2.47)*	2.50 (1.56–4.01)***	1.71 (1.10–2.66)*	1.96 (1.22–3.15)**	1.99 (1.22–3.27)**
Lack of sport activities	0.52 (0.36–0.77)**	1.15 (0.80–1.66)	2.73 (1.84–4.04)***	1.16 (0.78–1.73)	1.64 (1.08–2.51)*	1.72 (1.09–2.71)*
Lack of sleep (Mo–Fri)	0.76 (0.51–1.12)	2.22 (1.51–3.27)***	1.36 (0.92–1.99)	1.16 (0.77–1.75)	1.63 (1.06–2.52)*	1.96 (1.24–3.12)**
Lack of sleep (Sat–Sun)	2.47 (0.92–6.59)	3.26 (1.05–10.15)*	3.25 (0.92–11.44)	2.49 (0.92–6.77)	2.03 (0.69–5.96)	1.75 (0.60–5.10)
PC usage (Mo–Fri) ^d	0.88 (0.61–1.26)	1.62 (1.13–2.33)*	1.44 (1.00–2.06)*	1.05 (0.70–1.55)	1.07 (0.70–1.62)	1.03 (0.66–1.63)
PC usage (Sat–Sun) ^d	1.42 (0.93–2.16)	1.19 (0.80–1.76)	0.93 (0.63–1.39)	0.90 (0.58–1.39)	0.98 (0.62–1.55)	0.99 (0.60–1.63)
TV watching (Mo–Fri) ^d	1.82 (0.98–3.36)	0.84 (0.45–1.55)	1.14 (0.61–2.14)	1.10 (0.57–2.13)	1.14 (0.56–2.30)	1.12 (0.52–2.42)
TV watching (Sat–Sun) ^d	0.92 (0.61–1.40)	0.71 (0.47–1.06)	1.39 (0.92–2.10)	1.19 (0.77–1.83)	1.08 (0.68–1.73)	0.76 (0.45–1.30)

^a at least 1/month; ^b at least once in life; ^c at least 1/week; ^d > 3 hrs/day; ATP – alternative tobacco products; EC – electronic cigarettes; PMP – personal music players; PE – physical education; * p < 0.05; ** p < 0.01; *** p < 0.001

tion also for the smoking prevalence of adolescents. Students from vocational schools did fewer sports, but were more sexually active (OR 3.25 (2.19–4.83)) and smoked more (OR 1.80 (1.13–2.87)). Gender differences were not significant in many risky behaviors. Girls listened to PMP more often (OR 0.48 (0.26–0.86)) and did fewer sports (OR 0.52 (0.36–0.77)). Family incompleteness played a role as well. Adolescents from incomplete families had more experiences with drunkenness during the previous month (OR 1.64 (1.10–2.43)), they were more sexually active (OR 2.09 (1.40–3.10)) and attended less frequently compulsory PE (OR 1.7 (1.10–2.66)) (Tab. 5).

Discussion

In this study, the most important health risk behaviors in Bratislava students' sample were identified (tobacco, alcohol, drugs consumption, violence, risky sexual behavior, inadequate sleep, and physical inactivity and the excessive use of IT devices (PC, PMP, TV, etc.).

Risky behaviors in adolescence affect the overall health status, well-being and the healthy development of individuals' personality (14). Inappropriate lifestyle, especially incorrect eating habits and lack of physical activity, can negatively affect health and cause an early onset of chronic non-communicable diseases, leading causes of morbidity and mortality (11, 15, 16).

In our study, we found a very high occurrence of several risky behavioral characteristics compared to the other studies.

According to BRFSS US, adolescents smoke less (15.7 %), drink alcohol less (50.8 %), they are less sexually active (34 %), but watch more TV (32 %), consume more soda several times daily (27 %) and admit more physical violence in schools (25 %) (17, 9).

Results from the national YRBSS in 2017 indicated that many high school students were engaged in health-risk behaviors associated with the leading causes of death among persons aged 10–24 years in the United States. During the 12 months before the survey, 19.0 % had been bullied on school property and 7.4 % had attempted suicide, 39.5 % of students had a sexual intercourse and 9.7 % had a sexual intercourse with four or more persons during their life. YRBSS also indicated many high school students were engaged in behaviors associated with chronic diseases, such as: cardiovascular disease, cancer, and diabetes. Nationwide, 8.8 % of high school students smoked cigarettes and 13.2 % had used an electronic vapor product on at least 1 day, 29.8 % reported current alcohol use. Forty-three percent of students played video or computer games or used a personal computer for 3 or more hours per day on an average school day, not for school work and 15.4 % had not been physically active for a total of at least 60 minutes on at least one day (18).

In nationally representative yearly surveys of United States 8th, 10th, and 12th graders 1991–2016 (n = 1.1 million), psychological well-being (measured by self-esteem, life satisfaction, and happiness) suddenly decreased after 2012. Adolescents, who spent more time on electronic communication and screens (e.g., social media, the Internet, texting, gaming) and less time on non-screen activities (e.g., in-person social interaction, sports/exercise,

homework, attending religious services) had a lower psychological well-being (19).

Tobacco product use is often started and established primarily during adolescence. Tobacco kills more than 8 million people each year and it remains a major risk factor for cardiovascular disease and the leading preventable cause of death worldwide (20). Both prevention of smoking initiation among youth and smoking cessation among established smokers are key for reducing smoking prevalence and the associated negative health consequences (21). In the last release (2017/2018) of collaborative WHO survey Health Behaviour in School-aged Children (HBSC), which collected data of 11-, 13- and 15-year-old boys and girls from 42 countries in Europe and North America including Slovakia, it was found that an early initiation of smoking and alcohol abuse is relatively common in Slovakia. At the age of 15 years, almost 39 % of girls and 40 % of boys have the first experience with tobacco smoke, and 23 % resp. 21 % of them have been smoking during the previous 30 days. Even if the trends of experience with classical cigarettes seems to be declining in this study (from 63 % in 2010 to 48 % in 2014 and 40 % in 2018 among 15-year-old boys) the prevalence is still very high (22). According to data from GYTS (Global Youth Tobacco Survey) in 2016, there were 21.6 % current tobacco smokers and 8.0 % of current electronic cigarette users among 13–15-years old students (23). The new alternative tobacco products (electronic cigarettes, hookahs, cigars, etc.), are becoming more and more popular among adolescents and represent a growing problem (24, 25).

Given the increasing popularity of electronic cigarettes and recommendation of harm reduction strategy, it is imperative to evaluate the health risks of e-cigarettes, including the effects of their ingredients, especially nicotine and flavorings. An acute exposure to flavored e-liquids or e-cigarette use exacerbates endothelial dysfunction, which often precedes cardiovascular diseases (26). In our study, the experience with different forms of alternative tobacco products (ATP) (except electronic cigarettes – EC) had 63.1 % of students and more than 40 % of students had an experience with vaping EC. Alcohol is one of the substances with addictive potential most commonly used by adolescents. Drinking during adolescence, which includes early initiation, frequent consumption and drunkenness, brings negative consequences for young people's psychological, social and physical health (27). According to the results from the latest HBSC study, almost 16–17 % of 15-years old children have been drunk during the previous month, compared to every second student from our study (22).

Slovak children spent nowadays almost all afternoon with sedentary activities. Such manner negatively influences physical fitness compared to previous generations. Daily recommended physical activity for children is 90 minutes of moderate intensity or 60 minutes of moderate to vigorous intensity (28). From our sample, every fourth student is not exercising regularly on compulsory PE, and students spent with sedentary activities almost 10 hours. In the previous HBSC study, 46 % of school children spent two or three hours daily watching TV (29, 30).

In the integrated review from Brazilian adolescents, where thirty-seven studies were analyzed, with a predominance of risky

sexual behavior, tobacco use, and violent behavior, it was found that advancing age favored unprotected sex, alcohol and tobacco use. Influence of family and friends was related to smoking and alcohol consumption. Males were more involved in situations of violence and the female gender was associated with physical inactivity. Belonging to a lower economic class was related to unprotected sex, physical inactivity, unhealthy dietary behaviors, and violence (31).

Sufficient sleep is needed for the healthy development of children, maintenance and development of their physical and mental health. According to the recommendations of the American Academy of Sleep Medicine, children aged 13–18 years old should sleep regularly 8–10 hours (32). In the latest HBSC study, the average sleeping time was 7.68 hours for boys and 7.61 hours for girls (33). In our sample, there were no gender differences in the sleeping time, but older students, students from vocational schools and from less educated families slept less. More than 31.9 % of students did not sleep enough (less than 7 hours during Monday-Friday). During weekends they slept much longer (96.6 % of students slept seven hours or more) (Tab. 3).

Obesity is associated with a poor health-related quality of life. The present obesity epidemic in childhood will manifest with deleterious consequences in future, when adolescents reach adulthood (34). In our adolescent sample, the occurrence of overweight/obesity according to self-reported BMI differed between boys and girls. Almost every third boy was overweight/obese, and around 10% of girls were overweight/obese. In the recent study of Neermark et al, self-reported height and weight highly correlated with a physical measurement of height and weight (35). There are multiple studies about obesity and relations with different risk factors. According to Cespedes Feliciano et al, longer sleep duration and a higher sleep efficiency were associated with a more favorable cardiometabolic profile in early adolescence, independent of other obesity-related behaviors (36). Jong-Hyuck concluded that both smoking frequency and cigarette consumption had positive effects with regard to weight loss in adolescents. However, because smoking has negative side effects on general health, including an increase in abdominal fat and morbidity rates of obesity-related diseases, they recommend that adolescents should not smoke (37). In obese individuals, complex management of obesity should be applied (38). Generally, it is accepted that exercise plus food restriction is more effective than either therapy alone (39). Prevention is thus essential even before the overweight sets in according to specific individual needs. There are multiple reports that unequivocally associate overweight and obesity with an impaired health, related to hypertension, cardiovascular disease and type 2 diabetes (34). According to the study of Hujova and Lesniakova, the higher presence of obesity, hypertension, positive cardiovascular disease family history and poor lifestyle factors (cigarette smoking, physical inactivity, stress, and low socioeconomic status) were found in urban compared to rural children and adolescents (40). In the study by Schusterova et al, focused on the consequences of obesity, they found that in obese and overweight children, the signs of early myocardial damage, both structural and functional, were detectable mainly as the alteration of the left ventricular diastolic

function, despite preserved global systolic function and these changes seemed to be intensified by the severity of obesity (41).

Our study revealed a very high occurrence of PMP listening and mobile phone use, especially in girls. About 50% of students are listening to PMP more than 200 minutes a week. Those students had a bad lifestyle and tinnitus was also present. In the Spanish study, the frequency of cordless phone calls, mobile phone dependency, and tablet use was related to an increase of subjective and objective sleep problems in adolescents (42).

This finding is very important and needs more investigation, because this issue was not addressed in YRBSS or in the HBSC study either.

Conclusion

Our study revealed a very high prevalence of risky behavioral characteristics among the students of the pilot sample of adolescents – high school students in the Slovakian capital, Bratislava, the model region. Some of those behavioral characteristics were significantly related to age, gender, type of school, completeness of the family and parental education. This is a comprehensive study, based on a combination of two validated studies. Parents were directly involved in the study, what makes challenges for the analysis and for future prevention and intervention. The resulting data from this study will be used to create preventive measures to protect and promote the health of children and youth.

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