

Subjective health status, health behaviours, and high-risk behaviours as factors associated with adolescent mental health

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Abstract. This study aimed to examine the associations between socio-demographic factors, health complaints, health behaviours, high-risk behaviours and mental health difficulties in a representative sample of 11-, 13- and 15-year-old adolescents in Latvia. The study used data from the international Health Behaviour in School-aged Children (HBSC) study year 2017/2018 Latvian database. Statistical modelling was performed to explore the odds of mental health difficulties measured by the Strengths and Difficulties Questionnaire (SDQ). The sample consisted of 4412 students. Overall, 155 (8.0%) boys and 209 (10.3%) girls had an “abnormal” level of mental health difficulties. In a binomial logistic regression model, the gender and socioeconomic status-adjusted odds ratios of scoring “abnormal” on the SDQ were higher for adolescents with poor subjective health, low quality of life, inadequate body image, those having multiple health complaints, less than 7 hours of sleep on weekdays, low level of physical activity, smoking cigarettes or e-cigarettes, drinking alcohol or having a problematic level of social media use. We conclude that female gender, low socioeconomic status, poor subjective health indicators, poor health behaviours and high-risk behaviours are significant factors associated with adolescent psychopathology and should be considered important targets for public health and preventive interventions.

Key words: adolescents, mental health difficulties, subjective health status, health behaviours, high-risk behaviours.

1 Introduction

Adolescence is a developmental period marked by significant physiological, cognitive, and social changes, making individuals particularly susceptible to developing mental health difficulties [1]. It has long been established that mental health difficulties that start during childhood and adolescence have profound impact on an individual's well-being, social functioning, and long-term health outcomes [2]. The prevalence of psychopathology has been steadily increasing in this vulnerable population during the last decades [3], a process further hastened by the Covid-19 pandemic, posing significant challenges to public health systems worldwide [4]. Consequently, identifying and understanding the risk factors

associated with adolescent psychopathology is crucial for developing effective prevention and intervention strategies.

Subjective health status, encompassing an individual's perception of their overall health and well-being, has emerged as an essential indicator associated with mental health outcomes [5]. Adolescents who perceive their health as poor or report a higher burden of physical health symptoms may be at higher risk of developing physical and mental health difficulties [6]. Furthermore, health behaviours, such as physical activity and sleep, have been heavily implicated in mental health research [7]. Engaging in healthy behaviours may promote resilience and protect against the onset of psychopathology [8, 9]. Conversely, high-risk behaviours, such as substance abuse and overuse of social media, have consistently been associated with increased psychopathological symptoms in adolescents [10, 11].

The literature also describes a significant association between gender, age, socioeconomic status (SES), and adolescent mental health [12]. Research consistently shows that gender plays a role in mental health outcomes, with females often reporting higher levels of internalising symptoms such as depression and anxiety, while males may exhibit more externalising behaviours such as aggression and substance use [13]. Age is also an important factor that must be considered, as adolescence is a critical period marked by a swift process of hormonal and neurological changes and increasing social pressures and expectations [14]. Mental health issues tend to increase as the child gets older, with some studies indicating higher rates of depression and self-harm in late adolescence than in early adolescence [15]. The family's socioeconomic status, including income, education, and occupation, is closely linked to mental health outcomes. Adolescents from lower SES backgrounds often face more stressors, limited access to resources and healthcare, and higher rates of mental health problems [16].

While several studies have explored the relationship between subjective health status, health behaviours, high-risk behaviours and adolescent psychopathology, the interplay among these factors in different groups of the general population of Latvian adolescents has not been previously investigated. Understanding the association between these population-specific risk factors and adolescent mental health outcomes is crucial for developing targeted interventions, promoting mental health equity, and providing appropriate support for this vulnerable population.

The aim of this study was to examine the role of sociodemographic factors, subjective health status, health behaviours and high-risk behaviours as factors associated with mental health difficulties in a representative sample of 11-, 13- and 15-year-old adolescents in Latvia. To achieve this aim, we calculated the results of the mental health screening in the study population and explored the distribution of both the results of the screening (as a dependent variable) and the associated factors (as independent variables) in gender groups. Then we performed logistic regression analysis to calculate the non-adjusted as well as the gender and socioeconomic status-adjusted odds ratios of screening in the "abnormal" range for all the associated factors and interpreted the results.

2 Materials and methods

2.1 Health Behaviour in School-aged Children (HBSC) Study

The study used data from the international Health Behaviour in School-aged Children (HBSC) study year 2017/2018 Latvian database. The HBSC study is an internationally recognised research initiative that examines the health behaviours and well-being of young people aged 11 to 15 [17]. The study aims to provide comprehensive data on various

aspects of adolescent health, including physical activity, nutrition, substance use, mental health, and social relationships. Conducted every four years in numerous countries, the HBSC study collects data through anonymous self-completion questionnaires administered in the classroom. The HBSC survey in Latvia is carried out by the Latvian Centre for Disease Prevention and Control.

2.2 Strengths and Difficulties Questionnaire

The Strengths and Difficulties Questionnaire (SDQ) was used in this study as a mental health screening tool. The SDQ is a widely used screening tool in the adolescent population to assess their emotional and behavioural well-being [18]. Designed to identify potential psychological difficulties, the SDQ consists of 25 questions that capture both the difficulties experienced by adolescents and their strengths. The questionnaire covers five domains: emotional symptoms, conduct problems, hyperactivity, peer relationships, and pro-social behaviour. Four of the SDQ subscales (except the pro-social behaviour subscale) combined constitute the “Total difficulties scale” that can be used as a measure of overall psychopathology [19].

The SDQ’s strength lies in its brevity, ease of administration, and ability to provide a comprehensive overview of an adolescent’s emotional and behavioural functioning [20]. As a reliable screening tool, the SDQ has been used in clinical practice and population health research to identify individuals who may benefit from targeted support and mental health services.

2.3 Study variables

The SDQ Total difficulties score was chosen as the primary dependent variable in this analysis to measure the adolescents’ overall level of psychopathology (emotional and behavioural problems). The “caseness” threshold was calculated in consistency with the original approach adopted by the authors of the scale, with an “abnormal” level of difficulties being defined as a score above the 90th centile in the study population [21, 22]. This approach was chosen because previous studies have shown that using the UK population-based cut-off values would likely overestimate the presence of psychopathology in the Latvian adolescent population [23].

To account for probable socio-demographic confounders, gender, age and socioeconomic status were included. The respondents’ socioeconomic status was estimated based on a compound self-report measure included in the HBSC survey – the Family Affluence Scale (FAS) [24]. For the purposes of our analysis, the results of the FAS were dichotomised, and “low” family affluence was defined as the lowest quartile of the population or FAS total score of 0-5 points.

The subjective health and well-being measures included in the analysis were self-rated health, life satisfaction, body image and psychosomatic symptoms. The self-rated health was assessed with a single-item question with a 4-point Likert scale and further dichotomised to being either good (rated “good” or “excellent”) or not good (rated “poor” or “fair”). Life satisfaction was assessed with a single-item question on a 10-point scale and further dichotomised as high (6-10 points) or low (0-5 points). The body image was assessed with a single-item question on a 5-point scale and dichotomised to be “about right” (1-3 points) or “too fat” (4-5 points). The psychosomatic symptoms were assessed with a compound measure, registering eight different individual health complaints (e.g. headache, stomach ache, irritability etc.) and defining serious (multiple) health complaints as having two or more symptoms more than once a week in the last six months.

In the domain of health behaviours, we looked at sleep and physical activity. An insufficient level of sleep was defined as having less than an average of 7 hours of sleep on weekdays. A low level of physical activity was defined as having moderate physical activity two or fewer days a week and having vigorous physical exercise one or fewer days a week.

In the domain of high-risk behaviours, we evaluated alcohol use, smoking tobacco or e-cigarettes, and problematic levels of social media use. All substance-related behaviours were defined as risky if the adolescent admitted engaging in the behaviour at least once during the last 30 days. The level of social media use was assessed with a 9-item questionnaire focusing on behavioural addiction symptoms (The Social Media Disorder Scale [25]). The problematic level of social media use was defined as having five or more symptoms of behavioural addiction to social media.

3 Results

Of the 4412 study participants, 2188 (49.6%) were boys, and 2224 (50.4%) were girls. The respondents were equally distributed between the three age groups included in the study based on the HBSC sampling methodology. We found no significant gender variation in the age or socioeconomic status of the study participants. On the other hand, significant gender differences were found in all other study variables except tobacco smoking. Significantly more girls than boys scored “abnormal” on the SDQ Total difficulties scale, rated their health as not being good, had low life satisfaction, thought that they were “too fat”, had more psychosomatic symptoms, less sleep and physical activity and more problematic drinking and social media use. The only variable where boys scored significantly higher than girls was problematic e-cigarette smoking. The gender distribution of all the variables included in the analysis is presented in Table 1.

Table 1. Gender distribution of the study variables in a representative sample of Latvian 11-, 13- and 15-year-old adolescents.

	Total		Boys		Girls		<i>p</i>
	(n = 4412)		(n = 2188)		(n = 2224)		
	%	n	%	n	%	n	
SDQ Total difficulties							
Normal	90.8%	3607	92.0%	1793	89.7%	1814	0.010
Abnormal	9.2%	364	8.0%	155	10.3%	209	
Age group							
11 years	35.0%	1534	34.2%	743	35.7%	791	0.329
13 years	34.5%	1513	35.6%	772	33.5%	741	
15 years	30.5%	1338	30.2%	656	30.8%	682	
Family affluence							
High	74.0%	3193	74.8%	1595	73.2%	1598	0.238
Low	26.0%	1123	25.2%	538	26.8%	585	
Self-rated health							
Good	75.3%	3291	81.6%	1761	69.2%	1530	0.000

	Poor	24.7%	1078	18.4%	396	30.8%	682	
Quality of life								
	High (6-10 points)	83.8%	3636	86.9%	1860	80.8%	1776	0.000
	Low (0-5 points)	16.2%	701	13.1%	280	19.2%	421	
Body image								
	About right (1-3 points)	67.1%	2951	73.3%	1600	61.00%	1351	0.000
	Too fat (4-5 points)	32.9%	1447	26.7%	584	39.0%	863	
Psychosomatic symptoms								
	1 or less	80.1%	3506	85.1%	1842	75.2%	1664	0.000
	Multiple	19.9%	872	14.9%	322	24.8%	550	
Sleep time on weekdays								
	>7 hours	80.7%	3488	82.2%	1760	79.2%	1728	0.012
	<7 hours	19.3%	833	17.8%	380	20.8%	453	
Physical activity								
	High (3 and more days)	72.7%	3194	76.3%	1662	69.2%	1532	0.000
	Low (< 3 days)	27.3%	1198	23.7%	515	30.8%	683	
Vigorous physical activity								
	High (2-3x a week and more)	76.3%	3352	80.9%	1762	71.8%	1590	0.000
	Low (< 2 times a week)	23.7%	1040	19.1%	417	28.2%	623	
Tobacco smoking								
	No (last month)	89.8%	3887	90.00%	1922	89.6%	1965	0.342
	Yes (last month)	10.2%	441	10.00%	213	10.4%	228	
E-cigarette smoking								
	No (last month)	90.4%	3812	87.5%	1817	93.2%	1995	0.000
	Yes (last month)	9.6%	405	12.5%	259	6.8%	146	
Drinking alcohol								
	No (last month)	79.5%	3455	82.00%	1764	77.00%	1691	0.000
	Yes (last month)	20.5%	892	18.00%	388	23.00%	504	
Problematic social media use								
	No (0-4 points)	90.7%	3489	92.4%	1731	89.1%	1758	0.000
	Yes (5-9 points)	9.3%	359	7.6%	143	10.9%	216	

We performed statistical modelling to explore the relationship between mental health difficulties and other risk factors. First, separate binomial logistic regression models were constructed for each independent variable. Then, binomial logistic regression models were constructed for each risk factor, together with gender and socioeconomic status, to adjust for the possible confounding effects of these socioeconomic factors. The results of the binomial regression modelling are presented in Table 2.

Table 2. Results of the binomial logistic regression modelling.

Risk factors		SDQ “abnormal” Total difficulties			
		B1		Bs (gender&FAS)	
		OR	(95% CI)	OR	(95% CI)
<i>Socio-demographic factors</i>					
Gender (female)	ref. male	1.333	1.072-1.657	-	-
Age group	13 y.o. ref. 11 y.o.	0.986	0.759-1.280	1.008	0.775-1.311
	15 y.o. ref. 11 y.o.	0.944	0.721-1.235	0.935	0.714-1.224
Low family affluence	ref. high	1.437	1.140-1.811	-	-
<i>Subjective health</i>					
Low quality of life	ref. high	4.831	3.831-6.091	4.667	3.687-5.908
Poor self-rated health	ref. good	3.877	3.105-4.840	3.731	2.976-4.677
Inadequate body image	ref. adequate	2.074	1.669-2.578	2.020	1.622-2.517
Multiple psychosomatic symptoms	ref. 1 and less symptoms	2.685	2.133-3.381	2.600	2.058-3.285
<i>Health behaviours</i>					
Insufficient sleep time (weekdays)	ref. 7 and more h	2.115	1.666-2.687	2.108	1.658-2.681
Low physical activity	ref. 3 and more x a week	1.518	1.208-1.907	1.422	1.127-1.793
Low vigorous physical activity	ref. 2 and more x a week	1.664	1.318-2.100	1.557	1.229-1.973
<i>Risk behaviours</i>					
Smoking	ref. none last month	1.653	1.212-2.253	1.623	1.189-2.216
E-smoking	ref. none last month	1.409	1.004-1.980	1.503	1.067-2.118
Drinking	ref. none last month	1.982	1.566-2.508	1.945	1.535-2.464
Problematic social media use	ref. 4 or less symptoms	3.873	2.903-5.166	3.716	2.779-4.970

Ref. - reference group; CI - confidence interval; OR - odds ratio; B1 - non-adjusted OR; Bs - adjusted OR. Statistically significant OR ($p < 0.05$) indicated in bold.

The gender and socioeconomic status-adjusted odds ratios of scoring “abnormal” on the SDQ were not significantly different for adolescents from different age groups, but there was a significant difference in all other study variables. Adolescents with low subjective quality of life and poor self-esteem had the highest odds of having significant mental health difficulties (OR of 4.7 and 3.7, respectively). The odds ratios for other independent variables ranged from 1.5 to 2.5, but problematic social media use emerged as the risk behaviour most closely associated with mental health difficulties (OR = 3.7).

4 Discussion

Our findings suggest that overall adolescent girls in Latvia report higher levels of mental health difficulties than boys. These findings are consistent with the vast body of previously published literature indicating the existence of a significant mental health gender gap [26]. A recent cross-national analysis of 73 countries showed that the magnitude of this adolescent gender gap is higher in countries with higher GDP per capita across all mental health outcomes [27]. The gender-specific odds ratio for mental health difficulties we observed in our dataset is comparable to the magnitude of the gender correlations for symptoms of psychological distress found in other EU member states, the US and Canada [27, 28]. Similar to many other studies [29], we also found that Latvian adolescents from lower-income households had higher odds of having abnormal levels of emotional and behavioural difficulties. Although the relationship between poverty and mental illness in adulthood tends to get more complex and bidirectional, in childhood and adolescence, low household income is an indicator of a multitude of resource inequalities (e.g. access to healthcare and education) and higher risk of being exposed to early adverse childhood experiences that can both cause and precipitate the development of mental health difficulties downstream [30].

In our sample, we did not observe the effects of age on the level of psychopathological symptoms, which might be explained by the relatively narrow age group included in the HBSC study – 11-15 years of age. All of the study participants were in the early to middle stage of adolescence, all were still receiving their compulsory secondary education, and this fairly homogenous sample did not include older adolescents and young adults.

In our analysis, the strongest predictor of mental health difficulties was the self-rated quality of life, with adolescents that were overall not satisfied with their life having almost 5 times greater odds of significant psychopathology. A similar relationship was observed with self-rated health. Both constructs have been shown to have a high degree of overlap, but previous studies suggest that the self-rated quality of life demonstrates a slightly higher correlation with mental health difficulties, whereas self-rated health – with physical health, although in adolescent populations in contrast with the adult population mental health is still a more significant contributor [31]. Our data support the notion that both measures can be used as strong predictors of mental health difficulties in the Latvian adolescent population in research and clinical practice.

The relationship between mental health difficulties and body image in adolescents is well-documented. Negative body image perceptions, such as perceiving oneself as overweight, have been shown to contribute to the development of conditions like depression, anxiety, eating disorders and other types of internalising psychopathology [32]. Our data indicate that poor body image is associated with a higher risk of mental health difficulties also in Latvian adolescents. Adolescence is a time of profound physical changes and heightened self-awareness, making body image a prominent concern for many young individuals. The pressure to meet societal beauty standards, the influence of media and peer comparisons, and the prevalence of body shaming can all impact an adolescent's body image perception and, subsequently, mental well-being [33].

The relationship between health behaviours, such as sleep, physical activity, and adolescent mental health, is significant and likely bidirectional. Research consistently demonstrates that sleep and physical activity are crucial in promoting positive mental health outcomes among adolescents [34]. This connection is also evident in Latvian data.

Sufficient and quality sleep is essential for emotional regulation, cognitive functioning, and overall well-being. Inadequate sleep has been associated with increased risks of depression, anxiety, mood disturbances, and behavioural problems [7]. Regular physical activity has been found to have numerous mental health benefits, including reducing

symptoms of depression and anxiety, improving self-esteem, and enhancing overall psychological well-being [35]. Additionally, physical activity can improve sleep quality, helping to regulate the sleep-wake cycle. Therefore, a reciprocal relationship exists between sleep, physical activity, and mental health in adolescents. Encouraging healthy sleep habits and regular physical activity can have positive impact on adolescents' mental well-being, highlighting the importance of incorporating these lifestyle factors into comprehensive strategies for promoting adolescent mental health.

The reciprocal relationship between high-risk behaviours such as smoking, drinking alcohol, and problematic social media use and adolescent mental health is a matter of great concern worldwide [36]. Research consistently highlights the detrimental effects of these behaviours on the mental well-being of young individuals. Smoking tobacco and consuming alcohol during adolescence have been linked to an increased risk of developing mental health disorders such as depression, anxiety, and substance use disorders. These behaviours contribute to physical health problems, disrupt brain development, and exacerbate existing mental health problems. On the other hand, adolescents who already have developed mental health problems like anxiety and depression may use substances as a maladaptive coping strategy or "self-medication", thus furthering the vicious circle of a dual diagnosis [37].

Interestingly, our data suggest that problematic social media use in Latvian adolescents has a stronger connection to mental health difficulties than any substance-related high-risk behaviours and that the overall prevalence of symptoms of behavioural addiction to social media in 11- to 15-year-olds is disturbingly high. Emerging research shows that social media potentially has positive and negative impacts on adolescent mental health. However, there are still substantial evidence gaps in our understanding of the complex pathways through which exposure to social media may harm or benefit the developing brain [38].

5 Conclusions

Adolescent girls in Latvia are at a higher risk of having mental health difficulties. Poor subjective health status, poor health behaviours and high-risk behaviours (especially problematic social media use) are significant risk indicators for adolescent mental health difficulties. The causal relationship between mental health difficulties and the abovementioned factors is likely bidirectional. These indicators should be considered important targets for public health and preventive interventions, and taken into account when providing primary healthcare to individual adolescents.

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