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Professional paper

TRENDS IN ADOLESCENT RISK BEHAVIORS BEFORE AND AFTER THE COVID-19 PANDEMIC

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Abstract

Adolescence is a crucial period in individual development, as it is characterized by significant changes across all areas of functioning. During this period, adolescents face numerous challenges that, play a significant role in shaping their behavioral patterns. In this context, the emergence of risky behaviors becomes increasingly possible. This study aims to analyze and present the trends of risky behaviors among adolescents in North Macedonia during the period 2014–2022. The data are part of the HBSC-Macedonia study. Participants include adolescents aged 11, 13, and 15 years. The sample size ranges from 4,219 in 2014 to 5,144 in 2022. The findings indicate that smoking and cannabis use show an increasing trend across the three measurement points, while alcohol consumption shows a declining tendency. The development of comprehensive policies that promote health education can contribute significantly to the healthy development of adolescents.

Keywords: risk behavior, adolescents, trends.

1. Introduction

Adolescence is one of the most delicate stages of human development, including numerous changes in emotional, social, and physical development. Risky behaviors such as smoking, alcohol consumption, cannabis use, early involvement in sexual intercourse, and loneliness have shown a sharp increase, especially between the ages of 11 and 14. This negative cycle of risky behaviors in adolescents is associated with a large number of factors that can contribute positively to the mental health of young people; however, this contribution is often negative and encompasses long-term consequences (Ross et al., 2020).

In addition to family, peer pressure, and school environment, the post-COVID-19 period has also been deeply linked to external factors that impact young people's well-being (Dimitrova & Alexandrova-Karamanova, 2023).

The significance of this research is multidimensional, as all these risky behaviors add to the global challenges faced by adolescents and on the other hand these behaviors can escalate into serious consequences, including mental disorders and suicide. According to the World Health Organization (WHO, 2020), risky behaviors are the main cause that directs young people towards self-harm. This issue not only highlights the importance of this study but also serves as an urgency for public health policies.

On the other hand, the COVID-19 pandemic, in addition to the global crisis, interrupted the normal development of young people as well, moving from a physical learning practice to an online one, which affected their personality development. The effect of social isolation created an environment where the potential for an increase in risky behaviors emerged earlier than the COVID-19 period. Therefore, considering this, the entire scientific community at the international level is in search of understanding healthy and unhealthy behaviors in young

people before and after the pandemic.
According to the Health Behavior in School-aged Children (HBSC) Study, conducted in 36 countries in Europe and North America, tobacco use among 11, 13, and 15-year-olds decreased significantly in 2014 compared to previous years, especially among adolescents from countries that had adopted stricter policies on smoking among this age group. This also shows how important social and political regulations are in reducing and preventing risky behaviors among young people (De Looze et al., 2022).
In contrast to the previous year, in 2014, 15-year-old adolescents in New Zealand reported a decrease in alcohol use from 40% to 30% and cannabis use from 19% to 14% (Bell et al., 2022).
Data from HBSC Study in Italy (Lombardy Region, Adolescents aged 11, 13, and 15 years) survey indicated that 10% of adolescents reported regular alcohol consumption (defined as drinking on at least 3-5 days in the last 30 days) in 2014 (Benzi et al., 2025). In Europe, Asia and Canada, the proportions of 15-year-olds who had engaged in early sexual intercourse were relatively stable between 2014, 2018 and 2022, with one in five boys and one in seven girls reporting early sexual intercourse, according to HBSC. Overall, in 22 of the 42 countries, boys were more likely to engage in early sexual intercourse, particularly Bulgarian boys. However, in countries such as Denmark and Finland, the prevalence did not differ significantly between genders, with slightly higher rates observed among girls (Költő et al., 2024).
Additionally, Global Youth Tobacco Survey (GYTS) data from 2018 across 140 countries, Ma et al. (2021) reported that smoking (at least one day in the past 30 days) fell in 57% of countries, remained unchanged in 28%, and increased in some countries to 15%. Notably, countries that ratified the WHO Framework Convention on Tobacco Control (FCTC) experienced more conspicuous declines in smoking prevalence than those that did not.
In the United States, the average age of initiation of smoking in 2018 compared to previous years increased from 14 to 16 years (Barington-Trimis et al., 2020).
Furthermore, the prevalence of smoking in 2018 was higher among boys at 11% than among girls at 6% globally (Ma et al., 2021). In Austria, there were no significant gender differences in daily smoking (Strizek et al., 2021), just as in the US where no significant differences in smoking trends by gender were found between 1991 and 2019 (Meza et al., 2020).
Benzi et.al (2025), reported that approximately 18 out of every 100 adolescents in Italy have drunk at least five glasses on a single occasion within the year, while in terms of cannabis consumption, adolescents from the US have shown an increase, with a ratio of 8 out of every 100 adolescents during 2019,
The National Youth Tobacco Survey (NYTS), conducted with high school students in US from 2013 to 2022, in particular found a significant increase in the prevalence of e-cigarette use among young people, peaking in the years before COVID-19, with a decline during 2020, but still at worrying levels for both sexes (Mattingly & Hart, 2023).
Data from the Global Youth Tobacco Survey at a global level, conducted before COVID-19 in 144 countries, show that a large proportion of approximately 80% of adolescents aged 13-15 years had started smoking before the age of 13, and this average age remained unchanged in almost three-quarters of the surveyed countries, all due to the strengthening of strategies and interventions aimed at preventing smoking initiation (Xing et al., 2022).
Alcohol consumption trends among Italian adolescents aged 15 and older continue to increase during and after the pandemic, with approximately 56 out of every 100 boys and 44 out of every 100 girls consuming alcohol to the point of intoxication (Benzi et al., 2025), and these increases continue to be present in cannabis use.
According to Cosma et al. (2025), there has been a documented linear increase in psychological complaints including feeling low among adolescents from 35 countries during the period 2010–2022, with a more pronounced increase observed among girls compared to boys.

The relevant studies mentioned above address the forms of risky behaviors among adolescents, but they lack an integrated approach. This study addresses some of these behaviors in a comprehensive manner by focusing on a pre- and post-COVID-19 perspective, a topic that is still underdeveloped, and also contributes to providing different cultural dimensions regarding risky behaviors. This study aimed to identify trends in risky behaviors among 11-, 13-, and 15-year-old adolescents, such as smoking, alcohol use, marijuana use, early involvement in sexual relations, and feeling low during the years 2014, 2018, and 2022, comparing them with the pre- and post-pandemic periods, considering gender differences.

2. Methods

Sample

The data presented in this paper are part of the HBSC study, a collaborative cross-national survey conducted every four years in more than 50 countries. It includes a representative sample of young people aged 11, 13, and 15 years. The number of participants ranged from 4,219 in 2014, followed by 4,658 in 2018, to 5,144 in 2022.
By gender, among the total number of adolescents in the study, in 2014, 49.3% were boys and 50.7% girls, in 2018, 48.9% were boys and 51.1% were girls; in 2022, boys made up 48.4% of the sample, and girls accounted for 51.6%.
As part of the HBSC study protocol, for each survey year, the sample was selected using a systematic random sampling method. The units of analysis were primary and secondary schools in the Republic of North Macedonia. During the subject selection process, stratification is also applied based on the language of instruction—Albanian and Macedonian—which reflects the demographic composition of the population in North Macedonia.

Instruments

Cigarette use was measured through the question: *"On how many days (if any) have you smoked cigarettes in your lifetime?"* Adolescents responded on a scale from 1 (never), (1–2 days), up to 7 (30 days). This study presents the percentage of adolescents who reported that they have ever smoked.
Alcohol consumption was measured with the question: *"Have you ever had so much alcohol that you were really drunk?"* The possible answers ranged from never to ten or more times. The study presents the percentage of adolescents who reported being drunk on two or more occasions.
Cannabis use was measured through the question: *"Have you ever taken cannabis in your lifetime?"* Adolescents could respond on a scale from 1 (never), (1–2 days), up to 7 (30 days). The study includes the percentage of adolescents who reported having ever used cannabis.
Sexual activity was measured by asking 15-year-old adolescents to answer Yes or No to the question: *"Have you ever had sexual intercourse?"* The study presents the responses of those who answered affirmatively.
Regarding loneliness, adolescents were asked whether they had felt lonely in the past 12 months. The study includes the percentage of adolescents who reported feeling lonely most of the time or always.

3. Results

Figure 1 shows that the trend of cigarette smoking increases gradually with age among adolescents. In particular, the percentage of young people who smoke rises significantly between the ages of 13 and 15. Although the difference is not very pronounced, in general, boys report higher levels of smoking across the years and in all age groups included in the study. From 2014 to 2022, the prevalence of adolescents who smoke at ages 11, 13, and 15 shows a steady upward trend.

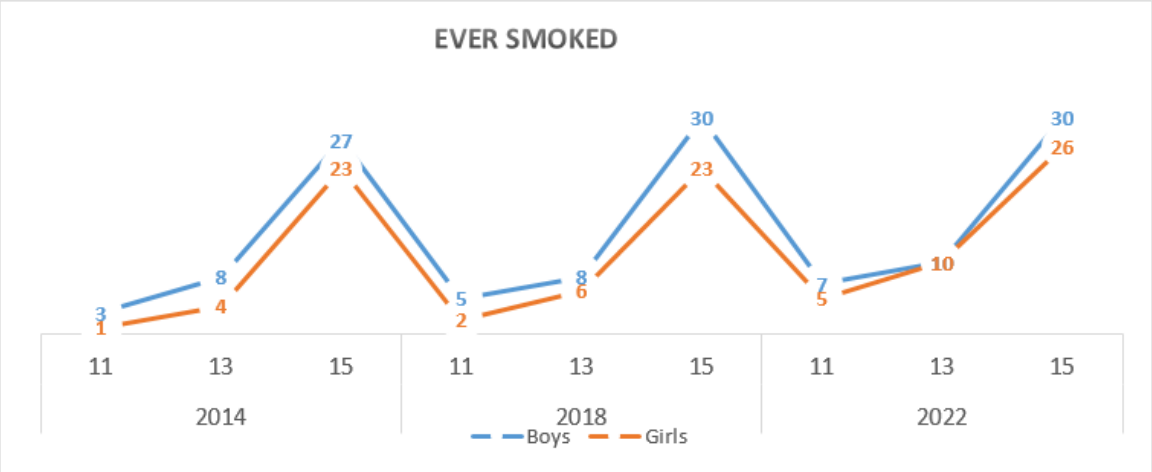

Figure 1. Prevalence of ever smoked cigarettes among adolescents aged 11, 13, and 15 in 2014, 2018, and 2022

According to the data in Figure 2, overall, the trend of 15-year-old adolescents who report having been drunk on at least two occasions in their lifetime remains stable between 2014 and 2022. The difference between boys and girls at age 15 regarding alcohol use, specifically drunkenness, is significant, with boys (15% in 2014) reporting almost twice as many cases of drunkenness compared to girls (8%). While the prevalence of drunkenness among girls remains unchanged over the years, Figure 2 shows a slight downward trend in boys' reports of having been drunk at least twice between 2018 and 2022.

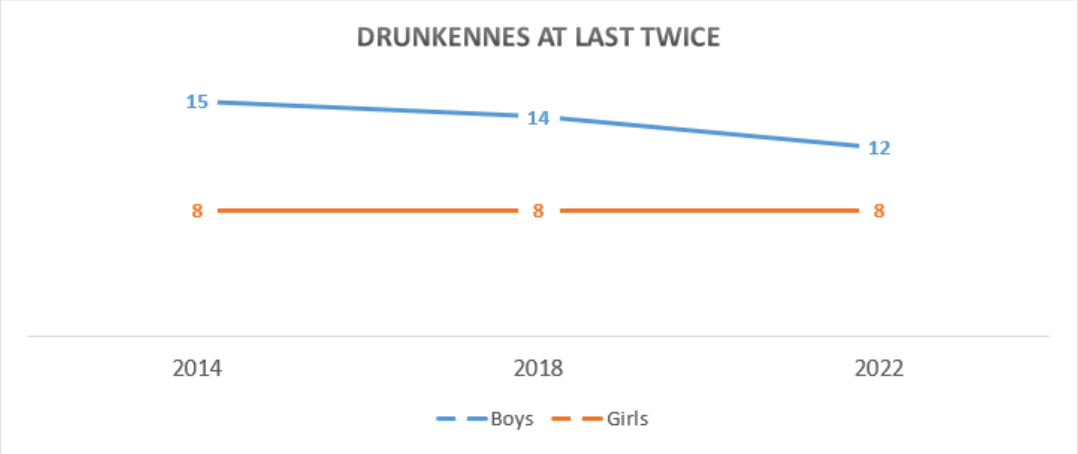

Figure 2. Trends in the prevalence of drunkenness on at least two occasions in a lifetime among 15-year-old adolescents in 2014, 2018, and 2022

The prevalence of 15-year-old adolescents who have ever tried cannabis shows a consistent upward trend from 2014 to 2022. Data from Figure 3 reveal a clear gender gap in cannabis use, with boys consistently reporting higher lifetime use compared to girls. This difference is present and persistent across all three survey points (figure 3). The gradual increase is more noticeable among boys, especially between 2014 and 2018.

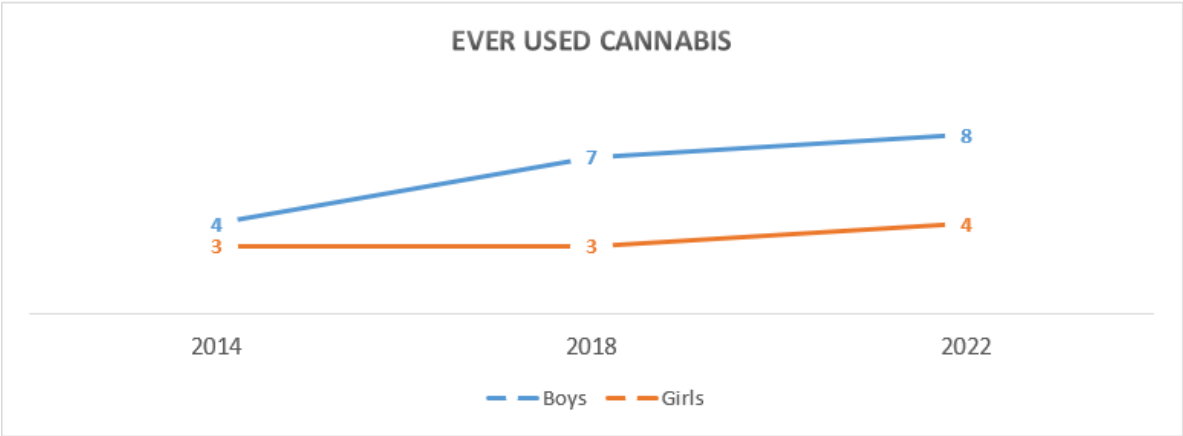

Figure 3. Trends in the prevalence of ever cannabis use among 15-year-old adolescents in 2014, 2018, and 2022

The prevalence of 15-year-old boys who have engaged in sexual intercourse is significantly higher than that of girls in all three survey years. Among 15-year-old girls, sexual activity shows a slight upward trend over time. From 2018 to 2022, there is a slight decline in the prevalence of boys who report having had sexual intercourse (figure 4).

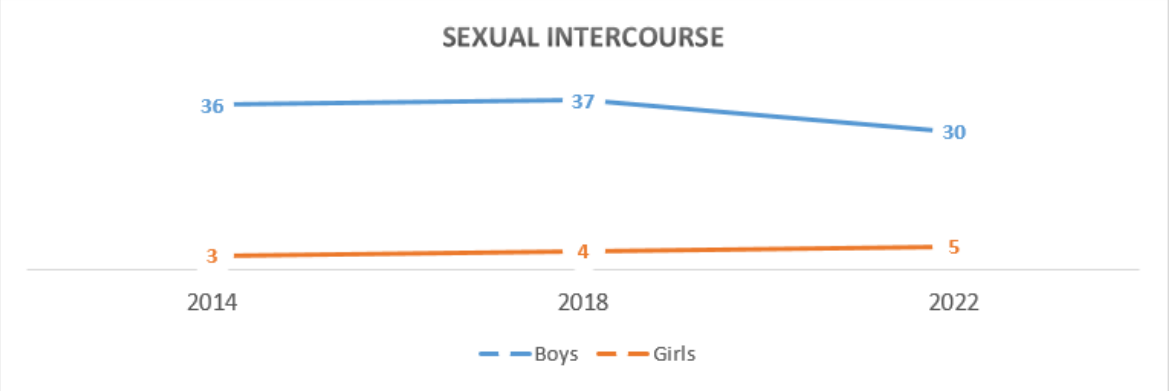

Figure 4. Trends in prevalence of sexual intercourse among 15-year-old adolescents in 2014, 2018, and 2022

Figure 5 illustrates an increasing trend of feeling low among adolescents as age increases, for both boys and girls. The prevalence of adolescents who report feeling low rises steadily across all three time points, with 15-year-olds reporting the highest levels. In general, feeling low is more commonly reported by girls than boys across all age groups (11, 13, and 15) and all three time points (2014, 2018, and 2022). However, among girls in particular, a dramatic increase is observed in the 15-year age group, with a sharp rise in feelings of low mood from 2018 to 2022.

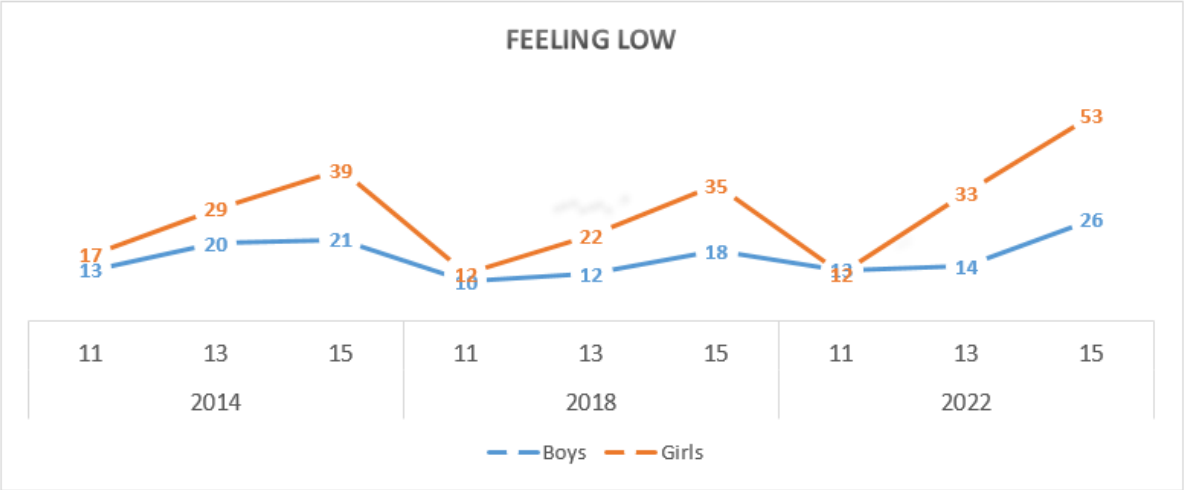

Figure 5. Prevalence of feeling low among adolescents aged 11, 13, and 15 in 2014, 2018, and 2022

4. Discussion and Conclusion

The results of this study highlighted some disturbing and consistent trends regarding risky behaviors among 11, 13 and 15-year-old adolescents in North Macedonia during the period 2014-2022. From what can be seen in Figure 1, we can say that tobacco use increases with age, with a greater susceptibility between the ages of 13 and 15 throughout all time periods. This finding is also consistent with the results of the European School Survey Project on Alcohol and Other Drugs (ESPAD), conducted during 2019, which also report an increase in tobacco use among a large number of European adolescents, this also highlights the fact that the early stages of adolescence are crucial for the formation of lasting habits, including high-risk behaviors such as smoking. Although gender differences in smoking are not very pronounced, with boys reporting higher levels of use across all age groups and years, what can be suggested

by these results is that preventive interventions should specifically take gender characteristics into account.

Regarding data on alcohol consumption, specifically getting drunk at least twice in their lifetime among 15-year-old adolescents, the data in Figure 2 illustrate a kind of stability over the years, with a clear gender divide. In addition to the fact that during the period 2014, also before COVID-19, boys reported twice as many cases of drunkenness as girls, after the pandemic a slight decrease in these cases among boys is observed, this may also be related to the awareness of young people about the health consequences, as well as the experience of social isolation and lack of opportunities for entertainment, especially during the period 2020-2022. Compared to boys, a pattern is observed among girls that continues in a similar way over the years. Similar trends were also found in the study conducted in Norway during the years 2014-2022, with a decreasing prevalence of drunkenness in boys over the years, but unlike our study, with a small increase in drunkenness in girls, but with a stability of the gender gap in alcohol consumption (Myhr et.al., 2024). The data of the study conducted by Valentić et.al (2024), provide information contrary to our findings regarding alcohol use in girls after the pandemic, where according to them, 15-year-old Croatian girls had similar levels of alcohol consumption to boys. This can be explained by the fact that in this context girls may have been more emotionally affected and used alcohol as a coping mechanism for this situation.

What is worrying based on the findings of this study is related to the reporting of a high level of cannabis consumption among boys, compared to girls, with a significant increase between 2014-2018 and a slight increase until 2022. These findings are also alarming and let us understand that young people have easy access through which they also distribute the same. In contrast to these data, a study conducted in America highlights that after 2021, boys have reported a decrease in cannabis use, while girls have an increase (Yang et.al., 2024). This can also be interpreted because of emotional experiences in girls, the way they internalize various problems, insufficient social support that they may have experienced during the pandemic.

The data in Figure 4 also reveals another worrying issue, the premature involvement of 15-year-olds in sexual relations. Although during the period 2018-2022, the involvement of boys has slightly decreased, while a gradual increase is seen in girls, the difference between them is still very visible in favor of boys. The gradual increase in girls, especially boys, in early sexual relations can also be seen from the influence of social norms, however, this trend without prior education from the educational system where these adolescents live remain a great risk for the transmission of various sexually transmitted diseases, unplanned pregnancies and other impacts with negative consequences. Similar increases in early sexual interactions have also been found among 15-year-olds in Albania, with a significant emphasis on the male gender (Kaçaj, et.al. 2025).

Finally, the trends in Figure 5 highlight another concern that affects emotional well-being, namely feelings of loneliness. This trend is most pronounced among girls, especially 15-year-olds, where there is a dramatic increase from 2018 to 2022. This fact raises major concerns about the mental health of adolescents, especially girls, and suggests the possible impact of factors such as academic pressure, the influence of social networks, self-esteem and social isolation after the pandemic. This finding is also consistent with the results of Cosma et al. (2025), who reported an increasing trend in feelings of low mood among adolescents, particularly among girls.

Despite the representative number of adolescents participating in this study, it can still be emphasized that one of the limitations of the study in question may be the fear of stigmatization and the sensitivity of the questions, especially on sexual relations, where from this perspective the girls in this study were more reserved, despite the strict confidentiality and ethics of the study.

In conclusion, we can emphasize that the trends provided over the years of this study clearly show the presence of risky behaviors among young people in North Macedonia, with a particular emphasis on growth after the pandemic period. These data can serve as important information for relevant institutions in creating educational and healthy strategies for young people.

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