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Predictive Markers and Self-Perceived Health in Adolescents: An Exploration Through a School-Based Public Health Survey

José Antonio Zafra-Agea [1,2,*], Mireia Vilafranca-Cartagena [1,*], Daniel García-Gutiérrez [1,*], Estel·la Ramírez-Baraldes [1,3], Anna Portabella-Serra [1] and Cristina García-Salido [1]

[1] Department of Nursing, Faculty of Health Sciences at Manresa, University of Vic–Central University of Catalonia (UVic-UCC), Av. Universitària, 4–6, 08242 Manresa, Spain
[2] Department of Nursing, Faculty of Nursing, Physiotherapy, and Podiatry, University of Seville, 41004 Seville, Spain
[3] Intensive Care Unit, Althaia, Xarxa Assistencial Universitària de Manresa, Fundació Privada, Manresa, Spain
* Correspondence: jzafra@umanresa.cat (J.A.Z.-A.); mvilafranca@umanresa.cat, (M.V.-C.); dgarcia04@umanresa.cat (D.G-G.)

Abstract: Adolescence is a critical developmental stage marked by significant physical, emotional, and social changes that profoundly influence health behaviors. Public health plays a crucial role in promoting adolescent well-being developing health education programs, community campaigns, and evidence-based prevention policies to mitigate risk factors associated with adolescent health, behavior and lifestyle patterns. The aim of this study is to examinate self-perceived health, mood, sleep patterns, substance use, dietary habits, and leisure activities among 120 adolescents aged 14 to 17 in a municipal school near Barcelona. Findings reveal that in the mood state distribution boys are 2.34 times more likely to report a positive mood than girls. In the prevalence of addictive substance and alcohol use between male and female adolescents, 82.6% of girls reported alcohol consumption significantly higher than the 56.9% of boys ($p = 0.003$). Similarly, 42.15% of girls smoked at least once, compared to 19.83% of boys ($p < 0.001$). Physical inactivity was more prevalent among girls (17.4%) than boys (11.8%), indicating potential barriers to participation. The distribution of sleep hours between boys and girls shows notable differences in the 8.5-hour sleep category ($p = 0.0090$). Skipping breakfast was more common among girls (33.3%) than boys (21.6%). Night out frequency and return times have an identical proportion between boys and girls. This study underscores the necessity of implementing gender-sensitive public health strategies to address disparities in substance use, physical activity, and dietary habits, while promoting sleep hygiene and overall adolescent well-being through municipal and community-based initiatives.

Keywords: adolescence; health behavior; self-perceived health; substance use; leisure activities; mental health; health promotion; municipal strategies; community health

1. Introduction

Adolescence is a key stage of human development, characterized by physical, emotional, social, and cognitive changes that shape health and well-being and serve as predictors of health in adulthood. During this transformative period, adolescents face challenges such as identity formation and social integration, which directly impact their self-perceived health, mood, and behavioral patterns, including substance use, sleep quality, dietary habits, and digital technology use [1].

Self-perceived health is a critical determinant of overall adolescent well-being, influencing their likelihood of engaging in risk behaviors. Alcohol, tobacco, and other substance use remain alarmingly

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prevalent, with early initiation exacerbating long-term health risks, including substance use disorders [2]. In Spain, recent data indicate that 75.9% of adolescents consumed alcohol in the past 30 days, 20.8% reported episodes of drunkenness, and 28.2% engaged in *binge drinking* (consuming five or more alcoholic drinks in approximately two hours). Furthermore, adolescent girls exhibit higher rates of alcohol consumption and drunkenness compared to boys. Regarding cannabis use, 30% of adolescents aged 14 to 18 have reported consumption, with significant gender differences in usage patterns [3].

Mental health issues, such as anxiety and depression, are strongly associated with poor self-perceived health and negative mood states. Inadequate sleep patterns further exacerbate these problems, as more than 40% of Spanish adolescents aged 14 to 17 do not meet the recommended eight hours of daily sleep. Sleep deprivation negatively affects academic performance, emotional regulation, and resilience while increasing susceptibility to risk behaviors, such as excessive digital technology use and substance consumption [4].

Dietary habits also play a fundamental role in adolescent health. In particular, regular breakfast consumption is associated with improved concentration, emotional regulation, and academic performance. Skipping breakfast, on the other hand, has been linked to increased susceptibility to unhealthy behaviors and risk-taking tendencies. Promoting balanced nutrition during adolescence is, therefore, a crucial strategy for enhancing overall health and well-being [5,6].

Additionally, the widespread use of digital technologies has significantly increased sedentary behavior and disrupted sleep patterns. Adolescents spend an average of 6.8 hours per day on digital devices, primarily engaging with social media and video games, which not only contribute to physical inactivity but also exacerbate mental health concerns. The interplay between these behavioral patterns underscores the need for comprehensive strategies to mitigate their impact on adolescent health [5,7].

Public health plays a crucial role in promoting adolescent well-being, not only from a preventive perspective but also as a means of youth empowerment. Encouraging healthy lifestyles from an early age is essential for reducing the incidence of chronic diseases and fostering optimal physical, emotional, and social development. Public health interventions should focus on providing educational tools and accessible resources that enable adolescents to make informed health decisions. Health education programs, community-based campaigns, and evidence-based prevention policies are key to mitigating risk factors associated with substance use, poor nutrition, physical inactivity, and excessive technology use [8,9].

Moreover, strengthening resilience and emotional intelligence through intersectoral approaches that involve families, schools, healthcare centers, and local governments can significantly enhance adolescent mental health and overall well-being [10]. In this context, empowering adolescents through well-designed public health strategies not only improves their current quality of life but also establishes a solid foundation for long-term health.

Understanding these interrelated factors—substance use, mood, sleep, nutrition, and leisure activities—is essential for developing effective public health strategies. Community-level interventions, particularly at the municipal level, offer a unique opportunity to address these challenges holistically [11,12]. Schools, primary healthcare centers, local governments, and community organizations play a fundamental role in fostering environments that promote healthy behaviors and reinforce adolescent resilience[13].

This study aims to analyze self-perceived health, mood, substance use, dietary habits, sleep patterns, and leisure activities among adolescents. Furthermore, it seeks to identify predictive markers of health-related behaviors and propose municipal-level strategies to promote overall well-being . By examining these dimensions collectively, this research contributes to the development of targeted interventions that enhance adolescent quality of life and strengthen community and public health efforts in supporting their development.

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2. Methodology

2.1. Study Design

This study employed a cross-sectional descriptive design with a quantitative approach, conducted in a municipality in the province of Barcelona during the 2023–2024 academic year. The research focused on analyzing self-perceived health, mood, sleep patterns, substance use, dietary habits, and leisure activities among adolescents aged 14 to 17, with particular emphasis on 4th-year ESO students. The primary objective was to identify predictive markers of health-related behaviors and propose municipal strategies to promote holistic well-being, contributing to the development of effective interventions aimed at improving adolescents' quality of life and strengthening community support.

2.2. Study Population

The study population consisted of 120 4th-year ESO students from the only school in the municipality. The sample size was determined to achieve a 95% confidence level and an expected response variability of 50%, ensuring adequate statistical power. The sample size was calculated based on statistical requirements to ensure reliability and generalizability within the studied population. Participants completed an online questionnaire individually and anonymously during class hours, after obtaining informed consent from their legal guardians. Participation was entirely voluntary, and data were collected confidentially to guarantee the anonymity of participants.

Of the students invited to participate, 86.3% completed the survey, resulting in a final sample of 120 participants. This response rate demonstrates a high level of engagement and provides robust data for analysis.

2.3. Ethical Procedures

The study adhered to the ethical principles established in the Declaration of Helsinki. Informed consent was obtained from legal guardians to ensure voluntary, anonymous, and confidential participation. The study was approved by the Ethics Committee of the educational institution and the Public Health Service of the municipal government (Approval No. SP:23/002, September 19, 2023). Additionally, each participant provided written informed consent prior to data collection.

2.4. Data Collection Instruments

A comprehensive online questionnaire, organized into various health-related domains, was used for data collection. The questionnaire evaluated substance use, sleep patterns, dietary habits, and leisure activities. The instruments employed included:

Self-perceived health: Likert scale ranging from 1 (very poor) to 5 (very good).

Mood: Items adapted from the Mood and Feelings Questionnaire (MFQ).

Sleep patterns: Questions addressing duration, routines, and sleep quality, based on the Pittsburgh Sleep Quality Index (PSQI).

Substance use: Items adapted from the European School Survey Project on Alcohol and Other Drugs (ESPAD).

Dietary habits: Evaluation of breakfast consumption and its quality using validated nutritional behavior questionnaires.

Leisure activities: Analysis of digital technology use and participation in physical activities.

2.5. Data Collection Procedure

Data collection was conducted between November 2023 and February 2024. The questionnaire was electronically distributed to students during class hours, ensuring standardized administration and minimizing potential response biases.

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2.6. Statistical Analysis

Descriptive statistics were calculated, including frequencies, percentages, means, and standard deviations. Pearson's chi-square test was employed to examine associations between demographic variables and health-related behaviors. To ensure the validity of statistical inferences, the following approaches were implemented:

Effect sizes (Cramer's V) were calculated for significant associations.

Odds ratios (ORs) were computed to quantify the strength of associations between categorical variables.

All analyses were performed using R statistical software (R Project for Statistical Computing), and a p-value of <0.05 was considered statistically significant. Additionally, logistic regression models were applied to identify predictors of health-related behaviors.

This methodological framework ensures robust and reliable results, providing valuable insights into the health-related behaviors of adolescents and their implications for public health strategie.

3. Results

Sample Description

The sample comprised 120 students from 4th year of Secondary Education (4th ESO) at a public high school in a town in the province of Barcelona, aged between 14 and 18 years. The average age was 15.2 years, with a gender distribution of 57.3% female and 42.7% male. Most students were native (71.8%), with 3.2% being first-generation immigrants, 16.9% second-generation immigrants, and 8.1% who did not specify their background.

Regarding family structure, 71% had a biparental family, 24.2% had a single-parent family, and 3.2% had a restructured family. Socioeconomic status was classified as high for 63.7%, medium for 29.8%, and low for 6.5%.

The educational levels of the parents showed that most had secondary education (39.1%) or university degrees (28.2%). A small percentage had no formal education (5.6%), primary education (8.5%), and 18.6% did not specify or were unsure.

The distribution of self-perceived health by gender showed no significant differences in the categories "very good" ($p = 0.620$), "good" ($p = 0.879$), or "poor/very poor" ($p = 0.723$). However, women were more likely to report "fair" health (15.9%) compared to men (7.8%), with a p-value approaching statistical significance ($p = 0.095$).

The mood state distribution shows significant differences between boys and girls, as indicated in Table 1, with a global chi-square value of 7.46 and a p-value of 0.024. Analyzing individual categories reveals that 64.7% of boys report a positive mood compared to 43.5% of girls, while 35.3% of boys report a negative mood versus 56.5% of girls. Both categories present a chi-square value of 5.98 and a p-value of 0.0144, indicating statistically significant differences. The odds ratio (OR) for a positive mood is 2.34, suggesting that boys are 2.34 times more likely to report a positive mood than girls. For a negative mood, the OR is 0.43, indicating that boys are less likely to report a negative mood compared to girls. Cramér's V value is 0.249, suggesting a moderate association between gender and mood state. Additionally, a correlation (r) of 0.436 is observed between the variables, indicating a moderate relationship

Table 1. Mood State Distribution by Gender with Chi-Square Values and Correlation Cramér's V and Odds Ratio.

Mood State	Boys (N=51)	Girls (N=69)	Total	χ^2	P-value	Cramér's V	Odds Ratio (OR)
Positive	33 (64.7%)	30 (43.5%)	63 (52.5%)	5,98	0.0144	0,223	2,34

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Negative	18 (35.3%)	39 (56.5%)	56 (47.5%)	5,98	0.0144	0,223	0,43
Global	**51 (100%)**	**69 (100%)**		**7,46**	**0.024**	**0,249**	
Correlation (r)							**0.436**

The distribution of sleep hours between boys and girls shows notable differences in certain categories, as detailed in Table 2. Although the average sleep duration is similar between boys (7.45 hours) and girls (7.60 hours), statistical analysis reveals a significant difference in the 8.5-hour sleep category. In this category, 17.6% of boys report sleeping 8.5 hours, compared to only 2.9% of girls, resulting in a chi-square (χ^2) value of 6.77 and a p-value of 0.009, indicating a statistically significant difference. The Cramér's V value for this category is 0.237, suggesting a moderate association between gender and sleep duration. Additionally, the Odds Ratio (OR) of 7.88 indicates that boys are approximately 7.88 times more likely to sleep 8.5 hours than girls. In other sleep hour categories, no statistically significant differences between genders were observed. These findings suggest that, although the average sleep duration is comparable between boys and girls, there is a significant tendency for boys to report a sleep duration of 8.5 hours more frequently than girls.

Table 2. Table of Sleep Hours Distribution.

Hours of Sleep	Boys (N=51)	Girls (N=69)	Total	χ^2	P-value	Cramér's V	Odds Ratio (OR)
<6 h	4 (7,8%)	8 (11,8%)	12 (10.0%)	0.45	0.504	0.061	0.64
6h	5 (9,8%)	8 (11,8%)	13 (10.8%)	0.10	0.749	0.029	0.83
6,5h	6 (11,8%)	7 (10,3%)	13 (10.8%)	0.06	0.810	0.022	1.19
7h	6 (11,8%)	9 (13,2%)	15 (12.5%)	0.05	0.823	0.020	0.89
7,5h	5 (9,8%)	5 (7,4%)	10 (8.3%)	0.21	0.648	0.042	1.40
8h	13 (25,5%)	12 (17,6%)	25 (20.8%)	0.86	0.355	0.085	1.61
8,5h	9 (17,6%)	2 (2,9%)	11 (9.2%)	6.77	0.009	0.237	7.88
9h	1 (2%)	6 (8,7%)	7 (5.8%)	2.34	0.127	0.139	0.21
9,5h	0 (0%)	2 (2,9%)	2 (1.7%)	1.50	0.221	0.112	-
10h	2 (3,9%)	6 (8,7%)	8 (6.7%)	1.04	0.308	0.093	0.43
>10h	0 (0%)	3 (4,3%)	3 (2.5%)	2.26	0.134	0.137	-
Global	-	-		**13.8**	**0.312**	**0.240**	-

Table 3 presents significant differences in the prevalence of addictive substance and alcohol use between male and female adolescents. The global chi-square ($\chi^2 = 58.56$) and Cramér's V (0.284) values indicate a moderate association between gender and substance use. Specifically, females exhibit higher consumption rates of hashish or marijuana (23.2% vs. 13.7% in males, $p = 0.029$), alcohol ever consumed (82.6% vs. 56.9% in males, $p = 0.003$), and alcohol use during school days (37% in females, with no reported cases in males, $p < 0.001$). Additionally, 42.1% of females have ever smoked, compared to 19.8% of males ($p < 0.001$).

Table 3. Gender Differences in the Prevalence of Addictive Substance Use (Including Tobacco) and Alcohol Among Youth.

Substance	Boys	Girls	χ^2	P-value	Cramér's V	Odds Ratio (OR)
Hashish or marijuana	13.7% (10)	23.2% (19)	4.78	0.029	0.162	0.53
Tranquilizers	5.9% (4)	11.6% (6)	2.89	0.089	0.100	0.74
Cocaine	0% (0)	1.4% (1)	1.49	0.222	0.067	-
Speed/amphetamines	0% (0)	0% (0)	N/A	N/A	N/A	-
Ecstasy	0% (0)	1.4% (1)	1.49	0.222	0.067	-
Inhalants	0% (0)	2.9% (2)	2.23	0.135	0.085	-
Alcohol (Ever Drunk	56.9% (34)	82.6% (50)	8.64	0.003	0.282	0.28

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Alcohol (During class days)	0% (0)	37% (22)	27.12	<0.001	0.612	-
Alcohol (During weekends)	21% (13)	27% (16.2)	10.21	0.001	0.180	0.72
Smoking (Ever smoked)	19.83% (24)	42.15% (51)	11.34	<0.001	0.300	0.34
Smoking (Currently smoking if smoked)	41.67% (10)	37.25% (19)	0.38	0.539	0.045	1.20
Global	-	-	**58.56**		**0.284**	

Table 4: Gender Differences in Physical Activity Among Adolescents reveals distinct patterns of physical activity participation between boys and girls. The data indicate that 66.7% of boys engage in both sports and physical activities, compared to 49.3% of girls, suggesting a higher inclination towards regular physical activity among male adolescents. Conversely, a higher percentage of girls (15.9%) participate exclusively in sports, in contrast to 5.9% of boys. No significant differences were found in exclusive participation in non-sport physical activities or in the total absence of physical activity between genders.

Table 4. Gender Differences in Physical Activity Among Adolescents.

Physical Activity	Boys	Girls	χ^2	P-value	Cramér's V	Odds Ratio (OR)
Sports and physical activity	66.7% (66)	49.3% (49)	4.14	0.042	0.144	2.06
Sports	5.9% (5)	15.9% (15)	4.70	0.030	0.154	0.33
Physical activity	15.7% (15)	17.4% (17)	0.11	0.740	0.024	0.88
No sports or physical	11.8% (11)	17.4% (17)	1.17	0.280	0.077	0.63
global	-	-	**10.12**		**0.226**	

In Table 5: Gender Differences in Night Out Frequency and Return Times Among Adolescents, the data reveal identical proportions of boys and girls across all categories of night outings, with no statistically significant differences (p=1.000). Specifically, 29.0% of both boys and girls report never going out at night, while 7.3% of each group go out more than twice a week. Regarding return times, the majority of participants return home before midnight or between midnight and 2 AM (29.8%), with negligible differences between genders.

Given the identical distributions, statistical measures such as Odds Ratios (OR), chi-square (χ^2) tests, and Cramér's V were not calculated. The chi-square test and Cramér's V assess the association between categorical variables; however, when the observed frequencies are identical across groups, the expected and observed counts are the same, resulting in a χ^2 value of zero and a Cramér's V of zero, indicating no association. Similarly, the OR compares the odds of an event occurring between two groups; with equal proportions, the OR equals one, signifying no difference in odds between groups

Table 5. Gender Differences in Night Out Frequency and Return Times Among Adolescents.

Night Out Frequency	Boys	Girls	P-value
>2 nights/week	7.3% (7)	7.3% (7)	1.000
2 nights/week	20.2% (20)	20.2% (20)	1.000
1 night/week	17.7% (17)	17.7% (17)	1.000
1-3 nights/month	10.5% (10)	10.5% (10)	1.000
<1 night/month	15.3% (15)	15.3% (15)	1.000
Never	29.0% (29)	29.0% (29)	1.000

Analyzing Table 6, which compares breakfast habits before leaving home and mid-morning between adolescent boys and girls, reveals that a slightly higher percentage of boys (54.9%) eat breakfast daily compared to girls (47.8%). However, this difference is not statistically significant (p=0.4898; χ^2=3.422). The Cramér's V value is 0.198, indicating a weak association between gender

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and the frequency of breakfast consumption before leaving home. Regarding mid-morning breakfast, 56.9% of boys and 50.7% of girls consume it daily, showing greater variability among girls; however, these differences are also not statistically significant (p=0.1398; χ^2=6.927). The Cramér's V of 0.282 suggests a weak association between gender and the frequency of mid-morning breakfast. These findings indicate no significant differences in breakfast habits between adolescent boys and girls, suggesting that other factors, such as socioeconomic status or family routines, may have a greater influence on these behaviors.

Table 6. Comparison of Breakfast Habits Before Leaving Home and Mid-Morning Between Boys and Girls.

Breakfast Habits Before Leaving Home					
Night Out Frequency	**Boys**	**Girls**	**P-value**	**χ^2**	**V de Cramér**
Every day	28 (54.9%)	33 (47.8%)			
4-6 times	4 (7.8%)	6 (8.7%)			
1-3 times	7 (13.7%)	7 (10.1%)	0.4898	0,480	0,077
Never	11 (21.6%)	23 (33.3%)			
NS/NC	1 (2.0%)	0 (0.0%)			
Global	51 (100%)	69 (100%)	**0,4898**	**3,422**	**0,198**
How many times a week do you have a mid-morning breakfast					
Every day	29 (56.9%)	35 (50.7%)			
4-6 times	10 (19.6%)	18 (26.1%)			
1-3 times	5 (9.8%)	12 (17.4%)	0.1398	0,480	0,077
Never	9 (17.6%)	4 (5.8%)			
NS/NC	1 (2.0%)	0 (0.0%)			
Global	**51 (100%)**	**69 (100%)**	**0.1398**	**6,927**	**0,282**

4. Discussion

The results of this study provide important data on adolescent health, behavior and lifestyle patterns, revealing significant differences between genders and areas requiring intervention. It examines the prevalence of substance use, physical activity, sleep patterns and leisure activities among adolescents, offering critical insights into gender-specific differences and broader behavioral trends. The results contribute to a comprehensive understanding of these behaviors and their implications for health promotion strategies.

One of the most concerning findings is the higher prevalence of substance use among adolescent girls compared to boys. Girls show significantly higher rates of marijuana (23.2% vs. 13.7%, p=0.029), alcohol (82.6% vs. 56.9%, p=0.003) and tobacco (42.15% vs. 19.83%, p<0.001) use compared to boys. This contrasts with previous studies that have traditionally reported higher rates of use in adolescent boys [14].This shift in consumption patterns may reflect changing social norms and peer pressures specifically affecting adolescent girls. Further research is needed to understand the factors underlying this trend and to develop preventive interventions specifically targeting girls [15].

The most common substance uses in childhood and adolescence have to do with alcohol and cannabis. Despite alcohol use declined along with that of tobacco, alcohol remains by far the most psychoactive substance used by adolescents. More than one-third of adolescents' report having used alcohol in the past 30 days, while 9% report having used it at least once per week in the past year. Most adolescents have their first experiences with tobacco and alcohol between the ages of 13 and 15. In this study, Girls exhibit significantly higher rates of alcohol, even drinking alcohol during class days, and tobacco use compared to boys. This finding aligns with previous research, indicating a shift in consumption patterns influenced by evolving social norms and peer pressures [16].

School-based activity should highlight the importance of the developmental perspective when designing and delivering school-based prevention programs, as heavy cannabis use impairs memory, learning, recall, attention, problem solving, reasoning skills and intelligence. Experimental studies

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suggest that the epigenetic effects of cannabinoids may impair myelination of the pubertal brain [17]. In this study, higher substance use in girls underlines the need for targeted prevention campaigns, integrating gender-sensitive approaches to address specific vulnerabilities

The disparity in physical activity levels, where 17.4% of girls report inactivity compared to 11.8% of boys, reflects persistent barriers to participation among girls. These barriers may include cultural norms, reduced access to sports programs, or social perceptions of athletic participation. Encouraging inclusive physical activity initiatives is critical to bridging this gap and fostering long-term health benefits for all adolescents [18]. The World Health Organization emphasizes that physical activity of any intensity, including light physical activity, is fundamental in transitioning from sedentary behavior to an active lifestyle, resulting in health benefit [19]. Light physical activity could thus serve as a gateway to more intense activities. However, recommendations for moderate to vigorous physical activity should be made to achieve more significant metabolic impacts on adolescent health. Addressing the decline in physical activity and participation among adolescent girls has become a public health priority. The "Girls in Sport" initiative, a multi-component school intervention implemented in urban, regional, and rural areas of New South Wales, Australia, exemplifies efforts to tackle this issue [18]. With a sample of 1,769 participants, the intervention aimed to promote physical activity among adolescent girls. However, the results were not as favorable as anticipated, primarily due to implementation challenges in most participating schools. Only 4 out of 12 schools achieved the set objectives, highlighting the crucial role of effective intervention presentation and school commitment in ensuring program success. This underscores the complexity of implementing physical activity interventions and the need for comprehensive strategies that address not only individual barriers but also institutional and systemic challenges in promoting adolescent girls' participation in physical activities [20].

Adolescence is a period of life characterized by biopsychosocial, cognitive, and behavioral changes that affect individuals throughout their lives [21]. Among these changes, a notable alteration in the sleep-wake cycle can be observed, with a predisposition toward a later cycle, leading to a delay in the circadian rhythm, along with a reduction in sleep quality and total sleep duration [22]. Although overall sleep duration is similar between genders (7.45 hours for boys and 7.60 hours for girls), a significant variation is observed in the 8.5-hour sleep category ($p=0.0090$). This suggests the existence of a subgroup of adolescents experiencing specific challenges. The literature has shown that most adolescents fail to meet public health recommendations, which include at least 60 minutes of moderate to vigorous physical activity, between eight and 10 hours of sleep, and a maximum of two hours of screen time per day. While total sleep duration shows minimal differences between genders, the significant variation in the 8.5-hour sleep category further supports the existence of a possible subgroup of adolescents facing unique challenges, possibly related to digital technology use or academic [20,23].

School systems provide opportunities for influencing dietary intake as well as for educating future generations on diet and nutrition [24].

The importance of nutrition, the short- and long-term consequences of inadequate nutrition, and the current global status of nutrition must be one of the major focusses of attention in the school age years [22].In this study, although not statistically significant, a gender difference is observed: boys tend to have breakfast more regularly before leaving home (54.9% vs. 47.8% of girls), while girls are more likely to skip breakfast entirely (33.3% vs. 21.6% of boys). Milosavljević study' point that breakfast skipping is an often-dietary habit in adolescents because of overweight. Overweight is more frequent in boys and underweight is worrying for the matter of eating disorders girls [26].

The habit of eating few meals a day or not knowing what to eat for breakfast is a public health issue driven by various factors: students from families with low educational levels, attending subsidized schools, repeating grades, lacking reading habits, or spending significant time with friends, among others, may contribute to these challenges [27].

Adolescents represent a population group particularly vulnerable to addiction, underscoring the need for comprehensive school-based prevention programs. The findings of this study reinforce

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the importance of developmental perspectives in designing interventions that address substance use, physical activity, sleep hygiene, and dietary habits. A multifaceted public health approach is required, incorporating individual, familial, and institutional strategies to create supportive environments that foster healthy adolescent development. The integration of school-based education, community engagement, and policy-driven initiatives will be essential in mitigating the long-term health risks associated with these behavioral patterns [28]. In this study, higher substance use in girls underscores the necessity of targeted prevention campaigns, integrating gender-sensitive approaches to address specific vulnerabilities.

5. Conclusions

This study highlights the urgent need for gender-sensitive public health strategies that address the social, behavioral, and environmental determinants of adolescent health. A multidisciplinary, evidence-based approach is essential to mitigating risk factors and fostering sustainable well-being.

Key priorities include targeted substance use prevention programs that consider gender-specific vulnerabilities, peer influence, and psychological factors. Educational institutions must lead early interventions, ensuring tailored strategies for both boys and girls. Additionally, dismantling barriers to girls' participation in sports requires equitable access to facilities and inclusive physical education. Community mentorship programs can further empower participation.

Sleep hygiene education is critical, with schools, families, and healthcare professionals collaborating to reduce sleep disturbances through digital device management, stress reduction, and structured sleep routines. Nutritional habits also require attention, particularly addressing breakfast skipping and ensuring access to balanced meals across socioeconomic backgrounds.

Notably, the rising prevalence of alcohol and tobacco use among girls underscores the need for early education, resilience-building, and stricter substance control policies. Structural reforms in sports and recreation are necessary to close the gender gap in physical activity, with inclusive role models and equitable opportunities. In conclusion, adolescent health requires a coordinated, interdisciplinary approach. Policymakers, educators, families, and healthcare professionals must implement gender-responsive, evidence-based strategies that promote early intervention, education, and equitable access to health resources, ultimately shaping healthier future populations.

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Institutional Review Board Statement: The study was approved by the Ethics Committee of the educational institution and the Public Health Service of the Municipal Government, with approval number SP:23/002 (September 19, 2023). Each participant signed a written informed consent.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent was signed by the parents or legal guardians of the students, in addition to the municipal public health service of the municipality.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest: The authors declare that they have no conflicts of interest.

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