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ORIGINAL ARTICLE

Adolescent health indicators in Mercosur countries: Analysis of school survey data

Indicadores de saúde dos adolescentes nos países do Mercosul: análise dos dados de inquéritos escolares

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ABSTRACT Risk behaviours in adolescence have a short- and long-term impact on health. Analysing health data from the Southern Common Market (Mercosur) countries can strengthen surveillance and support public policies. To compare the prevalence of health indicators among adolescents in Mercosur countries. A descriptive study was conducted using data from the Global School-based Student Health Survey in Argentina (2018), Paraguay (2017), and Uruguay (2019), as well as from the National Survey of School Health in Brazil (2015 and 2019). Prevalence and 95% confidence intervals of indicators were analysed for the total adolescent population and by gender. Alcohol experimentation before the age of 14 was higher in Argentina, while drunkenness was higher in Brazil. Current cigarette smoking and any tobacco product use were higher in Argentina. Regular physical activity was lower in Brazil. Sedentary behaviour was higher in Uruguay. Brazil had the lowest condom use at last sexual intercourse. There were differences in health risk behaviours among adolescents in the studied countries. These results can assist governmental entities in these countries in promoting the exchange of best practices.

KEYWORDS Adolescent health. Health risk behaviors. Health surveys. Mercosur. Public health surveillance.

RESUMO *Comportamentos de risco na adolescência impactam a saúde de curto e longo prazo. A análise de dados de saúde dos países do Mercado Comum do Sul (Mercosul) pode fortalecer a vigilância e apoiar políticas públicas. Objetivou-se comparar as prevalências de indicadores em saúde de adolescentes nos países do Mercosul. Estudo descritivo, com dados do 'Global School-based Student Health Survey' na Argentina (2018), no Paraguai (2017) e no Uruguai (2019), e da 'Pesquisa Nacional de Saúde do Escolar' no Brasil (2015 e 2019). Analisaram-se as prevalências e os intervalos de confiança de 95% de indicadores para a população total de adolescentes e segundo o gênero. A experimentação do álcool antes dos 14 anos foi maior na Argentina enquanto a embriaguez foi maior no Brasil. O consumo atual de cigarro e o uso de qualquer produto do tabaco foram mais elevados na Argentina. A prática regular de atividade física foi menor no Brasil, já o comportamento sedentário foi maior no Uruguai. O Brasil teve o menor uso de preservativo na última relação sexual. Houve diferenças dos comportamentos de risco para saúde entre os adolescentes dos países estudados. Os resultados podem auxiliar entidades governamentais desses países a promoverem intercâmbio de boas práticas.*

PALAVRAS-CHAVE *Saúde do adolescente. Comportamentos de risco à saúde. Inquéritos epidemiológicos. Mercosul. Vigilância em saúde pública.*

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Introduction

Around 40 million adolescents aged between 10 and 19 live in the Southern Common Market (Mercosur) countries (Argentina, Brazil, Paraguay and Uruguay), which represents almost 40% of the adolescent population in Latin America and the Caribbean[1]. These countries differ in the way they offer health services, as well as in their political and administrative organisation. All of this has an impact on the population's way of life and health[2], especially in adolescence because it is a phase of physical and psychological transformation that is influenced by the social, economic, cultural and family context[3].

These scenarios can predispose adolescents to new experiences and health risk behaviours, such as drug use, sedentary lifestyles, risky sexual behaviour and accidents[3]. These behaviours are the main precursors to the development of various diseases and illnesses, contributing to an increase in morbidity and mortality among young people[4].

Globally, adolescents have demonstrated multiple behavioural risk factors. A study of 89 countries showed that 34.9% of adolescents had three or more simultaneous behavioural risk factors, and in the Americas, the prevalence was 56.2%[4]. Many of these factors are related, for example, to Chronic Non-Communicable Diseases (CNCDs), the main causes of death in the world[5], with a higher occurrence in low- and middle-income countries[6]. Although these deaths are concentrated in adulthood, risk factors for NCDs have been observed among children and adolescents[7].

In view of this, international efforts have been made to support the development of policies and programmes for health promotion and disease prevention among adolescents, as well as the monitoring of risk factors and diseases. From this perspective, the Mercosur countries have also dedicated themselves to the process of adolescent health surveillance through epidemiological surveys, such as the Global School-based Student Health Survey (GSHS)[8], and in Brazil, with the National School Health Survey (PeNSE)[9], which is similar in scope to the GSHS.

This makes it possible to analyse and compare the main health indicators of adolescents that predispose them to the main causes of morbidity and mortality. In this way, it is possible to prioritise interventions based on identified health problems, promote the reduction of inequalities and support future analyses to delve deeper into the causes or factors involved in risk behaviours. The integration provided by Mercosur goes beyond the initial objectives based on economics and encompasses the social and health dimensions. In this context, this international agreement also aims to exchange and jointly implement health care actions based on information representative of their populations of interest, mainly from epidemiological surveys[10].

This study is also aligned with the 2030 Agenda[11], which has specific targets for improving the health and well-being of adolescents, making it essential to monitor, compare and share strategies in favour of a global effort for this public. Therefore, analysing the health data of these countries with a focus on adolescents helps to strengthen their surveillance systems, learn about the health situation and collaborate in the development of effective public policies for health promotion and disease and illness prevention. The aim was therefore to compare the prevalence of adolescent health indicators in the Mercosur countries.

Material and methods

Study design

Cross-sectional study, with secondary analysis of data from the GSHS conducted in Argentina in 2018, Paraguay in 2017 and Uruguay in 2019, and the PeNSE carried out in Brazil in 2015 and 2019.

THE GSHS

The GSHS was developed in 2003 by the World Health Organisation (WHO) at the US Centers for Disease Control and Prevention (CDC)[12]. The survey comprises ten thematic modules on the main aspects influencing adolescent health, at least six of which need to be investigated by the participating countries[12].

Argentina, Uruguay and Paraguay were supported by the Pan American Health Organisation (PAHO)/WHO and the CDC for the development of the survey. In Argentina, three editions (2007, 2012 and 2018) of the Encuesta Mundial de Salud Escolar (EMSE) were carried out. The survey was developed by the Argentine Ministry of Health and Social Development, with the collaboration of the National and Provincial Ministries of Education[13]. In Uruguay, there have also been three editions of EMSE (2006, 2012 and 2019), developed by the country's Ministry of Public Health and Ministry of Social Development[14]. In Paraguay, EMSE was developed for the first time in 2017 by the country's Ministry of Public Health and Social Welfare and the Ministry of Education and Sciences, also supported by PAHO/WHO and the CDC[15]. The most recent surveys in each country were representative of adolescents aged 13 to 17.

THE PENSE

In Brazil, PeNSE is carried out by the Brazilian Institute of Geography and Statistics (IBGE) at the Ministry of Health, with four editions (2009, 2012, 2015 and 2019). Its questionnaire addresses aspects of adolescent health, such as risk and protective factors for their health, use of services, among others[9]. In the 2015 edition, PeNSE carried out two different sampling plans: a representative sample of students in the 9th year of primary school, ensuring comparability with previous years, and a second sample (sample 2) of students aged 13 to 17, to generate data comparable to the GSHS[16]. In 2019, the sample was representative of school-age children aged 13 to 17[17].

Study population and PeNSE and GSHS sampling

The data came from questionnaires answered by adolescents aged 13 to 17 who were attending class and who were recruited through a standardised sample selection process with a common methodology[12,16,17]. The surveys in the aforementioned countries had two-stage cluster sampling plans, with schools corresponding to the first stage of selection and classes of students enrolled in the second. All the students in the selected classes were invited to take part in the survey, and those who agreed made up the student sample[12,16,17].

PeNSE and GSHS data collection

In both surveys, the questionnaire was self-applied during a class period. In Brazil, data was collected using a smartphone[16,17]. The other countries used scannable paper questionnaires filled in by pencil[12]. The response rates for schools, students and the number of students participating in each country can be seen in *table 1*. Estimates of the Brazilian response rates were calculated based on the expected, collected, and validated values. For this study, we used the data available on the GSHS[18] and PeNSE[9] platforms.

Table 1. School and student response rates and number of participants from Argentina, Paraguay, Uruguay and Brazil, 2015, 2017, 2018 and 2019

	Argentina	Paraguay	Uruguay	Brazil	Brazil
	2018	2017	2019	2015*	2019
School response rate	86%	100%	94%	97.6%	97.3%
Student response rate	74%	87%	69%	84.9%	84.7%
Total number of students who participated (valid questionnaires)	56,981	3,149	3,162	10,926	159,245

Source: Own elaboration with information from PAHO/WHO, 2017, 2018, 2019, 2020[12]; and IBGE[9], 2016, 2021.

* Sample 2.

Variables in this study

The description of the variables is shown in *box 1* (health indicators of adolescents participating in the GSHS and PeNSE), whose answers were dichotomized (yes/no).

Box 1. Description of the health indicators of adolescents participating in the GSHS and PeNSE, Argentina, Paraguay, Uruguay and Brazil, 2015, 2017, 2018 and 2019

Indicator	Description
Alcoholic Beverages	
Current alcohol consumption	Students who drank alcohol recently (at least one dose of alcohol on at least one day in the last 30 days before the survey) (%)
Early experimentation with alcohol (before the age of 14)	Students who consumed alcohol before the age of 14 for the first time among students who have already drunk alcohol (%)
Episodes of drunkenness in life	Students who have consumed alcohol excessively to the point of getting drunk one or more times in their life (%)
Smoking	
Current cigarette consumption	Students who used cigarettes recently (smoked cigarettes at least one day in the last 30 days before the survey) (%)
Use of any tobacco product	Students who have used any tobacco product recently (used any tobacco product at least one day in the last 30 days before the survey) (%)
Physical Activity	
Regular practice of physical activity	Students who were physically active for at least 60 minutes a day in the 7 days prior to the survey (%)
Participation in physical education classes	Students who attended physical education class three or more days a week during the school year (%)
Sedentary behaviour	Students who spent three or more hours a day sitting watching television, playing computer games or talking to their friends when they weren't at school or doing homework during a typical day (%)
Mental Health	
Absence of close friends	Students who had no close friends (%)

Box 1. Description of the health indicators of adolescents participating in the GSHS and PeNSE, Argentina, Paraguay, Uruguay and Brazil, 2015, 2017, 2018 and 2019

Indicator	Description
Sexual Practices	
Had sexual intercourse in life	Students who have had sexual intercourse (%)
Early sexual initiation (before the age of 14)	Students who had sexual intercourse for the first time before the age of 14 among students who had already had sexual intercourse (%)
Condom use during last sexual intercourse	Students who used a condom during their last sexual intercourse among students who have never had sexual intercourse (%)
Violence and Severe Injury	
Involvement in a physical fight	Students who were involved in a physical fight one or more times in the last 12 months before the survey (%)
Presence of severe injury	Students who were severely injured one or more times in the last 12 months before the survey (%)

Source: Own elaboration with information from PAHO/WHO, 2020[12].

Analysing the data from this study

For all the indicators, the prevalence rates and their respective 95% Confidence Intervals (CI) were analysed for the total population of school-age children, considering gender (female and male) for each country. The comparison between the countries' prevalence rates was made using the 95% CI, considering the non-occurrence of overlapping intervals as statistically significant differences.

Due to the change in the structure of some questions in the PeNSE questionnaire, the 2015 edition was used to keep the comparison between the variables of interest: regular Physical Activity (PA), involvement in a physical fight and report of serious injury. For the others, the 2019 edition was used.

The health indicators for adolescents in each country were organised in Microsoft Excel spreadsheets version 16®, and the PeNSE data was analysed in Stata, version 14.2, using the survey module, which considers post-stratification weights.

Ethical aspects of the GSHS and PeNSE

All the countries that carry out the GSHS obtain ethical approvals from their national government agencies and institutional ethics committees. The PeNSE editions were approved by the National Research Ethics Committee. Students who agreed to take part in the surveys signed an informed consent form. For the GSHS, passive parental consent was also obtained. In the case of this study, the data used is in the public domain and is available on the platforms mentioned, without the need for prior authorisation for use.

Results

The characterisation of the gender and age group of the adolescents participating in the surveys in each country can be seen in *table 2*.

Table 2. Description of the characteristics of the adolescents who took part in the GSHS and PeNSE, 2015, 2017, 2018 and 2019.

	Argentina	Paraguay	Uruguay	Brazil	Brazil
	(GSHS) 2018	(GSHS) 2017	(GSHS) 2019	(PeNSE) 2015	(PeNSE) 2019
Sex					
Male	48%	48.8%	45.2%	50.3%	49.3%
Female	52%	51.2%	54.8%	49.7%	50.7%
Age					
13 to 15 years old	67.7%	56.3%	52.1%	61.9%	64.7%
16 to 17 years old	31.5%	33.4%	37.6%	38.1%	35.3%

Source: Own elaboration with information from PAHO/WHO, 2017, 2018, 2019, 2020[12]; and IBGE[9], 2016, 2021.

Regarding current alcohol consumption, the highest prevalence rates were among adolescents in Argentina (54.1%; 95% CI 52.7-55.4%) and Uruguay (54.6%; 95% CI 51.6-57.5%). School-age children in Argentina had a higher prevalence of early alcohol experimentation (65.7%; 95% CI 64.3-67%) while the prevalence of drunkenness was higher in Brazil (47%; 95% CI 46-47.9%) (*table 3*).

Table 3. Distribution of the prevalence of health indicators among adolescents aged 13 to 17, of both sexes, in Mercosur countries, 2015, 2017, 2018 and 2019.

	Argentina	Paraguay	Uruguay	Brazil
	2018	2017	2019	2019/2015
	% (IC95%)	% (IC95%)	% (IC95%)	% (IC95%)
Alcoholic drinks				
Current consumption of alcoholic beverages	54.1 (52.7-55.4)	35.7 (32-39.7)	54.6 (51.6-57.5)	28.1 (27.3-28.8)
Early experimentation with alcohol (before the age of 14)	65.7 (64.3-67)	46.5 (41, 3- 51.9)	55.2 (50.7-59.5)	34.6 (33.8-35.3)
Episodes of drunkenness in life	37.3 (35.6-39)	22.5 (19.7-25.7)	40.2 (37.2-43.3)	47 (46-47.9)
Smoking				
Current cigarette consumption	19 (18-20)	**	13 (10.9-15.3)	6.8 (6.3-7.3)
Use of any tobacco product	20.4 (19.4-21.5)	**	14.1 (11.9-16.7)	12.3 (11.8 – 12.9)
Physical activity				
Regular practice of physical activity	16.5 (15.8-17.3)	17.2 (15-19.7)	13.8 (12.1-15.6)	7.6 (6.9-8.4)*
Participation in physical education classes	37.5 (35.9-39)	20.2 (17.4-23.4)	26.6 (23.5-30.1)	8.9 (8.3-9.5)
Sedentary behaviour	55.3 (53.6-57)	35.1 (30.2-40.4)	62.9 (61-64.8)	53.1 (52.3-54)
Mental health				
Absence of a close friend	5.6 (5.2-5.9)	5.7 (4.6-6.9)	5.9 (4.8-7.1)	4 (3.7-4.3)

Table 3. Distribution of the prevalence of health indicators among adolescents aged 13 to 17, of both sexes, in Mercosur countries, 2015, 2017, 2018 and 2019.

	Argentina	Paraguay	Uruguay	Brazil
	2018	2017	2019	2019/2015
	% (IC95%)	% (IC95%)	% (IC95%)	% (IC95%)
Sexual behaviour				
Had sexual intercourse in life	41.9 (39.9-44)	29.5 (25.5-33.9)	44.7 (40.7-48.7)	35.4 (34.5-36.3)
Early sexual initiation (before the age of 14)	35.9 (34.1-37.8)	23.5 (19.5-27.9)	25.8 (21.8-30.3)	36.6 (35.5-37.7)
Condom use during last sexual intercourse	78.3 (76.9-79.5)	74.7 (71.5-77.7)	78.4 (74.6-81.7)	59.1 (58-60.3)
Violence or unintentional injury				
Involvement in a physical fight	24.6 (23.4-25.9)	18.8 (16.2-21.7)	18.6 (17.2 -20.1)	21.4 (20.2-22.5)*
Presence of serious injury	33.2 (32.3-34)	36.4 (33.8-39.1)	35.5 (33.1-38)	12.8 (11.7-13.9)*

Source: Own elaboration. 2024.

* PeNSE 2015. ** Data unavailable.

Current cigarette consumption and the use of any tobacco product were highest among school-age children in Argentina (19%; 95% CI 18-20% and 20.4%; 95% CI 19.4-21.5% respectively). Brazil, on the other hand, had the lowest prevalence of cigarette use (*table 3*). These results require caution due to the lack of data from Paraguay.

Regular PA practice (7.6%; 95% CI 6.9-8.4%) and participation in physical education classes (8.9%; 95% CI 8.3-9.5%) were less prevalent among Brazilian adolescents. Sedentary behaviour was more prevalent among Uruguayan adolescents (62.9%; 95% CI 61-64.8%) (*table 3*).

Regarding mental health, the absence of a close friend was lower among Brazilian adolescents (4%; 95% CI 3.7-4.3%). Regarding sexual behaviour, the lowest prevalence of adolescents who had had sexual intercourse in their lifetime was in Paraguay (29.5%; 95% CI 25.5-33.9%), as well as the lowest occurrence of early sexual initiation (23.5%; 95% CI 19.5-27.9%), followed by adolescents from Uruguay (25.8%; 95% CI 21.8-30.3%). In Brazil, there was the lowest prevalence of condom use at last intercourse (59.1%; 95% CI 58-60.3%) (*table 3*).

The prevalence of involvement in a physical fight was higher in Argentina (24.6%; 95% CI 23.4-25.9%), and the report of severe injury was lower in Brazil (12.8%; 95% CI 11.7-13.9%) (*table 3*).

According to gender, current alcohol consumption was more prevalent among girls in Uruguay (58.3%; 95% CI 55.1-61.3%) compared to boys (49.7%; 95% CI 45.9-53.6%). A comparable situation occurred in Brazil (30.1%; 95% CI 29.2-31% among girls and 26%; 95% CI 25-26.9% among boys). The prevalence of early experimentation with alcoholic beverages was lower among male adolescents in Brazil (32.3%; 95% CI 31.5-33.2%) and higher among adolescents of the same gender in Argentina (69.2%; 95% CI 67.5-70.9%). Episodes of drunkenness were similar between genders in each country (*table 4*).

Table 4. Distribution of the prevalence of health indicators among adolescents aged 13 to 17 in Mercosur countries, stratified by gender

	Argentina 2018 % (IC95%)		Paraguay 2017 % (IC95%)		Uruguay 2019 % (IC95%)		Brazil 2019/2015 % (IC95%)	
	Female	Male	Female	Male	Female	Male	Female	Male
Alcoholic drinks								
Current alcohol consumption	55.7 (54.2-57.2)	52.3 (50.6-54.1)	35.4 (31.4-39.6)	35.8 (31.5-40.3)	58.3 (55.1-61.3)	49.7 (45.9 -53.6)	30.1 (29.2-31)	26 (25-26.9)
Early experimentation with alcohol (before the age of 14)	62.4 (60.5-64.3)	69.2 (67.5-70.9)	46.8 (40.8-52.9)	46.7 (41.2-52.3)	54 (48.6-59.3)	56.6 (52-61.2)	36.8 (35.7-37.8)	32.3 (31.5-33.2)
Episodes of drunkenness in life	38.8 (37.2-40.4)	35.6 (33.3-37.9)	22.3 (19.5-25.4)	22.7 (18.9-27)	43.2 (39.6-46.8)	36.3 (32.7-40.1)	47.6 (46.5-48.8)	46.2 (45.1-47.3)
Smoking								
Current cigarette consumption	20.5 (19.3-21.8)	17.2 (16-18.4)	**	**	15.1 (12.5-18.1)	10.3 (8.4-12.5)	6.5 (5.8-7.2)	7.1 (6.6-7.6)
Use of any tobacco product	21.8 (20.5-23)	18.8 (17.6-20.1)	**	**	16.1 (13.3-19.5)	11.6 (9.6-13.8)	12 (11.2 – 12.8)	12.8 (12.2-13.5)
Physical activity								
Regular practice of physical activity	12.9 (12.2-13.6)	20.4 (19.3-21.4)	12.1 (10.3-14.3)	22.4 (19.1-26.1)	9.5 (7.7-11.6)	18.8 (15.7-22.4)	3.1 (2.2-4.3)*	10 (8.5-11.7)*
Participation in physical education classes	34.9 (33-36.7)	40.3 (38.6-41.9)	14.9 (11.8-18.6)	25.6 (22.1-29.6)	26.4 (22.8-30.4)	27.1 (23.7-30.9)	7.8 (7.3-8.4)	10.1 (9.3-10.9)
Sedentary behaviour	57.7 (55.9-59.5)	52.8 (51-54.7)	37.9 (32.5-43.6)	32.4 (27.2-38.1)	61.8 (59.2-64.2)	64.3 (61.3-67.2)	54.3 (53.4-55.2)	51.9 (50.8-53)
Mental health								
Absence of a close friend	5.3 (4.8-5.8)	5.9 (5.4-6.4)	6.6 (5.1-8.5)	4.7 (3.4-6.6)	5.8 (4.6 -7.3)	5.8 (4.2-8.1)	3.8 (3.4-4.1)	4.2 (3.8-4.6)
Sexual behaviour								
Had sexual intercourse in life	36.3 (34.2-38.4)	48.1 (45.7-50.4)	20.4 (17.2-24.1)	38.9 (33.5-44.7)	43.8 (39.5-48.2)	45.2 (40.8-49.7)	31 (30-32.1)	39.9 (38.8-41.1)
Early sexual initiation (before the age of 14)	25.7 (24.1-27.3)	44.1 (41.1-47.1)	17.1 (12.7-22.7)	26.7 (22.1-31.9)	20.5 (16.2-25.7)	32 (27-37.5)	26.5 (24.8-28.1)	44.7 (43.4-46.1)
Condom use during last sexual intercourse	73.9 (72.4-75.4)	81.9 (80.1-83.5)	70.8 (64.7-76.2)	76.4 (72.3-80)	72.1 (67.6-76.2)	85.8 (81.5-89.3)	54.3 (53.7-56)	63 (61.7-64.3)
Violence or serious injury								
Involvement in a physical fight	16.5 (15.2-17.9)	33.3 (31.5-35.1)	12.2 (9.8-15)	25.3 (22-29)	10.7 (9.2-12.4)	28 (25.2-31)	14 (12.6-15.3)*	28.7 (27-30.3) *
Serious injury	28.4 (26.9-29.9)	38.3 (36.6-40.1)	29.6 (26.6-32.8)	43.2 (39.8-46.7)	33.1 (29.8-36.7)	38 (35.1- 41)	16.7 (14.8-18.6)*	15 (13.5-16.5)*

Source: Own elaboration (2024) with information from PAHO/WHO, 2017, 2018, 2019, 2020[12], and IBGE 2016, 2021[9].

* PeNSE 2015. ** Data unavailable.

The prevalence of current cigarette consumption (20.5%; 95% CI 19.3-21.8%) and the use of any tobacco product (21.8%; 95% CI 20.5-23%) were higher among Argentinian girls (note the absence of these data in Paraguay).

Regular PA practice was higher among boys in all countries. Participation in physical education classes was also higher among boys in Argentina, Paraguay, and Brazil. There was a gender difference in sedentary behaviour, which was higher among Argentinian girls

(57.7%; 95% CI 55.9-59.5%) and Brazilian girls (54.3%; 95% CI 53.4-55.2%).

The absence of close friends had similar prevalence rates in both genders in all countries. Regarding sexual behaviour, boys in Argentina, Paraguay and Brazil had the highest prevalence of sexual intercourse in life compared to girls. Early sexual intercourse and condom use were higher among boys in Argentina, Brazil, and Uruguay.

Boys reported more physical fights than girls in all countries. Reports of severe injury were more frequent among boys in Argentina (38.3%; 95% CI 36.6-40.1%) and Paraguay (43.2%; 95% CI 39.8-46.7%).

Discussion

Argentinian and Uruguayan adolescents showed higher rates of experimentation and recent alcohol consumption, and more episodes of drunkenness were reported by Brazilians. The prevalence of smoking was higher in Argentina and significantly lower among adolescents in Brazil. The practice of regular PA and participation in physical education classes were also lower among adolescents from Brazil. Uruguayans were the ones who showed the most sedentary behaviour, and Paraguayan adolescents showed the lowest prevalence of sexual intercourse in their lives. Brazilians, on the other hand, reported less condom use during their last sexual encounter. Involvement in physical fights was higher in Argentina, and the occurrence of serious injury was lower in Brazil.

Regarding gender differences, girls had a higher prevalence of recent alcohol consumption (except in Paraguay). As for sexual behaviour in Argentina, Paraguay and Brazil, there were more reports of sexual intercourse throughout life compared to girls. Early sexual initiation and condom use were more frequent among boys in Argentina, Brazil and Uruguay. Boys also showed a higher prevalence of involvement in physical fights and regular PA practice.

More than half of Uruguayan and Argentinian adolescents reported recent alcohol consumption. This is double the general prevalence (25%) in a study of 57 low- and middle-income countries in the world[19]. In Argentina, although there are interventions to control alcoholic beverages for this public, there isn't really a national policy, with legal regulations on alcohol sponsorship and restrictions on local sales[20]. Uruguay emphasises the availability, ease of access and tolerance of alcohol consumption as part of a culture of collective pleasure[21].

The same pattern of alcohol use between countries was observed when comparing adolescents by gender. However, there was a higher prevalence of current alcohol consumption among Uruguayan, Argentinian and Brazilian women, which has also been observed in European studies[20]. The increase in alcohol consumption among adolescent girls may be related to greater social tolerance[22], marketing incentives[23] and social media[24].

In Argentina, early alcohol consumption was also higher, which corroborates a previous study in the country[25]. Although the legal age is 18 and over, alcohol is easily accessible and is the most consumed substance among school-age children[25]. These findings may be related to its widespread social acceptance not only in Argentina, but also in Brazil and in most other countries[3], which highlights the flaws in controlling alcohol consumption among adolescents.

On the other hand, the highest prevalence of reported episodes of drunkenness in life was observed among Brazilian adolescents, who have even shown an increase in this practice in recent years[26]. Drunkenness is facilitated by access to alcohol at parties, bars, among peers and even family members, which indicates the normalisation of this consumption among adolescents and failures in family supervision[27]. High prevalences of excessive alcohol consumption have also been found in Russia, Angola and other Latin American countries such as Bolivia and Peru[20]. This behaviour

can lead to serious problems such as physical fights, accidents, unprotected sex[28] and alcohol intoxication[27].

Smoking is the main risk factor for several chronic diseases[29], and in adolescence it becomes even more worrying, since it is during this phase that the smoking habit begins and consolidates[30]. The lower prevalence of cigarette use among Brazilian school-age children may be related to the adoption of regulatory measures recommended by the WHO, making Brazil a world reference in tobacco control[31].

However, the higher prevalence of the use of other tobacco products observed in Argentina is already a global concern, especially electronic cigarettes[32]. Although tobacco products are banned for people under 18 in the countries studied, and e-cigarettes were banned for any age group at the time of the research, adolescents have been using these devices mainly influenced by the media, flavours, aromas, the perception that they are less harmful and pressure from friends[33], in addition to their use being associated with alcohol consumption[34]. In Brazil, although the use of conventional cigarettes is stable, there is a high prevalence of the use of other tobacco products, such as hookahs and electronic cigarettes[35], which can be attributed to the weakening of control policies in recent years[36].

Sexual practice was more common in Uruguay and Argentina, with slightly higher prevalence rates than in 67 low- and middle-income countries (40.6%)[37]. This behaviour is conditioned by cognitive and emotional development, as well as the influences exerted by peers, parents, culture, and social norms. Socioeconomic barriers can jeopardise access to quality information, increasing the vulnerability of certain groups. Although both countries have more structured legal frameworks compared to other Mercosur members[38] and show good results in related indicators, such as reducing teenage pregnancies[38,39], efforts to reduce inequalities in access to sexual and reproductive rights are still needed[39].

Boys had a higher prevalence of sex in life, consistent with previous findings[40]. The social pressure for boys to start having sex as proof of their masculinity is a marked gender difference. While girls tend to start their sex lives later, in stable relationships, boys tend to start earlier, in casual relationships[41].

Early sexual initiation was higher among adolescents in Brazil and Argentina, according to a study carried out on the triple border (Brazil, Argentina and Paraguay)[42]. This practice is considered risky behaviour because it is associated with Sexually Transmitted Infections (STIs), unplanned pregnancy, unsafe abortion[43], as well as mental health problems[44]. The prevalence of this indicator in these countries was higher than the average found in a study of 50 countries[45]. These differences may be related to religious, social and cultural factors and deserve further exploration to understand and reduce these prevalences[45]. Psychosocial factors such as loneliness, bullying, tobacco, alcohol and drug use are associated with early sexual initiation, with little global variation[45].

Regarding gender differences, other studies have also highlighted that males have a higher prevalence of early sexual initiation[42,45]. This scenario stems from a culture that encourages boys to start having sex and condemns girls who do[46].

Brazilian adolescents had a lower prevalence of condom use during their last sexual intercourse, indicating that almost 40% of them had unprotected sex the last time (*table 3*). Similar results were found in Brazil with a population aged over 15[46] and among adolescents in other countries[40]. Factors related to the non-use of condoms include the idea that this method reduces sexual pleasure, the idea that there is a low risk of contracting STIs, trust in a stable partner[47], and the unavailability of condoms[48].

Condoms are distributed free of charge by Brazil's Unified Health System[49], but measures in favour of condom use should be expanded. Sex education in Brazil is seen as controversial,

often influenced by religious and ideological concepts, and not as a consolidated public policy. Quality sex education should promote knowledge of the body and types of relationships[38]. Adolescents' decision-making process is multifaceted and involves both rational and emotional thoughts, so initiatives in this context need to consider the complexity of this choice[50].

Gender is also a factor related to condom use, with females being more likely not to use this method[46] as identified in the current study. This gender inequality is probably due to the establishment of stable partnerships and the use of other contraceptive methods, which leaves adolescents more vulnerable to STIs[46].

In general, the prevalence of physical fighting between the countries analysed was close, slightly higher in Argentina, indicating that almost a quarter of Argentinian adolescents had been involved in a physical fight in the previous year (*table 3*). A review of low- and middle-income countries, including Argentina and Uruguay, found worse prevalence rates in African, some Oceanic and Asian countries[51]. Factors related to physical violence among adolescents include alcohol and illicit drug use, living in violent places, family conflicts and depressive symptoms[52].

Male gender is considered to be a factor associated with involvement in physical fights[52], which corroborates this study. In general, boys seek social superiority through physical aggression in favour of relationships, followers, reputation and popularity[53]. Adolescent girls, on the other hand, tend to be more tolerant and friendly, avoiding violence[54].

The prevalence of reports of severe injury was lower among Brazilian adolescents. The other countries showed similar figures, close to 35% (*table 3*), higher than Canada (31.4%)[55] and lower than Mauritius (39%)[56]. Most of these injuries occur unintentionally[55], but are related to hunger, physical fights, missing school without permission, absence of close friends, use of illicit[56] and licit[55,56] drugs and anxiety[55].

Brazil was the country with the fewest reports of regular PA practice. In 50 low- and middle-income countries, this prevalence was higher (14.9 per cent)[57], but still lower, making it a global public health problem. There is controversy over the influence of the country's economic development on adolescents' PA routine[58]. However, it is believed that the growing sedentary behaviour is linked to greater access to the internet, computer games, mobile phones and TV[58].

In Brazil, lower prevalence rates of participation in physical education classes were also found, considerably lower than those found in other low- and middle-income countries (24.1%)[57]. In fact, lower participation in these classes has previously been associated with insufficient PA[57]. Measures that promote the creation of active environments, such as establishing a minimum number of hours of PA in school curricula, can therefore contribute to increasing the practice of these activities[59].

In all countries, there was a significant variation in the practice of regular PA and participation in physical education classes between genders, with lower levels among girls. These findings corroborate a previous study with Latin countries, including those in Mercosur[60]. In this context, it is important to consider the influence of gender roles. Latin American women were once considered the adult group with the highest levels of physical inactivity in the world[61]. Social barriers such as stereotypes, body image insecurity and cultural acceptability can reduce enthusiasm for PA[62].

In this respect, the prevalence of sedentary behaviour was high in all countries. Three of them had more than half of their adolescent population with sedentary behaviour (except Paraguay) (*table 3*). The worst scenario was observed in Uruguay, where more than 60 per cent of school-age children reported this habit. Sedentary behaviour is associated with poorer mental health[63] and a higher risk of mortality from cardiovascular causes, cancer, and type 2 diabetes[64]. Initiatives to promote sports in

leisure time and in communities[58] or social facilities can help to minimise this situation.

The study's limitations include the exclusion of adolescents outside of school. However, similar studies have been carried out all over the world[8], as they are facilitated by the integration of the health and education sectors, with schools being a favoured location for monitoring pupils' health indicators[3]. In addition, the strata used for sample calculation increase the representativeness of the target audience. Another limitation refers to information bias, with the possibility of collecting under- or over-reported information, since these are questionnaire data. However, self-reported behaviour among adolescents has validity[65], and the anonymous nature of the survey can reduce this tendency. The size of the study populations should also be considered, since there is great variability. It should also be noted that the structure of some PeNSE questions has changed, making it necessary to use data from the 2015 edition.

Conclusions

There were differences between the health indicators of adolescents in the Mercosur countries. Argentina had a higher prevalence of early experimentation with alcoholic beverages, current cigarette consumption, use of any tobacco product and involvement in a physical fight. Like Uruguay, Argentina also had a higher prevalence of current alcohol consumption. Uruguay had a higher prevalence of sedentary behaviour. Brazil had a higher prevalence of drunkenness, lower prevalence of smoking, absence of a close friend, regular PA, participation in physical education classes, condom use during last sexual intercourse and serious injuries. In Paraguay, a lower prevalence of lifetime sexual intercourse was found. The lack of data on tobacco use in Paraguay should be considered, as it may be higher, equal or lower than in the other countries studied.

The better performance in terms of cigarette consumption and serious injuries in Brazil, sedentary behaviour in Paraguay and condom use in all but Brazil could lead to strategies being shared in these areas. These results can help government bodies in the countries analysed to promote the exchange of good practices, according to the performance of the indicators in each territory, since this exchange is one of the purposes of Mercosur.

Collaborators

Morais EAH (0000-0003-0156-3449)* contributed to the conception and design, acquisition, analysis and interpretation of data, writing and critical review for intellectual content and final approval. Silva AG (0000-0003-2587-5658)* contributed to conception, data analysis and interpretation, writing and critical review for intellectual content and final approval. Souza JB (0000-0002-9308-7445)* contributed to the design, data analysis and interpretation, and final approval of the manuscript. Buback JB (0000-0002-8292-7015)* contributed to data analysis and interpretation, and final approval. Ondarsuhu D (0000-0003-0506-3046)* contributed to the design, analysis and interpretation of the data in the manuscript. Abreu MNS (0000-0002-6691-3537)* contributed to data analysis and interpretation, critical revision for intellectual content and final approval. Malta DC (0000-0002-8214-5734)* contributed to conception and design, data analysis and interpretation, writing and critical revision for intellectual content and final approval. ■

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