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Self-Medication Among Adolescents Aged 18 Years: The 1993 Pelotas (Brazil) Birth Cohort Study

Andréa Dâmaso Bertoldi, Ph.D. [a,*], Aline Lins Camargo, M.Sc. [b], Marysabel Pinto Telis Silveira, Ph.D. [c], Ana M.B. Menezes, M.D. [a], Maria Cecília Formoso Assunção, Ph.D. [a], Helen Gonçalves, Ph.D. [a], and Pedro Curi Hallal, Ph.D. [a]

[a] *Postgraduate Program in Epidemiology, Federal University of Pelotas, Pelotas, Rio Grande do Sul, Brazil*
[b] *Department of Pharmacosciences, Federal University of Health Sciences of Porto Alegre, Porto Alegre, Rio Grande do Sul, Brazil*
[c] *Institute of Biology, Department of Physiology and Pharmacology, Federal University of Pelotas, Pelotas, Rio Grande do Sul, Brazil*

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A B S T R A C T

Purpose: To estimate the point prevalence of self-medication among adolescents aged 18 years and to evaluate the type of drugs used (either over-the-counter or prescription drugs) and socioeconomic, health-related, and behavioral correlates of self-medication.
Methods: This cross-sectional study used data from the 1993 Pelotas (Brazil) Birth Cohort Study. Data were obtained through the administration of a questionnaire to adolescents aged 18 years. The outcome variables were point prevalence of medicine use and self-medication collected by self-report. The independent variables studied were gender, continuous medicine use, socioeconomic status, schooling, self-rated health, body mass index, and physical activity levels. Medicines were classified into therapeutic groups according to the Anatomical Therapeutic Chemical classification system.
Results: A total of 4,106 adolescents were interviewed. The point prevalence of medicine use was 41.1% (95% confidence interval [CI] 39.6–42.6), and the proportion of self-medication among medicine users was 65.1% (95% CI 62.8–67.4). The point prevalence of self-medication was 26.7% (95% CI 25.4–28.1), and it was higher among female adolescents, those more educated, and those who rated their health as poor. Out of the drugs used for self-medication (58% of all drugs used), 1,003 (78.7%) were nonprescription drugs and 271 (21.3%) were prescription drugs. The most frequently used drugs for self-medication were analgesics (56.1%), systemic antihistamines (7.4%), and anti-inflammatory and antirheumatic products (7.1%).
Conclusions: A high point prevalence of self-medication was found among adolescents, which is particularly concerning due to high use of prescription drugs for self-medication. Interventions are needed to promote rational use of medicines in this population.

IMPLICATIONS AND CONTRIBUTION

The proportion of self-medication among medicine users was high (65.1%), and for continuous medication, self-medication reached 18.7%. Strategies to promote rational drug use are needed addressing issues related to drug use, from elementary and high school, as they can potentially lead to behavior changes toward the rational use of medicines.

Self-medication is a widespread practice regarded by the World Health Organization (WHO) as being part of self-care. Self-medication is defined as the selection and use of medicines by individuals to treat self-recognized or self-diagnosed conditions or symptoms. WHO recognizes this practice as responsible when the individual uses products that are approved and available without the need of medical prescription [1]. It is important to

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* Address correspondence to: Andréa Dâmaso Bertoldi, Ph.D., Centro de Pesquisas Epidemiológicas, Programa de Pós-graduação em Epidemiologia, Universidade Federal de Pelotas, Rua Marechal Deodoro, 1160 3° piso, Pelotas, Rio Grande do Sul, Brazil 96.020-220.
E-mail address: andreadamaso.epi@gmail.com (A.D. Bertoldi).

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understand this practice among people of all ages, but particularly among those individuals who are becoming more independent and encouraged to be more independent about self-care.

In Brazil, as in most countries, the age of 18 years is a legal milestone into adulthood when adolescents can enjoy adult privileges. Yet, the road to adulthood involves exploring various levels of independence and responsibilities under adult supervision. This transition from adolescence into young adulthood is often characterized by going off to college, joining the military, marrying and becoming a parent [2]. This transition period can affect one's health and medicine use due to increases in the prevalence of sexually transmitted diseases, obesity, smoking and alcohol use, as well as decreases in physical activity practice [3].

Appropriate and responsible self-medication has been associated with several benefits including increased access to medicines, active patient role, and promotion of self-care and optimization of the use of public resources for the treatment of mild or minor health conditions [4]. However, self-medication is not always safe, as it may be related to incorrect self-diagnosis, delays in seeking medical advice when needed, infrequent but severe adverse reactions, dangerous drug interactions, incorrect manner of administration, incorrect dosage, incorrect choice of therapy, masking of a severe disease, and risk of dependence and abuse [4–7].

Only nonprescription, over-the-counter (OTC) drugs should be used through self-medication. According to WHO guidelines, OTCs must be safe, reliable, effective, easy to use, and convenient [1]. In Brazil, however, many pharmacies do not comply with the mandatory requirement of presenting a medical prescription for the purchase of prescription drugs, which facilitates its use through self-medication. The implications of this harmful practice and its potential damaging health effects are of great concern.

The prevalence of self-medication in Brazil and worldwide has been estimated between 10.3% and 87.0% varying according to the population studied and methods used [4,8–19]. The drugs most frequently used through self-medication are analgesics and antipyretics, nonsteroidal anti-inflammatory drugs, and antimicrobials [8,9,12,15,18,20]. Studies about self-medication in adolescents are rare. In three previous studies, the prevalence of self-medication ranged from 26.7% to 56.6% [14,17,18].

Previous studies have shown that medicine use is strongly associated with gender [13,17,21], socioeconomics position, schooling [15,16], and self-rated health [14,22]. We are interested in investigating whether these variables also influence self-medication in this age group. Body mass index (BMI) has proved directly associated with medicine use in adults [23,24]. In addition, physical activity was shown to be inversely associated with medicine use [25]. The effect of these two variables on medicine use and self-medication in adolescents was seldom explored. There is also a literature gap on the use of medicines that require medical prescription through self-medication, a fact that indicates lack of control in medicine dispensing. This would be of particular concern in a country like Brazil, where such medicines should be only used with medical prescription. The same concern was raised in Europe, Asia, and Latin American concerning the use of antibiotics [8,26–28].

This study aimed to assess the point prevalence of self-medication among adolescents aged 18 years, the type of drugs used (either OTC or prescription drugs), and socioeconomic, health-related, and behavioral correlates of self-medication.

Methods

Pelotas is a southern Brazilian city with around 330,000 inhabitants in 2010. All live births in city hospitals in the calendar year of 1993, of mothers living in the urban area of the city of Pelotas, Brazil, were included in the 1993 Pelotas (Brazil) Birth Cohort Study. Of the 5,265 eligible mothers of children born that year, 5,249 agreed to participate. Subsamples of these children were followed up at ages 1, 3, and 6 months and 1, 3, 6, and 9 years. The first follow-up visit to all cohort members took place when participants were aged 11 years. Follow-ups of the entire cohort were also carried out at the ages of 15 and 18 years.

The 18 years follow-up visit took place between September 2011 and March 2012. Adolescents were invited to attend the Postgraduate Program in Epidemiology outpatient clinic, where they underwent medical examinations and filled out questionnaires. Further details on the methods used in previous cohort visits can be found elsewhere [29,30]. Data on medicine use were collected during the follow-up at the age of 18 years through self-report.

We assessed two outcomes at the individual level: point prevalence of medicine use and point prevalence of self-medication. We defined medicine use as the use of at least one medicine in the 15 days preceding the interview, independent if it was an eventual use or an ongoing use (i.e., continuous use), and we defined self-medication as the use of at least one medicine without a current medical prescription in the 15 days prior to the interview. Information on advice for medicine use was collected and categorized as current medical prescription, noncurrent medical prescription, or nonmedical advice (by a family member, friend, nonmedical health professional, and others).

The independent variables studied were gender; continuous medicine use (daily or almost daily use with no end date); socioeconomic position (an index was constructed based on a score of household assets; the sum of items was entered in a principal component analysis and the first factor was extracted; we then divided this factor into quintiles to represent fifths of socioeconomic position; the assets originally included in the questionnaire were those collected in standardized socioeconomic position classification systems in Brazil [31]); schooling (up to 8 years; 9–11 years), self-rated health (excellent, good, regular, fair, poor); BMI (low, normal, overweight, obese according to the WHO criteria for 18-year-old adolescents) [32]; and physical activity (a cutoff of 300 minutes or more per week of commuting or leisure-time physical activity was used to classify participants as active) [33].

We also conducted analyses using the total number of drugs used as the denominator. The reported drugs were divided into groups following the Anatomical Therapeutic Chemical (ATC) classification system [34], level 1 classified drugs by main anatomical group and level 2 according to pharmacological/therapeutic subgroups. Medicines were also categorized as nonprescription (OTC) or prescription drugs according to the current Brazilian regulations [35].

The analyses were performed using Stata 11.2 (StataCorp, College Station, TX). First, we conducted a description of the independent variables and then calculated the point prevalence of medicine use and overall self-medication stratified by gender and continuous medicine use. We used the chi-square test for heterogeneity at a 5% level of significance and calculated 95% confidence intervals (CIs) of the main estimates.

Table 1
Distribution and point prevalence of self-medication among adolescents aged 18 years from the 1993 Pelotas Birth Cohort according to the socioeconomic, health-related, and behavioral variables

Total	Sample		Medicine use					Self-medication				
			Males		Females		Total %	Males		Females		Total %
	N	%	Overall use[a] %	Continuous use[b] %	Overall use %	Continuous use %		Overall use %	Continuous use %	Overall use %	Continuous use %	
	4,106	100	32.1	5.3	49.8	19.0	41.1	23.1	8.1	30.2	26.4	26.7
Quintiles of socioeconomic position			$p = .250$	$p = .244$	$p < .001$	$p < .001$	$p < .001$	$p = .689$	$p = .150$	$p = .100$	$p = .798$	$p = .368$
1st (poorest)	837	20.4	32.4	7.3	42.9	16.1	38.8	22.6	8.1	27.7	27.7	25.7
2nd	803	19.6	27.8	3.5	44.8	14.3	36.2	21.1	2.4	28.0	25.0	24.5
3rd	821	20.0	33.5	5.3	46.8	16.2	40.3	25.5	8.8	29.2	22.8	27.4
4th	822	20.0	31.6	5.2	56.0	23.2	42.8	23.0	12.8	35.1	29.3	28.6
5th (wealthiest)	820	20.0	34.9	5.5	61.4	26.8	47.2	23.2	7.8	32.3	26.8	27.4
Schooling (years)			$p = .035$	$p = .490$	$p < .001$	$p < .001$	$p < .001$	$p = .738$	$p = .502$	$p = .019$	$p = .768$	$p = .007$
Up to 8	1,859	45.3	30.0	4.9	42.7	13.5	35.4	22.9	7.4	27.2	25.7	24.7
9 to 11	2,245	54.7	54.1	5.6	54.1	22.3	45.8	23.5	9.1	32.1	26.8	28.5
Self-rated health			$p < .001$	$p = .008$	$p = .175$	$p = .103$	$p < .001$	$p = .002$	$p = .671$	$p = .002$	$p = .567$	$p < .001$
Poor/very poor	158	3.9	47.8	11.9	55.0	26.4	51.9	32.8	13.6	31.9	27.6	32.3
Fair	698	17.0	41.3	7.6	53.3	20.6	48.6	30.1	9.6	36.5	30.5	34.0
Good	2,433	59.3	30.8	4.9	49.2	18.7	40.2	22.6	7.9	29.7	25.3	26.2
Excellent	816	19.9	27.5	3.7	46.2	15.8	35.1	19.3	6.4	23.7	23.1	21.1
BMI			$p = .027$	$p = .099$	$p = .914$	$p = .248$	$p = .152$	$p = .152$	$p = .781$	$p = .739$	$p = .111$	$p = .598$
Low	299	7.5	24.0	4.0	50.0	8.3	36.7	20.0	.0	37.5	.0	28.6
Normal	2,573	64.8	30.5	4.4	49.8	18.6	40.1	22.5	8.1	30.8	25.7	26.6
Overweight	739	18.6	32.9	6.0	51.6	19.1	42.9	23.0	10.5	32.5	26.9	28.0
Obese	363	9.1	40.8	8.4	48.9	22.9	45.2	29.8	7.0	29.2	35.4	29.5
Physically active[c]			$p = .389$	$p = .325$	$p = .196$	$p = .258$	$p = .007$	$p = .253$	$p = .784$	$p = .367$	$p = .288$	$p = .172$
Yes	2,497	61.5	31.5	4.9	51.3	20.0	39.5	22.6	8.0	31.2	28.3	26.1
No	1,563	38.5	33.5	6.0	48.5	18.0	43.7	25.1	8.8	29.4	24.6	28.0

$p < .001$: medicine use and self-medication among males and females.
BMI = body mass index.
[a] Overall use: use of at least one medicine in the 15 days preceding the interview for acute or continuous use.
[b] Continuous use: use of at least one medicine in the 15 days preceding the interview, only for continuous use.
[c] Physically active = 300 min/week or more of commuting or leisure-time physical activity.

The medicines used were listed by ATC (groups 1 and 2), overall and stratified by OTC or prescription drugs. We conducted further analyses to characterize drugs used for self-medication: most frequently used drugs; major therapeutic classes; and OTC or prescription drug categorization.

This research project followed the principles of the Declaration of Helsinki and was approved by the Research Ethics Committee of the School of Medicine of the Federal University of Pelotas. All cohort participants or their parents or guardians (when they were <18 years at follow-up) signed an informed consent agreeing to participate in the study.

Results

We evaluated 4,106 cohort members. Characteristics such as sex, skin color, maternal schooling, and family income were comparable among participants not included in this follow-up and the original cohort members. Reasons for loss to follow-up include mainly address not found, having moved away from Pelotas, or death. The sample comprised almost the same proportion of males (n = 2,015) and females (n = 2,091). More than half (54.7%) had 9–11 years of schooling; 4.0% self-rated their health as fair or poor; 7.5% presented low BMI; 27.7% were overweight/obese; and 61.5% were physically active. The point prevalence of medicine use in the 15 days preceding the interview was 41.1% (95% CI 39.6–42.6), and of these, 65.6% used only one drug, 23.4% two, and 10.9% three or more drugs. The proportion of self-medication among medicine users was 65.1% (95% CI 62.8–67.4; n = 1,687), and the point prevalence of self-medicine was 26.7% (95% CI 25.4–28.1; n = 4,106).

Table 1 lists the sample distribution, the point prevalence of medicine use, and point prevalence of self-medication for any drug reported and those of continuous use, stratified by gender and according to socioeconomic position, level of education, self-rated health, BMI, and level of physical activity. The point prevalence of medicine use was 32.1% (95% CI 30.0–34.1) in males and 49.8% (95% CI 47.6–51.9) in females ($p < .001$), while the point prevalence of self-medication was 23.1% (95% CI 21.3–25.0) in males and 30.2% (95% CI 28.3–32.2) in females ($p < .001$).

The overall point prevalence of continuous use of at least one medicine was 12.3% (95% CI 11.2–13.3), with a difference by gender ($p < .001$), 5.3% (95% CI 4.3–6.2) in males and 19.0% (95% CI 17.3–20 7) in females. The overall point prevalence of continuous medicine use for self-medication was 18.7% (95% CI 16.4–21.0), again with a difference ($p < .001$) by gender, 8.1% (95% CI 5.7–10.6) among males and 26.4% (95% CI 23.0–30.0) among females (Table 1). When contraceptives are excluded from the analyses, females continue to significantly use more medicines than males.

Medicine use by quintiles of socioeconomic position showed higher use among those in the upper quintiles. After stratifying by gender, this association remained only among female adolescents. This was found for both overall medicine use (female adolescents in the upper quintile used 40% more medicines than those in the lower one) and continuous medicine use (use 70%

Table 2
ATC classification (levels 1 and 2) of 271 prescription drugs used for self-medication

ATC classification	N	%
M—Musculoskeletal system	**70**	**25.8**
M01—Anti-inflammatory and antirheumatic products	68	
M02—Topical products for joint and muscular pain	1	
M03—Muscle relaxants	1	
G—Genitourinary system and sex hormones	**68**	**25.1**
G03—Sex hormones and modulators of the genital system	68	
R—Respiratory system	**37**	**13.7**
R01—Nasal preparations	15	
R03—Drugs for obstructive airway diseases	10	
R05—Cough and cold medicines	1	
R06—Antihistamines for systemic use	11	
N—Nervous system	**33**	**12.2**
N02—Analgesics	11	
N03—Antiepileptics	9	
N05—Psycholeptics	5	
N06—Psychoanaleptics	8	
A—Alimentary tract and metabolism	**26**	**9.6**
A02—Drugs for acid-related disorders	8	
A03—Drugs for functional gastrointestinal disorders	6	
A04—Antiemetics and antinauseants	11	
A08—Antiobesity preparations, excl. diet products	1	
J—Anti-infectives for systemic use	**25**	**9.2**
J01—Antibacterials for systemic use	25	
C—Cardiovascular system	**5**	**1.9**
C03—Diuretics	2	
C07—Beta-blocking agents	1	
C09—Agents acting on the renin–angiotensin system	2	
H—Systemic hormonal preparations, excl. sex hormones and insulins	**4**	**1.5**
H01—Pituitary and hypothalamic hormones and analogues	1	
H02—Corticosteroids for systemic use	1	
H03—Thyroid therapy	2	
B—Blood and blood forming organs	**1**	**.4**
B03—Antianemic preparations	1	
D—Dermatologicals	**1**	**.4**
D07—Corticosteroids, dermatological preparations	1	
S—Sensory organs	**1**	**.4**
S01—Ophthalmologicals	1	
Total	**271**	**100%**

ATC = Anatomical Therapeutic Chemical.
Bold values are ATC classification level 1. Other values are ATC level 2.

higher). We found no difference for self-medication between quintiles of socioeconomic position (Table 1).

We found greater medicine use among more educated adolescents, both male (80% higher) and female (30% higher). Continuous medicine use was higher (70%) among more educated female adolescents. The point prevalence of self-medication was 20% greater among those more educated but, after stratifying by gender, this difference remained only for overall medicine use among females (Table 1).

Medicine use increased as self-rated health decreased; we observed 50% higher use among those who self-rated their health as poor/very poor compared with those who self-rated it as good/excellent. After stratifying by gender, we observed differences only among male adolescents regarding overall medicine use (70% higher among those who self-rated their health as poor/very poor) and continuous medicine use (3.2 times greater in those who self-rated it as poor/very poor). We also detected differences in the point prevalence of self-medication among those who self-rated their health as poor/very poor (50% higher compared with those who self-rated it as good/excellent) in both males (70% higher) and females (30% higher; Table 1).

With respect to BMI, we found differences only regarding overall medicine use in males; obese adolescents used 30% more medicines than those with normal BMI. Physically active adolescents used less medicine than those who were inactive. However, the small difference found between them disappeared after stratifying by gender. We saw no differences in self-medication regarding BMI and level of physical activity.

We repeated the analyses on the association between self-medication and socioeconomic position, education, self-rated health, BMI, and physical activity after excluding contraceptives from the analyses, and no changes were found (data not shown).

Of all medicines used (n = 2,522), 58% were used by self-medication. Of the medicines used, those for acute conditions represented 75% of the sample, whereas those for continuous use represented 25%. Continuous medicine use following current medical prescription was reported by 74.1%; 10.2% reported noncurrent medical prescription, and 15.7% following nonmedical advice. Among drugs continuously used (n = 559), sex hormones and modulators of the genital system and psychoanaleptics were the most frequently used accounting for 39% and 7.5% of continuous medicine use, respectively. Analgesics and anti-inflammatory and antirheumatic products accounted for 51.8% and 9.8% of all drugs used for acute conditions (n = 1,543), respectively.

Medicine use was also categorized as OTC or prescription drugs. Although information was missing for 16.4% of the use reported, 41.5% of all drugs used required medical advice. Yet, 31.0% were used for self-medication (n = 271).

The anatomical groups (ATC1) and pharmacological/therapeutic subgroups (ATC2) of 271 prescription drugs used for self-medication are listed in Table 2.

Table 3 lists the drugs most commonly used for self-medication (around 80% of total drugs), as well as their distribution between OTC and prescription drugs. The medicines included in the "others" category (21.9% of all) represent over 150 products each with a proportion of use below 1%.

The main reasons reported for medicine use were headache (30.9%), pain (17.1%), contraception (8.8%), infection (6.8%), cold/flu (6.3%), allergies (3.7%), abdominal pain (3.1%), gastric disorders (2.6%), anxiety (2.2%), anemia (1.8%), asthma (1.7%),

Table 3
Drugs often used for self-medication and OTC (nonprescription) or prescription drug categorization

Drug	N	%	OTCs	Prescription drugs
Paracetamol	443	34.7	x	
Dipyrone	128	10.0	x	
Dipyrone + orphenadrine caffeine	88	6.9	x	
ASA	69	5.4	x	
Diclofenac	44	3.4		x
Ethinylestradiol + levonorgestrel	34	2.7		x
Dipyrone + caffeine + isometheptene	32	2.5	x	
Paracetamol + phenylephrine + clorfeniram	32	2.5	x	
Dipyrone + caffeine + chlorpheniramine	28	2.2	x	
Papaverine + ASA + Atropa belladonna	24	1.9	x	
Ibuprofen	21	1.7	x	
ASA + caffeine	20	1.6	x	
Scopolamine	20	1.6	x	
Amoxicillin	13	1.0		x
Other	280	21.9	—	—

ASA = acetyl salicylic acid; OTC = over-the-counter; x = categorization in OTCs or in prescription drugs.

depression (1.3%), seizures (1.2%), and inflammation (1.1%). All other reasons were reported in <1% of the medicines used.

Discussion

Our study used a population-based sample of all adolescents aged 18 years born in the city of Pelotas, Brazil, in 1993. The age of 18 years is particularly relevant for medicine use due to the transition from adolescence to the legal definition of adulthood. We highlighted the most frequently used medicines and the reasons for use, as well as focused on self-medication, particularly in the case of medicines requiring medical prescription. Previous studies on self-medication in Brazil used different age groups, nonrepresentative or small samples, or methodological limitations that are not present in our survey [11,17,18].

Self-medication among adolescents aged 18 years presented a high proportion (65.0%) among those using medicines. Previous Brazilian studies found proportions of self-medication of 52.6% [17] and 56.6% [18]. However, the sample of these studies differs from ours, since they were conducted with children and adolescents aged 14–18 and 0–18 years, respectively.

The overall point prevalence of self-medication (26.7%) found in the sample studied is consistent with that reported in a German population-based study (25.2%) that investigated 17,450 children and adolescents aged 0–17 years [14]. Contrasting to the findings of Du and Knop, we did not observe a positive association between self-medication and high-income (odds ratio 1.23). We saw a higher point prevalence of medicine use for self-medication among more educated adolescents, which corroborates results described by other authors [7,14,15].

Self-rated health is known to affect medicine use, both prescription medication and self-medication. Thus, the point prevalence of medicine use was higher as expected among adolescents who self-rated their health as poor/very poor. Investigators in Germany also found higher prevalence of self-medication among children and adolescents with poor health (odds ratio 1.29) [14].

Other Brazilian studies [5,15] also reported higher prevalence of self-medication among females, which is partially not only due to contraceptive use but also due to hormonal, care-seeking, and cultural differences between men and women. Sex hormones and modulators of the genital system are among the most frequently used drugs through self-medication in our sample.

Medicine use in our sample fitted into a pattern described in the literature of a higher prevalence among females, more educated individuals, those with poor/very poor self-rated health, and those who are physically inactive. In addition, the pharmacological groups of the most commonly used drugs among adolescents are consistent with those described in the literature [36,37].

A distinctive feature of our study is the categorization of OTC and prescription drugs. It provided valuable input on the use of drugs through self-medication that require medical advice and monitoring (by skilled medical or dental provider). It should be mentioned that in Brazilian pharmacies or drugstores, people sometimes purchase medicines that require a medical prescription without it, therefore not complying with the mandatory requirement of presenting and withholding a medical prescription. Lack of control in the dispensing of prescription medicines is a matter of concern for the regulatory agency from the Brazilian Ministry of Health (ANVISA [Agência Nacional de Vigilância Sanitária]). A task force was started in 2013 to tackle this issue [38].

Fortunately, most drugs the adolescents in our sample used for self-medication were OTC drugs, which are safer. However, it is concerning that one third of the drugs used for self-medication (31.0%) were prescription drugs, suggesting that a large proportion of the adolescents included in our study are not practicing what is considered responsible self-medication according to the WHO guidelines [1]. This finding confirms a failure to comply with current drug regulations, and that adolescents are at risk of misusing prescription drugs. It calls for education interventions to inform the public about the risks of self-medication with prescription drugs, and most importantly, regulatory and correction actions to ensure full compliance with mandatory requirements.

An analysis of the drugs used showed that 58% were used for self-medication, and most of them (75%) were used to treat acute conditions. The most often used medicines to treat acute conditions were analgesics, which are OTC drugs that are quite safe with rational use. People are supposed to engage in self-medication for treating mild, self-limiting acute conditions.

The analysis of self-medication with continuous medicine use revealed that adolescents mostly used (74.3%) prescription drugs, which may have damaging health effects. Misdiagnosis, delayed medical care, bacterial resistance, hypersensitivity reactions, risk of drug dependence or abuse, dangerous drug interactions, serious adverse reactions, and hiding of symptoms that may be part of a more serious disease are often adversely associated with self-medication [4,5,7]. There is an increased risk when drugs requiring monitoring are used for self-medication.

The adolescents in our sample most often reported the use of self-medication for treating headaches and pain, which is consistent with the most frequently used drugs reported, paracetamol and dipyrone. Our findings support those of other research studies showing widespread use of analgesics for self-medication [5,7,13,14,18]. The prevalence of pain among children and adolescents has been identified as a major public health problem; it is estimated that 15%–25% of all children and adolescents suffer from chronic or recurrent pain conditions such as headache and abdominal pain [21]. Although it was an expected finding, the widespread use of this class of drugs evidences a need to educate people on the risks of overuse of painkillers and the importance of proper diagnosis and adequate treatment of pain to prevent persistent or recurrent conditions.

Data collection took place between September 2011 (Spring) and March 2012 (Summer). Therefore, it is expected that some medicines that are used more frequently in the Winter were underreported in our sample. The city of Pelotas is located in the south of the country and presents well-defined seasons.

A strength of our study is the use of a large birth cohort. In addition, the study population was willing to participate and voluntarily came to the clinic to attend the current visit as they did in the past several times. Thus, we believe that we were able to collect good quality data that may be representative of the reality of young people living in other areas/regions with similar characteristics.

However, the study findings are limited by the use of self-report. Self-report may be affected by forgetfulness and recall errors, misclassification of medicines, ignorance of the actual reasons for drug use, and underreporting of drug use when adolescents intentionally omit the use of certain drugs such as steroids, contraceptives, or abortifacients or do not know which medicines they used as their drug use is controlled by their parents or caregivers. Some of the medicines classified under

"noncurrent medical prescription," treated here as self-medication, might be cases of refilling. The method used for data collection does not allow us to detect such cases, but because only 5% of the medicines were classified into this group, the likely impact on the study findings is minimal.

It should be mentioned, however, that appropriate self-medication, whereby individuals treat their ailments with OTC medicines following a health provider's advice, is a valuable practice to health systems as people are responsible for their own self-care and can promptly manage mild, self-limiting conditions, reducing the demand for care services.

Unfortunately, due to the fact that this study was not designed to identify adverse effects of self-medication, it is not possible to present data about unfavorable outcomes related to medicines used in this population.

Self-medication is a concerning issue in Brazil because most people do not seek advice from a skilled health-related provider such as a pharmacist. Most people have easy access to pharmacists, and they play a strategic role offering relevant information advice on drug use, especially OTC drugs, and promoting rational drug use [39]. Our findings suggest that Brazilian pharmacists have been neglecting their crucial role in promoting rational drug use, a strategy identified as important for decades by the WHO [1].

Another study using this same birth cohort assessed continuity of patterns of drug use and self-medication from childhood to adolescence. They found that 28% of adolescents who engaged in self-medication at age 11 would also engage in self-medication at age 15, while only 19% of those who did not engage in self-medication at age 11 would engage in self-medication at age 15 [11]. Self-medication among young people on the path to adulthood may follow a pattern of drug use that may perpetuate into adulthood. Family members, especially the mother [18], has been described as promoters of self-medication [13,18], suggesting this behavior may be acquired and encouraged at home.

Strategies to promote rational drug use in this population are needed, and it is crucial to develop education programs aligned with their needs. Substantial advances can be made with the use of tools that are part of their everyday life such as social media, virtual games, blogs, and microblogs. Also, formally addressing issues related to drug use, from elementary and high school, is necessary as it can potentially lead to behavior changes toward the rational use of medicines. Because analgesics were the most frequently used medicines in this population, we suggest future studies should collect more detailed data about their use, including a clear differentiation between acute and chronic pain.

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