



ORIGINAL ARTICLE

Self-reported recurrent pain and medicine use among 15-year-olds: results from the HBSC Italian study

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Keywords

Medicine use • Adolescents • Recurrent complaints

Summary

Background. The prevalence of adolescent pain varies considerably across epidemiological studies, and little information is available on pain-related behaviours among adolescents, including medicine use. The aims of this study were: [1] to examine the prevalence of recurrent pain among 15-year-old adolescents in Italy; [2] to investigate the association between recurrent pain and medicine use among boys and girls; and [3] to evaluate the consistency of these associations across Regions.

Methods. The World Health Organization (WHO) collaborative International Health Behaviour in School-aged Children 2013/2014 study collected self-reported data on pain and medicine use from 13611 15-year-old adolescents in 21 Italian Regions. We used multi-level multivariate logistic regression, stratified by gender, to analyse the association between recurrent pain and medicine use for headache, stomachache, nervousness and difficulties in getting to sleep.

Results. On average, across all Regions, almost 45% of adolescents reported recurrent headache, more than 30% reported recurrent backache and approximately 30% reported recurrent stomachache. Although the prevalence of both pain and medicine use was much higher among girls, the association between pain and medicine use was similarly strong in adolescents of both genders. Adolescents with recurrent pain proved more likely to use medicines also for non-corresponding pain, nervousness and difficulties in getting to sleep. The association between recurrent pain and medicine use was consistent across Regions despite large inter-regional differences in the prevalence of both phenomena.

Conclusions. Recurrent pain in adolescence is common nationwide. Adolescents with recurrent pain are more likely to use medicines in general. Recurrent pain and medicine use should be addressed by adolescent health policies.

Introduction

The World Health Organization (WHO) defines adolescence as the age between 10 and 19 years, which constitutes a key period of human growth [1]. Numerous studies have shown that about 10-50% of adolescents report suffering from recurrent pains. Recurrent pain is defined as pain occurring at least once a week within the time frame of three or six months. The use of medicines to treat common complaints, such as headache and stomachache, is widespread and increasing among adolescents [2-6]. Overall, the use of medicines and the prevalence of recurrent complaints are much higher among girls than boys [7-9]. Studies have demonstrated an increasing use of medicines for headache and stomachache among girls, and an association between the use of medicines and the frequency of the corresponding complaints [2, 3]. Adolescents who suffer from recurrent pains take medicines more frequently, and it has been hypothesized that medicine use during adolescence continues into adulthood [10]. In general, the use of pharmaceutical drugs seems to be facilitated by their easy accessibility and availability, and by changes in pharmaceutical regulations and the attitudes of parents, who

are the primary source of medicines [2, 6, 7]. As adolescents generally have scant knowledge of the use of pharmaceutical drugs, it seems important, from the public health standpoint, to instruct these young people in the appropriate use of such medicines and to conduct studies in target groups in order to analyse the phenomenon of medicine use in greater depth [2, 8, 10]. Although trends in the use of medicines have been investigated by several in-country studies, the results are difficult to compare owing to differences in study populations, data collection and measurements. The International Health Behaviour in School-aged Children (HBSC) study is a single tool for the collection of data on medicine use among adolescents; as it is based on a unified methodology that involves all Italian Regions, it enables direct comparison of the data collected.

The aims of the present study were: to determine the prevalence of recurrent pains, such as headache, stomachache and backache, among 15-year-old adolescents in 21 Italian Regions; to evaluate any correlation between recurrent pains and medicine use among males and females; and to assess the possible similarities and differences among the Italian Regions considered.

Materials and methods

STUDY POPULATION

The data utilised were taken from the HBSC Italian study, a cross-sectional study promoted by the WHO at the international level in order to document health-related behaviours among school-age adolescents. Details of the method and the investigative tools used to gather the data have been reported elsewhere [11-13].

Specifically, we used the data from 21 Italian Regions; these were collected from a representative sample of adolescents aged 11, 13 and 15 years in each Region from 2013 to 2014. In order to obtain a random sample of school classes, we implemented the strategy of cluster sampling. Data were collected by means of an internationally validated questionnaire, which was self-administered (in the presence of qualified personnel) in schools, in conformity with the national protocol [11]. This questionnaire is subject to ongoing development and validation by all the researchers in the countries participating in the international HBSC project. Parental consent to participation in the study is mandatory. The study protocol, which was approved by the Ethics Committee of the University of Turin, provided for the use of an “opt-out” consent form, meaning that a child would be included by default unless his or her parents chose to opt out by explicitly refusing consent. All the data were collected anonymously, so that the individual participants could not be identified. For what concerns the present article, we selected only 15-year-old adolescents (n = 13611), 6907 girls (50.7%) and 6704 boys (49.3%), in order to observe the behaviour of only those subjects who are more independent in their use of medicines (Tab. I).

VARIABLES

From the HBSC questionnaire, we used the questions concerning the following complaints: headache, stomachache, difficulties in getting to sleep and nervousness, which were measured on a scale ranging from “almost every day” to “rarely or never”. Each symptom was dichotomized as “recurrent”, if it occurred at least weekly, and “not recurrent” otherwise. The percentages of non-response to the questions were: headache, 0.31%; stomachache, backache and nervousness, 0.35%; and difficulty in getting to sleep, 0.38%.

In addition, the question “Have you taken any medicines or drugs for the following complaints in the last month?” was used to assess the recurrence of the use of medicines for headache, stomachache, difficulty in sleeping and nervousness. The possible response options were: *no*, *yes once*, and *yes more than once*. In this case, too, the answers were dichotomised into *yes* and *no*. The percentages of non-response were: 1.04% to the question regarding medicines for headache; 1.18% for stomachache; 1.13% for nervousness, and 1.16% for sleeping difficulties.

Tab. I. Subdivision of the sample by sex and region.

Italian Regions	Boys	Girls	Total
Abruzzo	262	269	531
Basilicata	209	210	419
Bolzano	170	255	425
Calabria	317	316	633
Campania	313	287	600
Emilia Romagna	340	317	657
Friuli Venezia Giulia	391	354	745
Lazio	241	213	454
Liguria	374	420	794
Lombardia	462	444	906
Marche	319	424	743
Molise	282	277	559
Piemonte	311	306	617
Puglia	285	293	578
Sardinia	204	206	410
Sicilia	299	308	607
Toscana	356	398	754
Trento	299	323	622
Umbria	427	363	790
Val d'Aosta	141	150	291
Veneto	702	774	291
Total	6704	6907	13611

STATISTICAL ANALYSIS

The prevalence of the various complaints and of the use of medicines among males and females, subdivided by Region, was evaluated by means of the chi-square test. In all statistical analyses, we applied a significance value of 0.05 and 95% confidence intervals. Logistical regression was used to evaluate the association among the various complaints, on considering boys and girls separately. The odds ratios (OR) and the confidence intervals were then calculated in order to evaluate the association. The association between complaints and medicine use was evaluated by means of multilevel logistical regression, in which the clusters were identified by the Italian Regions. Subsequently, we calculated the ORs and the pertinent confidence intervals in order to evaluate the association, the Median OR (MOR) as a measure of heterogeneity in order to assess the random effect of the Regions, and the Intra-Class Correlation (ICC), which enabled us to assess both the variance within the clusters and the variance among the clusters. The ICC thus enables us to evaluate the relevance of clustering, i.e. the degree to which subjects within the same Region have the same outcome [14]. The analyses were carried out by means of the R software, version 3.3.3.

Results

PREVALENCE OF RECURRENT COMPLAINTS

On considering all the Italian Regions included in this study, a mean of more than 40% of the adolescents surveyed reported suffering from recurrent headache; 27%

reported recurrent stomachache, and over 30% recurrent backache (Tab. II).

The prevalence of recurrent headache among girls ranged from 43.5% in the Autonomous Province of Bolzano to 67.5% in Campania, while among boys it ranged from 20% in the Autonomous Province of Bolzano to 36.9% in Piedmont, followed by Campania and Val d'Aosta, which displayed similar values (36.1%). In general, in all of the Regions considered, the prevalence of recurrent headache proved to be 1.5-2 times higher in females than in males, the difference being statistically significant.

The lowest prevalence values were recorded for stomachache, especially among males; in this group, the lowest value (14.1%) was seen in the Autonomous Province of Trento, and the highest (31.2%) in Val d'Aosta. Among girls, the highest prevalence of stomachache was recorded in Basilicata (43.2%) and the lowest in Bolzano (21.9%). The prevalence of stomachache also proved to be significantly higher among females than among males in practically all the Regions (except in Bolzano e Val d'Aosta, in which the difference was not significant).

Different types of recurrent pain were found to co-exist in individuals. All recurrent pains, nervousness and difficulty in getting to sleep were associated (the ORs were higher than 1 and statistically significant).

PREVALENCE OF MEDICINE USE

The data on the prevalence of medicine use revealed that almost half of 15-year-old Italian adolescents use medicines to treat headache, followed by stomachache, the use of medicines to treat this complaint being about 1.5 times more frequent among girls than among boys in all the Regions (Tab. III). The use of medicines to alleviate insomnia and nervousness displayed markedly lower percentages, and in most of the Regions no significant difference emerged between males and females.

With regard to headache, the lowest prevalence of medicine use by boys was recorded in Lazio (26.7%), while the highest was seen in Calabria (37.9%). Among girls, by contrast, the prevalence proved to be much higher in almost all the Regions considered, with the highest percentage being recorded in Lombardy (57.6%) and the lowest in Marche (44.7%) and Molise (44.8%).

A marked difference was also seen between males and females with regard to the use of medicines to treat stomachache in most Regions, the greatest difference (almost 3-fold) being recorded in the Autonomous Province of Trento (males 9.6%, females 31.3%). Among males, the lowest percentage was seen in Trento (9.6%) and the highest in Campania (23.6%); among females, the lowest percentage was recorded in Friuli Venezia Giulia (28.4%) and the highest in Basilicata (41.6%).

MEDICINE USE AMONG ADOLESCENTS WITH RECURRENT COMPLAINTS

The odds of medicine use for headache and stomachache were substantially higher among adolescents with corresponding recurrent pain than among adolescents

who reported pain less often (Tab. IV). Adolescents with recurrent headache or stomachache were more likely to use medications for other types of pain, too.

For both genders, the OR of medicine use for headache was 4. Furthermore, those who suffered from recurrent headache were twice as likely also to use medicines for nervousness and difficulties in getting to sleep. While for boys with recurrent stomachache there was four times increase in the odds of medicine use for stomachache, for girls the OR was 3. Furthermore, among adolescents of both genders, those who had stomachache and backache were 1.5 times more likely also to use medicines for headache. Regarding the use of medicines for nervousness and difficulties in getting to sleep, it can be seen in Table IV that, among boys, the ORs ranged from 2 to 2.5 for each complaint and among girls from 1.5 to 2. Overall, little regional variation was seen in the association between medicine use and recurrent pain, as most of the calculated MORs were close to 1 and the ICCs were close to zero; thus, little of the total variance in the use of medicines is due to differences among the Italian Regions (Tab. IV).

Discussion

Medicines are commonly used to alleviate such complaints as headache, stomachache, backache, difficulty in getting to sleep and nervousness, and their use among adolescents is increasing [2-5, 15]. Given that habits acquired during adolescence tend to persist into adulthood, adolescents constitute a strategic study population from the point of view of public health [10, 16]. The purpose of the study was threefold. First, we aimed to investigate the prevalence of recurrent complaints, such as headache, stomachache and backache, among adolescents in 21 Italian Regions in a year time frame (2014). Second, we assessed the correlation between recurrent complaints and medicine use among males and females. Third, we conducted a comparison of data from the Italian Regions involved in our analysis. The fact that the HBSC utilises a common homogeneous method enabled us to compare the data gathered in the various Italian Regions. The data analysed in our study revealed that the prevalence of recurrent complaints among Italian adolescents was high in all the Regions considered, and that, in general, such complaints were more common among females than among males, as also reported in other studies [7, 8, 17-19]. The most frequent complaint proved to be headache, followed by backache and stomachache. Moreover, it emerged that the prevalence of backache was higher than that of stomachache, especially among males, in the majority of Regions. These data are in line with those of other studies, in which backache has been observed to be more common than stomachache among older adolescents [8].

Overall, about half of Italian adolescents make use of medicines, particularly in order to alleviate headache, as reported in other studies [18, 19], and, in second position, stomachache, with medicine use being more fre-

Tab. II. Prevalence of recurrent complaints, subdivided by sex and Region.

Regions	Recurrent headache			Recurrent stomachache			Recurrent backache					
	Males	Females	p	Total	Males	Females	p	Total	Males	Females	p	Total
Abruzzo	34.35	57.99	< 0.001	46.33	16.03	38.29	< 0.001	27.31	24.43	34.20	0.02	29.38
Basilicata	28.71	63.94	< 0.001	46.06	23.44	43.27	< 0.001	33.17	19.14	43.27	< 0.001	31.03
Bolzano	20.00	43.53	< 0.001	34.11	15.88	21.96	NS	19.53	21.76	27.84	NS	25.41
Calabria	34.92	64.87	< 0.001	49.76	21.27	41.27	< 0.001	31.12	25.88	34.29	0.03	29.86
Campania	36.10	67.48	< 0.001	51.00	21.15	43.36	< 0.001	31.67	29.39	31.82	NS	30.50
Emilia Romagna	26.76	59.94	< 0.001	42.77	20.59	35.02	< 0.001	27.55	25.88	40.69	< 0.001	33.03
Friuli Venezia Giulia	29.67	51.98	< 0.001	40.27	18.16	30.23	< 0.001	23.89	23.33	37.01	< 0.001	29.80
Lazio	24.48	62.91	< 0.001	42.51	18.26	38.50	< 0.001	27.75	21.58	44.60	< 0.001	32.38
Liguria	27.35	55.24	< 0.001	42.07	16.62	38.33	< 0.001	28.09	28.42	41.19	< 0.001	35.14
Lombardia	25.00	54.50	< 0.001	39.29	14.91	33.78	< 0.001	24.06	23.19	40.77	< 0.001	31.68
Marche	32.18	58.53	< 0.001	46.97	20.19	35.31	< 0.001	28.67	27.44	41.71	< 0.001	35.40
Molise	25.81	56.00	< 0.001	40.43	21.07	37.45	< 0.001	28.98	25.18	33.09	0.05	28.80
Piemonte	36.98	59.80	< 0.001	48.30	21.29	35.92	< 0.001	28.53	30.23	38.56	0.04	34.36
Puglia	33.22	56.16	< 0.001	44.64	20.49	33.56	< 0.001	26.99	20.14	32.88	< 0.001	26.47
Sardegna	30.20	59.22	< 0.001	44.63	21.78	40.29	< 0.001	30.98	33.17	40.29	NS	36.59
Sicilia	25.50	60.39	< 0.001	43.16	17.11	42.67	< 0.001	29.98	27.61	38.64	0.005	33.11
Toscana	27.48	61.93	< 0.001	45.23	14.73	38.83	< 0.001	27.19	23.23	39.09	< 0.001	31.30
Trento	24.92	52.48	< 0.001	39.07	14.14	29.50	< 0.001	22.03	24.58	37.27	< 0.001	31.03
Umbria	28.47	53.99	< 0.001	40.13	15.02	34.81	< 0.001	24.05	26.29	37.74	< 0.001	31.52
Val d'Aosta	36.17	59.46	< 0.001	47.77	31.21	40.54	NS	35.74	35.46	43.92	NS	39.52
Veneto	33.90	59.25	< 0.001	47.15	17.29	38.16	< 0.001	28.18	26.71	38.55	< 0.001	32.86
Total	29.80	57.92	< 0.001	43.94	18.44	36.54	< 0.001	27.54	25.75	38.00	< 0.001	31.86

NS = not significant

Tab. III. Prevalence of medicine use, subdivided by sex and region.

Regions	Medicines for headache			Medicines for stomachache			Medicines for sleeping difficulties			Medicines for nervousness						
	Males	Females	p	Total	Males	Females	p	Total	Males	Females	p	Total				
Abruzzo	32.31	48.13	< 0.001	40.11	15.89	32.46	< 0.001	24.11	3.88	4.85	NS	4.33	4.25	6.72	NS	5.46
Basilicata	30.43	49.76	< 0.001	39.38	19.42	41.67	< 0.001	29.83	5.83	3.40	NS	4.53	5.83	6.83	NS	6.21
Bolzano	31.76	46.27	0.004	40.47	14.12	32.55	< 0.001	25.18	7.06	7.45	NS	7.29	7.65	10.59	NS	9.41
Calabria	37.94	54.02	< 0.001	45.18	20.90	33.33	< 0.001	26.70	2.25	3.21	NS	2.69	4.50	6.75	NS	5.53
Campania	36.25	53.36	< 0.001	43.83	23.62	33.10	0.01	27.83	2.92	3.51	NS	3.17	5.18	7.75	NS	6.33
Emilia Romagna	29.97	55.70	< 0.001	42.16	16.12	28.98	< 0.001	22.07	2.68	4.49	NS	3.50	4.73	5.73	NS	5.18
Friuli Venezia Giulia	34.79	53.98	< 0.001	43.62	11.83	28.49	< 0.001	19.60	4.10	6.55	NS	5.23	2.05	6.82	0.003	4.30
Lazio	26.78	51.90	< 0.001	38.11	22.59	34.43	0.007	27.97	3.80	4.29	NS	3.96	6.72	10.90	NS	8.59
Liguria	31.27	50.72	< 0.001	41.18	15.55	33.73	< 0.001	24.94	4.07	7.91	0.04	6.05	3.23	7.25	0.02	5.29
Lombardia	31.21	57.69	< 0.001	43.82	15.42	33.63	< 0.001	24.17	4.41	5.42	NS	4.86	2.64	6.79	0.006	4.64
Marche	29.21	44.74	< 0.001	37.55	17.57	32.21	< 0.001	25.44	2.86	4.07	NS	3.50	4.13	6.99	NS	5.65
Molise	30.00	44.89	< 0.001	37.03	13.57	31.14	< 0.001	22.00	2.51	1.82	NS	2.15	5.36	4.74	NS	5.01
Piemonte	32.26	53.95	< 0.001	42.79	18.83	33.88	< 0.001	26.09	3.57	4.26	NS	3.89	4.85	5.61	NS	5.19
Puglia	32.62	54.64	< 0.001	43.43	19.08	30.24	0.003	24.57	2.14	4.11	NS	3.11	5.32	7.24	NS	6.23
Sardegna	27.86	55.61	< 0.001	41.46	16.42	36.45	< 0.001	26.10	1.99	7.84	0.01	4.88	2.51	7.80	0.03	5.12
Sicilia	36.86	46.25	0.02	41.19	20.34	40.98	< 0.001	30.48	3.74	3.30	NS	3.46	6.14	6.86	NS	6.43
Toscana	27.07	53.59	< 0.001	40.32	13.71	35.13	< 0.001	24.54	4.00	4.88	NS	4.38	2.85	7.69	0.006	5.31
Trento	31.96	48.90	< 0.001	40.03	9.69	31.35	< 0.001	20.58	2.76	6.25	NS	4.50	3.11	6.58	NS	4.82
Umbria	30.88	55.71	< 0.001	41.77	14.73	29.61	< 0.001	21.27	2.36	4.47	NS	3.29	3.77	7.80	0.02	5.57
Val d'Aosta	30.94	55.78	< 0.001	42.96	18.44	34.69	0.003	26.46	0	7.48	0.002	3.78	2.86	8.84	NS	5.84
Veneto	34.29	55.71	< 0.001	45.26	14.41	33.72	< 0.001	24.32	3.45	6.76	0.006	5.15	5.16	7.57	NS	6.37
Total	32.01	52.24	< 0.001	41.84	16.42	33.20	< 0.001	24.65	3.37	5.16	< 0.001	4.23	4.32	7.23	< 0.001	5.73

t significant

Tab. IV. Association between propensity to recurrent complaints and medicine use.

Recurrent complaint	Medicines for headache		Medicines for stomachache		Medicines for sleeping difficulties		Medicines for nervousness	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Males								
Headache	4.14 MOR = 1.03	3.70-4.63 ICC = 0.00003	1.78 MOR = 1.19	1.56-2.04 ICC = 0.01	2.45 MOR = 1.05	1.87-3.21 ICC = 0.001	2.12 MOR = 1.19	1.67-2.70 ICC = 0.01
Stomachache	1.80 MOR = 1.06	1.58-2.04 ICC = 0.001	3.85 MOR = 1.19	3.33-4.44 ICC = 0.01	2.67 MOR = 1.09	2.01-3.54 ICC = 0.003	2.52 MOR = 1.16	1.96-3.24 ICC = 0.007
Backache	1.33 MOR = 1.06	1.19-1.50 ICC = 0.001	1.48 MOR = 1.20	1.28-1.70 ICC = 0.01	2.08 MOR = 1.04	1.58-2.74 ICC = 0.0004	1.90 MOR = 1.18	1.49-2.43 ICC = 0.01
Females								
Headache	4.38 MOR = 1.14	4.07-4.72 ICC = 0.006	1.55 MOR = 1.03	1.39-1.72 ICC = 0.0004	2.06 MOR = 1.27	1.62-2.61 ICC = 0.02	2.13 MOR = 1	1.73-2.62 ICC = 0
Stomachache	1.67 MOR = 1.12	1.51-1.84 ICC = 0.004	2.89 MOR = 1	2.60-3.21 ICC = 0	2.25 MOR = 1.28	1.81-2.79 ICC = 0.02	1.93 MO = 1	1.61-2.32 ICC = 0
Backache	1.43 MOR = 1.11	1.29-1.58 ICC=0.004	1.42 MOR = 1.05	1.28-1.57 ICC = 0.0008	1.49 MOR = 1.24	1.20-1.85 ICC = 0.02	1.55 MOR = 1	1.29-1.87 ICC = 0

quent among females than males [3, 6, 7, 9]. These data support the conviction that adolescents now have easier access to medicines as a result of modifications in pharmaceutical regulations, more aggressive marketing and the changing attitudes of parents, who are the primary source of medicines [2, 6, 7]. In addition, the odds of medicine use for headache and stomachache were seen to be substantially higher among adolescents with corresponding recurrent pain than among those who reported less frequent pain in all the regions considered. Interestingly, boys with recurrent stomachache were seen to be much more likely to take medicines to treat this complaint than girls; although the medicine taken proved to be appropriate to the type of complaint, it should be stressed, as already pointed out by the results of national and international studies, that adolescent boys should not be underestimated as a subgroup at risk of excessive medicine use [20, 21].

In addition, it emerges from the present study that adolescents suffering from recurrent complaints are also more likely to use medicines that are not appropriate to the treatment of their specific complaint. This tendency, which was documented among adolescents of both sexes in our study, has been observed in international studies, in which adolescents with recurrent complaints have been seen to display a greater likelihood of using medicines in general and, in particular, medicines that are not specific to the treatment of their symptoms [20]. Those adolescents who most frequently take medicines to alleviate their pain not only report a higher frequency of pain, but also a higher frequency of anxiety, depression and functional disabilities than adolescents who make little or no use of medicines [22]. Moreover, the tendency to take medicines has been observed more frequently among young people with scant coping resources

and poor self-rated health, and those of lower social class [8, 21].

A limitation of the present study is its lack of a clinical diagnosis of the intensity of each individual complaint and the unavailability of data on the social class of the respondents' parents; indeed, previous studies have found a correlation between the use of medicines and low parental social class, in addition to the conditions of having a scant sense of coherence and being a victim of bullying [21]. Nevertheless, the subjective perception of pain, regardless of its primary cause, is important in that it impacts on the adolescent's general well-being; indeed, recurrent pain has a detrimental effect on adolescents' daily functioning and quality of life [24-27]. Overall, the data reported in this study reveal that over 40% of 15-year-old adolescents in Italy report suffering from recurrent headache, followed by stomachache and backache. Adolescent girls are more likely to take medicines to treat headache and stomachache, while those of both sexes who suffer from recurrent complaints are more likely to take medicines that are not intended for the treatment of their specific complaint.

Adolescents' use of medicines to treat recurrent complaints is a complex phenomenon which needs to be properly studied. Indeed, this behaviour may be influenced by many factors, such as the attitudes, social class and educational level of parents, which should be taken into account. Given that behaviours acquired during adolescence tend to be carried over into adulthood, the recurrent complaints experienced by adolescents may increase the risk of chronic complaints and critical health disorders in adulthood [28]. Thus, the use of medicines in adolescence is a public health concern and constitutes an emerging issue that requires more attention and investigation on the part of scientific research and greater awareness among adults and health professionals.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

GL wrote the first draft of the manuscript; AP conducted the statistical analyses; RS, FC, PD, PL, LC, PB, AB, AV, ML, LC and PB contributed to the paper revision and to the final manuscript editing. All authors have critically revised the manuscript and approved the final version. PD, AB, PL, FC, LC, PB, RS, AV, ML and GL participated in designing the study and data collection as members of the HBSC Italian team.

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