MONOGRAPHIC SECTION

Dietary habits among Italian adolescents and their relation to socio-demographic characteristics

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Abstract
Objective. The aim is to describe dietary habits and their association with socio-demographic characteristics in a large nationally representative sample of Italian adolescents aged 11, 13 and 15 years.
Materials and methods. Data from the 2018 Italian Health Behaviour in School-aged Children (HBSC) survey on 58,976 adolescents were analysed to determine eating habits. Logistic regression was used to investigate the association between incorrect dietary habits and potential predictors.
Results. 38.3% of boys and 48.1% of girls skipped breakfast and 54.1% did not consume fruit and/or vegetables daily. 15.9% of boys and 11.3% of girls drank carbonated-sugary beverages at least once a day. Incorrect dietary habits were more common among boys, adolescents with lower socio-economic conditions, residents in Southern Italy and those spending more time watching TV. Italian adolescents were more likely to have incorrect dietary habits compared with those from most other countries involved in 2018 HBSC.
Conclusions. Action is needed to improve dietary habits among adolescents.

Key words
• eating behaviour
• beverage
• vegetables
• fruit
• breakfast

INTRODUCTION

Adolescence is a critical time for adopting lifelong health behaviours [1, 2]; different habits, either positive or negative, are established during this period of life and health-related behaviours adopted by young people may persist throughout adulthood [3]. Unhealthy eating habits, insufficient physical activity, smoking, alcohol and substance abuse are some of the negative behaviours that may be observed among adolescents.

In particular, incorrect dietary habits, reduction of physical activity and time spent playing outside may lead to a higher prevalence of overweight and obesity in children and adolescents [4-6]. In addition, screen media exposure is another factor that might contribute to increase the risk of incorrect eating habits characterized by a high consumption of energy-dense foods and sweetened drinks during the viewing. Furthermore, low-nutrient food and beverage marketing can influence adolescent food preferences, purchases and consumption [5, 7, 8].

Diet plays an important role in the quality of life not only during adolescence but also through adult life. Unhealthy eating habits, in addition to other several environmental and genetic factors, might contribute to the development of overweight, obesity and diet-related non-communicable diseases [9-11]. In order to encourage healthy dietary choices by young people, the knowledge of their dietary habits is essential to promote innovative policies and focused actions. This knowledge can be obtained by surveillance and monitoring initiatives [12, 13].

The World Health Organization (WHO) recommends for adolescents a daily consumption of five portions (400 grams) of fruit and vegetables [5], but adolescent diets are often low in fruit and vegetables. A meta-analysis conducted between 2003 and 2011 found that in low/middle-income countries 74% of adolescents aged 12 to 15 years consumed fruit and vegetables less than 5 times per day [14]. The recent international report on 2018 Health Behaviours in School-aged Children (HBSC) survey stated that the daily consumption of fruit and vegetables among European adolescents

aged 11, 13 and 15 years was for all age groups 40% and 38%, respectively [15].

Starting the day with breakfast is a basic dietary recommendation especially for children and adolescents [16]. Breakfast is considered the "most important meal of the day" and recent scientific reviews addressed many aspects related to its essential role in people diet and its possible impact on body weight control, as well as on other physiological, social and cultural aspects [17]. Breakfast consumption is positively associated with an adequate nutrient intake in children and adolescents [18]. In contrast, skipping breakfast in young people is linked with higher adiposity measures as found in both cross-sectional and longitudinal studies [19, 20]. Findings from the international 2018 HBSC report showed a significant difference between gender prevalence of breakfast consumption on every school day among 11-15 year old European adolescents (61% boys and 55% girls) [15].

Adolescent diet often involves high intakes of energy-dense and nutrient-poor foods, including sweet and salty snacks, sugar-sweetened beverages (SSB) and fast foods [21]. A recent review of sugar consumption in Europe and North America highlighted that the adolescent diet had a higher amount of added sugars than that of any other age-group [22]. As reported by the 2018 HBSC investigation, one in four (25%) European adolescents aged 11, 13 and 15 years consume sweet chocolates daily. Additionally, 16% of adolescents, between ages 11 and 15, participating in the HBSC international survey, claimed to consume sugared soft drinks daily [15].

A wide variety of social and economic factors is associated with eating patterns and behaviours of adolescents. These include peer influence, parental modelling, food availability, food preferences, cost, convenience, personal and cultural beliefs, mass media, body image, socio-economic status, family structure, parents' education and occupation. These factors might contribute to unhealthy diets and poor nutrition especially for the most vulnerable groups [23-27]. In order to adopt and implement appropriate policies and measures to promote healthy food choices as well as healthier lifestyles among young people, it is essential to understand how these factors can influence their eating habits [12, 13].

The aim of this study was to describe dietary habits (i.e. consumption of breakfast, fruit, vegetables, legumes and carbonated-sugary drinks) and their possible association with geographic and socio-demographic characteristics (i.e. Family Affluence Scale – FAS, family meals, parents' educational level) in a large nationally representative sample of Italian adolescents aged 11, 13 and 15 years. Furthermore, in the discussion these Italian data were compared with those from other European and North American countries involved in the international 2018 HBSC survey [15].

MATERIALS AND METHODS

In 2018, a survey was conducted in all Italian Regions on students (11, 13 and 15 year-old) in the framework of the international Health Behaviour in School-aged Children study. Target classes were the first and third

grade of middle school and the second grade of high school. To all subjects attending the sampled classes a questionnaire was administered to collect information on their dietary habits, physical activity, risk behavior and well-being, their relationship with the school, parents and peers as well as general information concerning their health and social background. A stratified cluster sample design, with class as the primary sampling unit, was used (see *Appendix 1*).

In the self-completed anonymous questionnaire, students were asked to indicate parents' educational level and country of birth. For these analyses the highest educational level between the two parents was considered and three educational levels were taken into account: "low" (both parents with less than high school), "medium" (at least one of the parents with high school) and "high" (one of the parents with university degree or higher); a fourth category, regarding the answer "don't know", was also considered.

Country of birth was categorized into "both Italians", "at least one foreign parent" and "both foreigners".

The socio-economic position of the students' families was measured according to the FAS described in *Appendix 1*.

The numbers of hours spent using TV/Tablet/PC were calculated by adding up hours spent watching television (including videos and DVDs) on weekdays and on the weekend (possible responses were "never" to "about 7 or more hours a day") and hours spent playing on electronic devices (possible responses were "never" to "about 7 or more hours a day"). This sum was recoded into "≤2 hours a day" *vs* ">2 hours a day".

For nutritional habits, the frequency of family meals (possible responses were every day/most days/ about once a week/less than once a week/never) was dichotomized into "every day" *vs* "less than every day". Students were asked to indicate how many times they had breakfast (defined as having more than a glass of milk or fruit juice) during schooldays (possible responses were "never" to "five days") and during weekend (possible responses were "never" to "both days").

In the analysis, only breakfast consumption during school days was considered because it was assumed that during weekend days this would be different. Breakfast consumption on weekdays was dichotomized into "daily breakfast" (five days a week) and "no daily breakfast" (less than five days a week).

Students also reported how many times per week they consumed fruit, vegetables, legumes (i.e. peas, chickpeas, beans) and carbonated-sugary drinks (possible responses: never/less than once a week/once a week/ two to four times a week/five to six times a week/once a day/more than once a day). Consumption of fruit and vegetables was dichotomized into "at least once a day" *vs* "less than once a day"; in the logistic regression models the consumption of fruit and vegetable were combined and dichotomized into "fruit or vegetables at least once a day" *vs* "neither fruit nor vegetables at least once a day". Legume consumption was categorized as "at least twice a week" or "less than twice a week" and carbonated-sugary drinks as "less than once a day" *vs* "at least once a day".

Using the above 5 dietary indicators a global score was created by counting the number of correct habits, ranging from 0 to 5: daily breakfast (yes = 1, no = 0), consumption at least once a day of fruit (yes =1, no = 0) consumption at least once a day of vegetables (yes = 1, no = 0), consumption at least twice a week of legumes (yes = 1, no = 0) and consumption less than once a day of carbonated-sugary drinks (yes = 1, no = 0); this global score was dichotomized into "less than 3" *vs* "at least 3" correct habits.

Logistic regression models for dietary indicators were fitted to assess the association with socio-demographic and behavioural characteristics. The likelihood of unhealthy eating habits was described by odds ratios (OR) with a 95% confidence interval (CI). Stata software version 16.1 was used for all statistical analyses. Missing data were excluded from the analysis.

RESULTS

The Italian HBSC 2018 survey included 64,929 students from 4,183 selected classes. After data cleaning and applying the inclusion criteria, 58,976 students' data were eligible for analysis. *Table 1* shows the main characteristics of the sample. For each age group, the male and female ratio is 1:1 (male: 29,820 *vs* female: 29,156). Almost half of the sample were resident in the Northern regions (boys: 45.0%; girls: 46.2%), a third in the Southern Regions (boys: 37.3%; girls: 36.4%) and the remaining in Central Italy (boys: 17.7%; girls: 17.4%).

The majority of adolescents (boys: 86.7%; girls: 87.0%) reported to have both Italian parents, followed by students who had both foreign parents (boys: 7.8%; girls: 7.5%) and 5.5% of boys and girls with one foreign parent. More than one third of teenagers (boys: 35.8%;

Table 1
Socio-demographic and behavioural characteristics of the sample by age and gender. Italy, 2018

Sample characteristics*	11 years old N = 19,504		13 years old N = 20,554		15 years old N = 18,918		All age group N = 58,976	
	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)
Residence area								
North	48.5	49.2	46.5	46.2	37.9	42.5	45.0	46.2
Centre	17.2	17.8	17.1	17.6	19.4	16.7	17.7	17.4
South	34.3	33.0	36.4	36.2	42.7	40.8	37.3	36.4
Missing	-	-	-	-	-	-	-	-
Parents' country of birth								
Both Italians	85.9	86.0	85.8	86.7	88.9	88.7	86.7	87.0
One foreign parent	5.4	5.1	5.8	5.7	5.1	5.8	5.5	5.5
Both foreigners	8.7	8.9	8.4	7.6	6.0	5.5	7.8	7.5
Missing	4.9	4.9	4.2	3.5	3.1	2.2	4.2	3.7
Parents' educational level**								
Low level of education	7.0	6.1	11.2	13.1	14.1	14.2	10.4	10.9
Medium level of education	21.7	21.9	42.1	44.3	46.2	47.5	35.8	37.3
High level of education	26.9	28.1	30.4	28.5	29.3	30.4	28.8	28.9
Don't know	44.4	43.9	16.3	14.1	10.4	7.9	25.0	22.9
Missing	5.6	5.3	3.0	2.1	4.8	2.7	4.4	3.4
Family Affluence Scale (FAS)								
Low	28.0	29.7	27.5	30.1	29.8	31.3	28.3	30.3
Medium	47.0	47.8	46.8	47.1	47.9	47.9	47.2	47.6
High	25.0	22.5	25.7	22.8	22.3	20.8	24.5	22.1
Missing	3.5	2.7	3.6	1.9	2.8	1.6	3.3	2.1
Hours "screen time" daily								
<= 2 hours	45.5	54.3	33.2	42.4	31.6	40.7	37.3	46.2
> 2 hours	54.5	45.7	66.8	57.6	68.4	59.3	62.7	53.8
Missing	3.5	2.5	3.3	1.5	2.8	1.7	3.2	1.9
Family meal every day								
Yes	55.9	55.9	59.1	57.0	56.9	54.3	57.3	55.8
No	44.1	44.1	40.9	43.0	43.1	45.7	42.7	44.2
Missing	0.9	0.9	0.6	0.3	0.5	0.3	0.7	0.5

*For each variable, percentages are calculated on the total of subjects excluding those with missing information. Percentage of those missings are calculated on the total.
**The highest educational level between the two parents.

girls: 37.3%) reported at least one parent with a medium level of education, one third (boys: 28.8%; girls: 28.9%) at least one parent with high level of education and the remaining (boys: 10.4%; girls: 10.9%) both parents with low educational level. About a quarter of the respondents did not know the educational level of their parents; this aspect was highest for 11-year-old and followed a decreasing trend with age. The majority of adolescents had a medium FAS level (boys: 47.2%; girls: 47.6%) and about one-third a low FAS level.

There were some differences between the adolescents' use of TV or other devices: more than one half (boys: 62.7%; girls: 53.8%) spent more than two hours per day watching television or other devices. This habit is more common among boys than girls for all age groups. More than one half of adolescents (boys: 57.3%; girls: 55.8%) said to consume at least one family meal every day.

Data quality in terms of completeness was good; missing values were less than 6% for each of the considered variables.

Dietary habits

The prevalence rates of dietary indicators by age and gender are presented in *Table 2*. Overall, more than one half of the adolescents (boys: 61.7%; girls: 51.9%) reported to consume breakfast every school day, while 38.3% of boys and 48.1% of girls skipped breakfast, a bad habit that increased with age. More than a half of the sample (boys: 67.5%; girls: 61.1%) reported not to eat fruit every day and this habit was more common among those who are 15-years old compared to the younger age groups.

77.9% of boys and 67.5% of girls did not eat vegetables daily and this was constant among age groups and the values were higher among boys. Overall, the percentage of adolescents that reported no daily consumption of fruit and/or vegetables was 54.1%.

About one-half of the adolescents (boys: 48.3%; girls: 51.1%) consumed legumes at least twice a week; this slightly increased with age and was more common among girls for all age groups.

15.9% of boys and 11.3% of girls drank carbonated-sugary beverages at least once a day, with lower percentages among girls for all age groups.

Considering these 5 dietary indicators, the adolescents who had less than 3 correct dietary habits were 40.3% at eleven years, 42.8% at thirteen years and 43.8% at fifteen years; the proportions were slightly higher among boys than girls.

Multivariate analyses

The results of the logistic regression model applied to the dietary habits are reported in *Table 3*. The risk of not consuming breakfast daily on school days significantly increased with age (13 years: OR = 1.36, 95% CI = 1.24-1.48; 15 years: OR = 1.49, 95% CI = 1.36-1.62). In addition, this risk is higher for girls (OR = 1.54, 95% CI = 1.44-1.64) and for those who live in the Central (OR = 1.12, 95% CI = 1.03-1.22) and Southern regions (OR = 1.70, 95% CI = 1.57-1.85). Also, the risk was found to be higher for those with both parents foreign (OR = 1.23, 95% CI = 1.09-1.40) and for adolescents

who spend more than 2 hours a day watching TV or other devices (OR = 1.24, 95% CI = 1.16-1.32).

Geographical area of residence was associated with the consumption of fruit and/or vegetables. In detail, the results showed that students from Central and Southern regions were more likely to not consume fruit or vegetables every day than those from the North (Centre: OR = 1.10, 95% CI = 1.02-1.19; South: OR = 1.43, 95% CI = 1.33-1.55). A higher risk was also observed among adolescents that spend more than 2 hours a day watching TV or other devices (OR = 1.37, 95% CI = 1.29-1.45) and among students aged 13-15 years (13 years: OR = 1.12, 95% CI = 1.03-1.22; 15 years: OR = 1.17, 95% CI = 1.07-1.27).

The risk of daily consumption of carbonated-sugary drinks is higher among adolescents that live in the Southern regions (OR = 1.48, 95% CI = 1.31-1.67) compared with those from the Central and Northern ones and among adolescents who spend more than 2 hours a day watching TV or other devices (OR = 1.69, 95% CI = 1.53-1.86).

The consumption of legumes at least twice a week significantly increased with age and parents' educational level.

In general medium-high parents' educational level, in addition to medium-high family FAS and family meal consumption, were positively associated with some correct habits: daily consumption of fruit/vegetables and breakfast; weekly consumption of legumes; low intake of carbonated-sugary drinks.

The model of the score of correct dietary habits shows that adolescents who are more likely to have a bad diet (less than 3 correct dietary habits) spent more than 2 hours a day watching TV or other devices (OR = 1.55, 95% CI = 1.45-1.65) and are residents in Southern Italy (OR = 1.24, 95% CI = 1.14-1.34). On the contrary, adolescents who were more likely to have a better diet were characterized by higher educated parents (high educational level: OR = 0.51, 95% CI = 0.45-0.57) and a major FAS (high FAS: OR = 0.75, 95% CI = 0.69-0.82). Additionally, eating a meal with the family every day is positively associated with having a better diet (OR = 0.83, 95% CI = 0.78-0.88).

DISCUSSION

The results show that dietary habits in some Italian adolescents are not in line with the Dietary Guidelines [5, 28]. In detail, 4 out of 10 adolescents skipped breakfast, more girls than boys; 7 out of 10 adolescents did not consume vegetables daily and 1 in 2 did not consume both fruit and vegetables daily. Approximately 1 in 7 consumed carbonated-sugary beverages at least once a day and a lower percentage was found among girls for all age groups. Considering the total number of correct dietary habits, adolescents who had less than 3 correct dietary habits were 40.3% at eleven years, 42.8% at thirteen years and 43.8% at fifteen years; boys had higher prevalence of incorrect dietary habits than girls.

Comparing these findings to other research, it can be observed that most of the studies reported that at least 10-30% of children and adolescents never eat breakfast [29]. Additionally, an increasing prevalence was noticed

Table 2
Dietary indicators by age and gender. Italy, 2018

Dietary habits*	11 years old N = 19,504		13 years old N = 20,554		15 years old N = 18,918		All age group N = 58,976	
	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)
Breakfast daily								
Yes	64.8	60.5	61.6	48.1	57.5	45.8	61.7	51.9
No	35.2	39.5	38.4	51.9	42.5	54.2	38.3	48.1
Missing	3.8	2.6	2.2	1.7	1.6	1.2	2.6	1.9
Fruit at least once a day								
Yes	35.6	41.0	31.8	38.2	29.2	37.1	32.5	38.9
No	64.4	59.0	68.2	61.8	70.8	62.9	67.5	61.1
Missing	0.5	0.4	0.4	0.2	0.2	0.1	0.4	0.2
Vegetables at least once a day								
Yes	23.1	31.1	22.2	33.0	20.7	33.7	22.1	32.5
No	76.9	68.9	77.8	67.0	79.3	66.3	77.9	67.5
Missing	0.6	0.4	0.6	0.2	0.3	0.1	0.5	0.3
Fruit/Vegetables at least once a day								
Yes	44.0	52.4	40.5	50.5	37.1	50.0	40.9	51.1
No	56.0	47.6	59.5	49.5	62.9	50.0	59.1	48.9
Missing	0.7	0.5	0.6	0.2	0.3	0.1	0.6	0.3
Legumes at least twice a week								
Yes	43.9	47.2	49.0	52.3	53.2	54.6	48.3	51.1
No	56.1	52.8	51.0	47.7	46.8	45.4	51.7	48.9
Missing	1.1	1.0	1.2	0.8	0.7	0.4	1.4	0.7
Carbonated-sugary drinks less than once a day								
Yes	83.8	87.5	84.1	88.4	84.3	90.4	84.1	88.7
No	16.2	12.5	15.9	11.6	15.7	9.6	15.9	11.3
Missing	0.6	0.4	0.4	0.1	0.3	0.1	0.5	0.2
Correct dietary habits								
Less than 3	42.8	37.7	43.2	42.3	45.5	42.3	43.7	40.7
At least 3	57.2	62.3	56.8	57.7	54.5	57.7	56.3	59.3
Missing	5.5	3.5	3.5	2.6	2.2	1.7	3.9	2.7
Number of correct dietary habits								
0	1.9	1.5	2.2	1.9	2.0	1.7	2.0	1.7
1	13.2	11.5	11.9	12.4	12.3	10.9	12.5	11.7
2	27.7	24.8	29.2	28.0	31.2	29.7	29.2	27.3
3	31.7	31.0	32.4	28.1	32.5	28.0	32.2	29.0
4	17.6	20.2	17.3	19.7	14.9	19.2	16.7	19.8
5	7.9	11.0	7.0	9.9	7.1	10.5	7.4	10.5
Missing	4.5	3.5	3.5	2.6	2.2	1.7	3.9	2.7

*For each variable, percentages are calculated on the total of subjects excluding those with missing information. Percentage of those missings are calculated on the total.

in adolescents, mainly in girls [29, 30]. Furthermore, since 2014, a significant decline in daily breakfast consumption was observed in most countries, including Italy [15, 31].

The determinants of fruit and vegetable intake among adolescents are numerous: gender, age, parental vegetable and fruit consumption, and the availability/accessibility of these foods at home. In addition, girls tend to have a higher or more frequent intake of fruit and vegetables than boys [32, 33]. In general our findings suggest that the daily frequency of fruit and vegetables consumption was very low among Italian young people.

Carbonated-sugary beverages are the leading source

Table 3
Logistic regression models for dietary indicators. Italy, 2018

Indipendent variables	No daily breakfast N = 57,874			Fruit/Vegetables less than once a day N = 58,708			Legumes less than twice a week N = 58,355			Carbonated-sugary drinks at least once a day N = 58,746			Less than 3 correct dietary habits N = 57,308		
	Prev	OR*	95% CI	Prev	OR*	95% CI	Prev	OR*	95% CI	Prev	OR*	95% CI	Prev	OR*	95% CI
Age															
11 years	37.3	1		51.9	1		54.5	1		14.4	1		40.3	1	
13 years	45.0	1.36	(1.24-1.48)	54.6	1.12	(1.03-1.22)	49.3	0.83	(0.76-0.91)	13.8	0.94	(0.83-1.07)	42.8	1.09	(1.00-1.20)
15 years	48.4	1.49	(1.36-1.62)	56.4	1.17	(1.07-1.27)	46.1	0.76	(0.69-0.83)	12.6	0.86	(0.75-0.98)	43.8	1.12	(1.03-1.23)
Gender															
Males	38.3	1		59.1	1		51.7	1		15.9	1		43.7	1	
Females	48.1	1.54	(1.44-1.64)	48.9	0.67	(0.62-0.71)	48.9	0.91	(0.86-0.97)	11.3	0.67	(0.61-0.74)	40.7	0.91	(0.85-0.97)
Residence area															
North	37.8	1		49.8	1		57.8	1		11.8	1		39.7	1	
Centre	40.9	1.12	(1.03-1.22)	52.6	1.10	(1.02-1.19)	51.4	0.76	(0.69-0.82)	12.1	1.03	(0.91-1.17)	39.7	0.97	(0.89-1.05)
South	51.0	1.70	(1.57-1.85)	60.2	1.43	(1.33-1.55)	40.5	0.47	(0.43-0.51)	16.7	1.48	(1.31-1.67)	46.5	1.24	(1.14-1.34)
Parents' country of birth															
Both Italians	42.9	1		54.5	1		50.5	1		13.2	1		42.2	1	
One foreign parent	42.0	1.03	(0.91-1.17)	52.9	0.94	(0.83-1.08)	51.0	0.97	(0.85-1.11)	13.2	1.10	(0.91-1.32)	40.8	0.97	(0.85-1.11)
Both foreigns	45.7	1.23	(1.09-1.40)	49.7	0.76	(0.67-0.87)	48.3	0.69	(0.61-0.78)	18.2	1.38	(1.17-1.62)	42.0	0.86	(0.76-0.98)
Parent's educational level**															
Low level of education	52.0	1		64.6	1		47.7	1		22.2	1		53.5	1	
Medium level of education	44.9	0.87	(0.79-0.97)	56.0	0.77	(0.69-0.86)	49.0	0.88	(0.79-0.98)	12.8	0.60	(0.52-0.68)	43.1	0.72	(0.65-0.80)
High level of education	39.1	0.75	(0.67-0.84)	45.3	0.54	(0.48-0.61)	47.5	0.78	(0.69-0.87)	8.5	0.40	(0.34-0.47)	33.1	0.51	(0.45-0.57)
Don't know	41.7	0.92	(0.82-1.03)	56.4	0.87	(0.77-0.99)	56.0	1.03	(0.91-1.16)	17.3	0.82	(0.70-0.96)	46.4	0.89	(0.79-1.00)
Family Affluence Scale (FAS)															
Low	48.2	1		60.1	1		48.2	1		17.0	1		48.2	1	
Medium	42.3	0.89	(0.83-0.96)	54.3	0.89	(0.82-0.96)	51.1	1.04	(0.96-1.13)	12.4	0.85	(0.77-0.95)	41.6	0.86	(0.80-0.93)
High	38.9	0.84	(0.76-0.92)	46.3	0.70	(0.64-0.77)	50.8	1.01	(0.93-1.10)	11.6	0.92	(0.80-1.06)	35.6	0.75	(0.69-0.82)
Hours "screen time" daily															
≤ 2 hours	39.4	1		48.6	1		47.7	1		10.0	1		35.3	1	
> 2 hours	45.8	1.24	(1.16-1.32)	58.0	1.37	(1.29-1.45)	51.9	1.25	(1.17-1.33)	16.0	1.69	(1.53-1.86)	46.9	1.55	(1.45-1.65)
Family meals															
Less than every days	44.9	1		57.2	1		52.0	1		12.0	1		44.2	1	
Every days	41.9	0.83	(0.78-0.89)	51.6	0.75	(0.71-0.79)	49.0	0.94	(0.89-1.00)	14.8	1.26	(1.15-1.37)	40.5	0.83	(0.78-0.88)

*Adjusted Odds Ratio for all variables list in the Table 3.
**The highest educational level between the two parents.

of added sugars in adolescents' diet; sugar-containing beverages and free sugars may increase the risk for overweight, obesity and dental caries as well as result in poor nutrient supply and decrease dietary diversity. For these reasons, it is especially important to avoid or limit free sugars in infants and obese/overweight children/adolescents [34-36]. In Italy, a "sugar tax" should be applied to carbonated-sugary beverages from 1st October 2020.

In accordance with other studies [37-40], our results underlined that high consumption of carbonated-sugary beverages as well as low intake of fruit and vegeta-

bles were associated with use of TV or other devices for more than 2 hours per day.

High Family Affluence and parents' high educational level were linked to better eating habits. These results are confirmed by several studies; in particular, socio-economically disadvantaged people showed more difficulties to change unhealthy behaviours since their environments offer fewer opportunities and a diet consisting of healthy foods is generally more expensive [41, 42].

On the contrary, family support as well as the habit to consume meal with family every day have been report-

ed to be positively associated with a better diet among adolescents and these behaviours are also evident for Italian young people [43].

The risk of having a less than 3 correct dietary habits was higher among the adolescents living in the Southern Italy in comparison to that found for the Northern and Central regions. This geographic gradient is also observed for other health indicators in Italian adolescents and children [4].

Eating habits: Italian HBSC results 2018 vs International HBSC results 2018

Dietary habit data obtained from Italian HBSC 2018 study were compared to those from International HBSC 2018 results, which involved 45 countries (including Italy).

Overall International HBSC 2018 data report that the consumption of breakfast every school day was more prevalent among boys than girls and younger adolescents. Concerning to the percentage of adolescents who did not consume breakfast every school day, Italy is in an intermediate position in the ranking of the 45 countries participating to the International HBSC 2018 study (29th place, 21st place and 19th place respectively for 11, 13 and 15 years old).

The results on fruit and vegetable daily consumption showed a lower intake among Italian adolescents compared to the other 45 countries: Italy ranks respectively at 45th, 41st and 36th for the consumption of vegetables among 11, 13 and 15 years old and respectively at 42th, 32th and 16th for 11, 13 and 15 years old for the consumption of fruits.

In comparison with the same international framework, rankings for a meal with family every day for Italian adolescents were: 21st, 17th and 10th for 11, 13 and 15 years, respectively. The International HBSC average showed a decrease of having meal with family every day among older adolescents.

The overall findings indicate that actions to improve healthy dietary habits among young people should be undertaken. In particular, the consumption of fresh fruit and vegetables as well as breakfast every day, in addition to decrease of routine consumption of nutrient-poor foods high in sugars, should be encouraged among both Italian and European adolescents. As reported by WHO, the taxation of sugar-sweetened beverages might be an important action to reduce sugar consumption among young people [44]. The importance of dietary factors to gain health and well-being for every age group of the population has been indicated by the WHO. In the "European Food and Nutrition Action Plan 2015-2020" report, the WHO suggested possible actions that governments should implement to improve the quality of life, such as the creation of healthy food and drink environments, promotion of a balanced and healthy diet by a life course approach taking into account population differences as well as the vulnerability of some groups [13]. In addition, schools can play an important role to encourage healthy food choice by promoting education and restricting the availability of unhealthy foods in school context [45].

STRENGTHS AND LIMITATIONS

The main strength of this study was the use of a large and representative Italian sample to investigate the association between dietary habits of adolescents and social-demographic characteristics with a low percentage of missing values.

However, the questionnaire used in HBSC study does not permit to characterize food consumption patterns by adolescents and portion sizes as well.

Moreover, the parental country of birth and the educational level was reported by the adolescents who, sometimes, did not know the answer to these questions. The HBSC methodology strengths and limitations were described in *Appendix 1*.

CONCLUSIONS

A healthy diet plays a crucial role in the quality of life during adolescence and also into the adult life. Data of this study underline the need to encourage healthy food consumption and the implementation of policies at national and local level. The policy-makers and stakeholders should use the survey's data to promote a cultural change to a healthy diet among all population groups, particularly children and adolescents.

APPENDIX 1. THE HBSC METHODOLOGY
Background

Data were collected as part of the 2018 Health Behaviour in School-aged Children (HBSC) study. HBSC is a World Health Organisation (WHO) Collaborative Cross-National Survey of school students, collecting data every four years on well-being, social environments and health behaviours in early adolescence (aged 11, 13, and 15 years). HBSC 2018 survey includes data from 45 countries across Europe and North America, all adhering to a detailed international study protocol [1, 2].

Italy joined HBSC international network in 2000 and has carried out five data collections (2002, 2006, 2010, 2014, 2018), promoted and funded by the Ministry of Health, and coordinated by the Universities of Torino, Padova and Siena, with the support of Ministry of Education and the Italian regions [3]. Since 2017, the Prime Minister's Decree on "registers and surveillance" has included the Surveillance of behavioural risks at 11-17 years of age among the Surveillance Systems of national and regional relevance, coordinated by the Italian National Institute of Health, with the collaboration of Universities of Torino, Padova and Siena [4].

Methods
Sampling procedures

The sampling procedure adopted in Italy has followed the rules agreed internationally. Class is the primary sampling unit, drawn by systematic cluster sampling of all public schools throughout the Italian regions on the behalf of the Ministry of Education, allowing a national and regional representative sample of youths aged 11, 13, and 15 years. In 2018, the Italian HBSC survey included around 4,100 classes and 85,000 students: the response rates were 86% of all sampled classes and 97% of students.

Data collection

Data were collected using the international questionnaire, including information on health indicators, health-related behaviours and socio-demographic characteristics. Socioeconomic status was assessed according to the Family Affluence Scale (FAS), a reliable indicator of family wealth [5]. The scale consists of six questions including family car ownership, whether adolescents have their own bedroom, number of holidays trips taken in the last year, number of computers owned by the family, dishwasher ownership, and number of bathrooms in the home. The obtained score (0-13) was recoded in a 3-point ordinal scale according to low (0-6), medium (7-9), and high (≥10) family affluence. The geographic area of residence was derived from the Region of residence and classified into North, Central and South Italy according to the Italian National Institute of Statistics (ISTAT) classification.

The questionnaires, distributed in schools, were self-filled and anonymous.

The responses to the questionnaires were acquired through optical reading. The construction of the database, the cleaning of the records and the subsequent analysis of the data were carried out centrally by the coordination group.

Ethics and privacy

Students' parents received an information note with the description of the purpose of the survey before the day of the data collection. Families could refuse the participation by filling in the note that was returned to the teachers of the involved class. In respect of anonymity and privacy, respondents can never be identified.

In 2018, the Italian HBSC study protocol and questionnaire were formally approved by the Ethics Committee of the Italian National Institute of Health (Ref. PROT-PRE876/17, 20 November 2017)

Strengths and limitations

Limitations of the HBSC are the cross-sectional design, which does not allow to draw conclusions about causation, and the self-reported information.

The main strengths are standardized and validated data collection procedures, based on the international HBSC study, and the representativeness of the findings, both at national and regional level, with the largest sample size available in these developmental ages.

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Authors' contributions

PN, SC, AS, DP conceptualized and designed the study. DP analysed the data. PN, SC wrote the first draft. AS contributed to the interpretation of data and reviewed the manuscript. GL and NC critically reviewed the manuscript and approved the final version.

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