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Unhealthy food consumption in adolescence: role of sedentary behaviours and modifiers in 11-, 13- and 15-year-old Italians

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Backgrounds and aim: Unhealthy eating behaviours increase with age and have been associated with adverse health consequences in adulthood. We examined the influence of screen-based sedentary behaviours (SBs) on unhealthy food consumption, such as energy-dense foods and sweetened drinks, among a representative sample of nearly 60 000 adolescents and assessed the role of possible modifiers. **Methods:** Data come from the Italian 2009–10 Health Behaviour in School-aged Children (HBSC) survey. Data on Eating patterns, SBs, physical activity, peers network, BMI and socio-economic status (SES) were collected following the HBSC study protocol. Hierarchical logistic regression models were used. **Results:** Unhealthy food consumption was significantly associated with a lower intake of fruit and vegetables and with the increase of SBs in both sexes and in all ages. The risk was interestingly higher in normal weight adolescents, in those with wider relationships with peers and in low SES children. **Conclusions:** This study adds evidence to support the importance of investing more resources in educational initiatives both to increase parents' awareness to support adolescents on dietary choices and on time spent in screen-based behaviours, independently of their adiposity status; and to develop youth's ability to access and appropriately use media and technologies. Policy makers should also increase their attention on introducing regulatory policies on television food advertising to which youth are exposed.

Introduction

Childhood nutrition has gained increasing attention in recent years,[1] particularly in relation to the global obesity crisis. Dietary factors, such as consumption of fast food and sugar-sweetened drinks,[2] and the type of dietary fat, rather than total fat consumption, are linked to several undesirable health outcomes. These include type-2 diabetes, hypertension, hypercholesterolemia and other metabolic disturbances, as well as overweight and obesity.[1,3] In particular the intake of partially hydrogenated (trans) fat, commonly found in commercial bakery products and fast foods, may raise the risk for both cardiovascular diseases and type-2 diabetes by increasing the serum levels of low-density lipoprotein cholesterol and decreasing high-density lipoprotein cholesterol.[3] In contrast, unsaturated fats from vegetables can lower the risk of these diseases by favouring an high-density lipoprotein increase.[4]

Scholars showed that the 30% of the calories in the average diet of US children derive from sweets, soft drinks, salty snacks and fast food, and consumption of these foods has doubled in the last 30 years.[5] Other studies have reported that one-fifth of British secondary school children consume junk food daily[6] and nearly 50% of French children prefer sugar-sweetened drinks rather than water.[7] Sugar-sweetened drinks furthermore represent a significant source of dietary fructose, which has been associated with higher serum uric acid levels and increased blood pressure in particular in adolescents.[8]

Behavioural factors, such as a reduction of the total amount of physical activity (PA) and an increase in the proportion of time spent in sedentary behaviours (SB), have also been associated with junk food consumption and body mass index (BMI) increase.[9,10] More specifically, TV viewing and other screen-based behaviours have been linked with an increased consumption of energy-dense and junk foods, of sugar-sweetened beverages,[10] and negatively associated with fruit and vegetable intake.[9,10]

A recent review showed that specific dietary patterns are strongly related to the adolescent's peer network, in which friends are more prone to share food-related attitudes and choices.[11]

This recent evidence has shown not only an increase in unhealthy food consumption through adolescence but also a tendency for eating behaviours established in adolescence, both negative and positive ones, to persist into adulthood.[1,3] All of this highlights the need for a better understanding of the factors that can influence adolescents' eating behaviours.

To our knowledge, these correlates of food choices have rarely been studied in a nationally representative sample of young people, using an internationally validated and standardized approach, in particular as regards Italy. The aim of this study, therefore, was to examine the influence of screen-based SB on unhealthy eating among a large representative sample of 11-, 13- and 15-year-old Italian and to assess the role of possible modifiers such as fruit and vegetable consumption, PA, number of friends, BMI and socio-economic status (SES).

Methods

The Italian study protocol and the questionnaire were approved (prot. CE-ISS 09/273) by the Ethics Committee of the Istituto Superiore di Sanità (Italian Ministry of Health).

Study population and design

Data were collected as part of the Health Behaviour in School-aged Children (HBSC) 2009–10 survey in Italy. HBSC is an international study involving 43 different countries and regions across and outside Europe.[12] To ensure consistency in survey instruments, consent procedure, data collection, processing procedures, and anonymity and confidentiality, each country adheres to the HBSC international study protocol.[12,13] A representative sample of 77 113 students aged 11, 13 and 15 years were recruited from 3555 school classes allocated throughout all Italian Regions. Cluster sampling was used, the school class being the primary sampling unit, or the school, if a sampling frame of classes was not available.[13] The study questionnaires were administered by *ad hoc* trained personnel, with a response rate of 96%.[14] As agreed in the international study protocol, adolescents not reporting their gender, age, or whose age was not within 6 months of the mean age of each age group, were excluded ($n = 5751$, 7.4%).[12] A total of 58 928 (82.6% out of 71 362) adolescents were included in the study, respectively, 20 728 eleven-year-olds, 20 661 thirteen-year-olds and 17 539 fifteen-year-olds, of which 50.3% were girls.

Variables and measures

Eating habits

Eating habits were assessed using a short food-frequency questionnaire by asking participants how many times a week they usually consumed singularly: sweets (candy, chocolate); non-diet (sugared) soft drinks; crisps; fruits and vegetables. Response categories ranged from 'never' to 'more than once a day, every day'. A previous study found the items to be valid and acceptable for use with adolescents.[15] For descriptive purposes, each variable was recoded into three categories of consumption: low consumption (once a week or less), moderate consumption (2–6 days a week), or high consumption (once a day every day or more). In order to quantify weekly unhealthy food consumption and to allow comparisons with previous HBSC published investigations, responses to the items on sweets, soft drinks and crisps consumption were recoded as follows:

'never' was coded 0, 'less than once a week' 0.5, 'once a week' 1, '2–4 days/week' 3 (midpoint of the interval 2–3), '5–6 days/week' 5.5 (midpoint of the interval 5–6), up to 'once a day, every day' 7, and 'every day, more than once' 8,[16] and then summed into a new variable representing unhealthy food consumption. The new variable was subsequently dichotomized below and above the median score value for use in multilevel logistic regression analyses.

Sedentary screen-based behaviours

Time spent in screen-based activities was assessed using two items: 'For about how many hours a day do you usually: (i) watch television (including videos) and (ii) play PC-games or TV-games (Playstation, Xbox, Game-Cube, etc.) in your free time?'. Available response options used a 9-point scale from 'None at all'; 'approximately half an hour a day'; 'approximately 1 h/a day', and so on to 'approximately 7 or more hours per day'. Questions were asked for weekdays and the weekend, then an SB index score was derived by summing the number of hours spent in a 7-day week. Previous studies conducted in similar age groups showed a good test–retest reliability and validity of this approach.[17] In accordance with Vereecken *et al.*,[15] the average number of hours of TV/PC exposure per day was grouped into four categories: 2/h or less per day, 2–4/h per day, 4–6/h and more than 6/h per day.

Adiposity

Adiposity was assessed by computing the BMI [weight/height^2 (kg/m^2)] calculated using self-reported weight and height. Participants were then classified as overweight/obese when BMI was equal to or greater than the sex- and age-specific 75th percentile from Cole *et al.*[18]

Validation studies showed that self-reported vs. measured heights and weights represent a valid and acceptable estimate for population-based studies[19] including in Italy.[20]

Physical activity

Moderate to vigorous physical activity (MVPA) was measured with a single item: 'Over the past 7 days how many days were you physically

active for a total of at least 60 min?'. The item was introduced with the definition of MVPA: 'an activity that usually increases your heart rate and makes you get out of breath some of the time'. This question has been shown to have a good reliability and validity when compared with accelerometer data.[21] A score of 5 or more (days per week) classified respondents as meeting or not meeting the MVPA guidelines Physical Activity Guide Lines (PAGL).[22,23]

Peer network

The number of close friends of the same sex was used as an indicator of the peer network. Participants were asked how many close friends they have with the following response options: none, one, two, three or more. Answers were dichotomized into less than, or three or more friends.

Socio-economic status

The SES of participants was assessed using the HBSC Family Affluence Scale (FAS) reflecting the material resources of the family. The FAS has been developed within the HBSC study to assess the participants' SES, given the known difficulties of asking young people to accurately detail their parents occupation.[24] The FAS has been used and validated since its development and findings confirm that it is a valid indicator of young people's material circumstances for use in cross-national surveys,[24,25]

The scale consists of four items including family car ownership, whether children and adolescents have their own bedroom, number of holidays spent with their parents per year and family computer ownership. The obtained scores were recoded in a 3-point ordinal scale according to low, medium and high family affluence.[24]

Statistical analysis

To account for the clustered structure of the sampling scheme, with students nested within schools, multilevel analyses were carried out using the IBM-SPSS (version 20) statistical software package. The primary sampling unit was the school class.

All analyses were performed separately by gender and age. Multilevel logistic regression models were performed to examine the relationships between unhealthy food consumption, as a dependent variable, and screen-based SB (television/computer exposures), healthy food consumptions (fruit and vegetables), peer relationship, BMI, PA and SES as independent variables. Binary logistic regression analyses were used to produce adjusted odds ratios (ORs) and 95% confidence intervals (95%CIs).

Results

Information on gender- and age-specific self-reported food consumption, screen-based SB, peer relationships, BMI, PA and SES is summarized in table 1. Unhealthy food consumption, recoded as the sum of sweets, crisps and sugared drinks consumption ranged between a minimum score value of 0 (<1% of the whole sample) and a maximum value of 18 (1.3% of the sample) independently of age and sex, with a mean value of 7.75 (SD ± 3.8) and a median score value of 7.00. The number of adolescents with a consumption of unhealthy food above the median value increased with age in both sexes and was slightly higher in boys than in girls. Sweets and sugar drinks consumption increased between 11 and 15 years of age. For sugared drinks and crisps intake the majority of respondents reported a low consumption, once a week or less, with a slight increase in moderate consumption in all the ages and in both sexes.

Adolescents spent, on average, 3–4 h a day in screen-based behaviours [mean hours per day for boys vs. girls were, respectively: 3.07 vs. 2.83 in 11 y.o.; 3.82 vs. 4.07 in 13 y.o. and 4.08 vs. 4.26in 15 y.o. (data not shown)] and girls were the most sedentary among the 13- and 15-year-olds. On average, 57% of 11-year-olds spent more than 2 h a day in screen-based behaviours (watching TV or using a PC), and this increased with age to more than 80% of 15-year-olds.

Vegetable consumption was the lowest among boys and in the youngest while fruit consumption was higher among 11-year-olds and girls.

The percentage of adolescents meeting PAGL was lower than 20%, and further declined with age. Girls were the least active, in the oldest group 89% of girls did not meet the PA recommendations.

The proportion of adolescents reporting three or more close friends of the same sex decreased with age, falling from 70% in 11-year-olds to 55% of 15-year-olds. Girls reported having fewer close friends than boys.

BMI was higher in among boys across all ages, but particularly for 11-year-olds. As regards SES, the large majority of the sample reported medium or high family affluence.

The logistic regression analyses results predicting the risk of being in the unhealthy eating group (above the population median) are reported in table 2.

Screen-based SB were strongly associated with unhealthy food consumption. The risk of consuming junk food increased with increasing time spent watching TV or using a PC, shifting in 11 y.o. children for example, from an OR of 1.77 (95%CI 1.52;2.06) for 2–4 h/day to an OR of 4.31 (95%CI 3.29;5.65) for more than 6 h/day. A similar pattern was found for 13- and 15-year-olds. Girls showed the highest risk in all age groups.

A lower intake of fruit and, in particular, of vegetables was significantly associated with the likelihood of being in the unhealthy eating group. In all the age groups and in both sexes, the odds of unhealthy food consumption decreased as fruit and vegetable intake increased.

Junk food consumption was not associated with PA, except among 11-year-old boys (OR = 1.37, 95%CI 1.07; 1.76).

Having three or more close friends of the same gender was also associated with junk food consumption in both sexes: the highest risk was observed in 11- and 13-year-old boys and in 15-year-old girls.

BMI was found to be inversely associated with unhealthy food consumption. This association was observed in all ages and both sexes, except for 11-year-old girls. No consistent relationship was found between SES and consumption of unhealthy food.

Discussion

In the present study, correlates of unhealthy eating behaviour were investigated in a representative sample of Italian 11-, 13- and 15-year-old young adolescents.

Previously, time spent in SB, and TV viewing in particular, has been strongly linked with negative eating patterns.[26,27] In accordance with these studies, our results show a clear positive association of unhealthy food consumption and time spent in screen-based behaviours, and a negative association of unhealthy food consumption and the consumption of healthy foods, particularly vegetables.

During adolescence, parents provide the main contextual environment for many behaviours and in particular television viewing, computer playing and food consumption within the home. If children are left in front of the screen with available foods and drinks to distract them, they may associate television viewing with food intake. Indeed, when TV viewing is repeatedly accompanied by consumption of snacks and sugar-sweetened beverages, the screen-viewing itself may thus become an automatic cue to junk food intake also in the absence of hunger.[27] Furthermore, children's food preferences, requests and consumption have been shown to be influenced by marketing proposals. During time spent watching TV, adolescents are exposed to varied food advertisements that can proportionally influence their choices.[28] In fact, studies have found that each additional hour of television watched can result in

Table 1 Gender- and age-specific self-reported food consumption, screen-based SB, quality of peer relationships, BMI and SES in 11-, 13-, 15-year-old young adolescents; absolute and relative frequencies

Variables		11 years old Boys*N* (%)	Girls*N* (%)	All*N* (%)	13 years old Boys*N* (%)	Girls*N* (%)	All*N* (%)	15 years old Boys*N* (%)	Girls*N* (%)	All*N* (%)
Sweets consumption	Low	4004 (38.3)	4003 (39.9)	8007 (39.1)	3131 (31.0)	3117 (30.2)	6248 (30.6)	2104 (25.1)	2306 (25.6)	4410 (25.4)
	Moderate	3612 (34.5)	3359 (33.5)	6971 (34.0)	4184 (41.4)	3925 (38.0)	8109 (39.7)	3602 (43.0)	3620 (40.2)	7222 (41.6)
	High	2850 (27.2)	2662 (26.6)	5512 (26.9)	2798 (27.7)	3289 (31.8)	6087 (29.8)	2675 (31.9)	3073 (34.2)	5748 (33.1)
Sugared drinks consumption	Low	5493 (52.6)	6367 (63.7)	11 860 (58.0)	4720 (46.5)	5979 (57.9)	10 699 (52.3)	3248 (38.8)	5136 (57.1)	8384 (48.3)
	Moderate	2902 (27.8)	2181 (21.8)	5083 (24.9)	3369 (33.2)	2715 (26.3)	6084 (29.7)	3213 (38.4)	2422 (26.9)	5635 (32.4)
	High	2048 (19.6)	1444 (14.5)	3492 (17.1)	2052 (20.2)	1625 (15.8)	3677 (18.0)	1909 (22.8)	1445 (16.1)	3354 (19.3)
Crisps consumption	Low	6753 (69.9)	7096 (77.0)	13 849 (73.4)	6864 (72.6)	7383 (76.5)	14 247 (74.5)	5498 (71.0)	6451 (76.8)	11 949 (74.0)
	Moderate	1992 (20.6)	1532 (16.6)	3524 (18.7)	2008 (21.2)	1799 (18.6)	3807 (19.9)	1819 (23.5)	1609 (19.2)	3428 (21.2)
	High	921 (9.5)	587 (6.4)	1508 (8.0)	589 (6.2)	475 (4.9)	1064 (5.6)	428 (5.5)	340 (4.1)	768 (4.8)
Unhealthy food[a] consumption (sweets, coke, crisps)	Below the median	5832 (61.5)	6233 (68.8)	12 065 (65.1)	5487 (58.9)	6053 (63.6)	11 540 (61.3)	4092 (53.6)	5202 (62.9)	9294 (58.5)
	Over the median	3647 (38.5)	2821 (31.2)	6468 (34.9)	3823 (41.1)	3460 (36.4)	7283 (38.7)	3536 (46.4)	3066 (37.1)	6602 (41.5)
Screen-basedSB	≤2 h a day	4139 (40.5)	4423 (44.8)	8562 (42.6)	2411 (24.0)	2112 (20.6)	4523 (22.3)	1597 (19.2)	1529 (17.0)	3126 (18.1)
	To 4 h a day	3546 (34.7)	3375 (34.2)	6921 (34.5)	3841 (38.3)	3814 (37.1)	7655 (37.7)	3239 (38.9)	3356 (37.4)	6595 (38.1)
	To 6 h a day	1494 (14.6)	1306 (13.2)	2800 (13.9)	2239 (22.3)	2510 (24.4)	4749 (23.4)	2029 (24.4)	2278 (25.4)	4307 (24.9)
	>6 h a day	1040 (10.2)	767 (7.8)	1807 (9.0)	1540 (15.4)	1842 (17.9)	3382 (16.7)	1458 (17.5)	1814 (20.2)	3272 (18.9)
Vegetables consumption	Low	4215 (40.4)	3200 (31.9)	7415 (36.2)	3576 (35.2)	3096 (29.9)	6672 (32.5)	2778 (33.1)	2500 (27.7)	5278 (30.3)
	Moderate	3909 (37.4)	3992 (39.8)	7901 (38.6)	4414 (43.5)	4468 (43.1)	8882 (43.3)	3913 (46.6)	3991 (44.2)	7904 (45.4)
	High	2322 (22.2)	2827 (28.2)	5149 (25.2)	2164 (21.3)	2795 (27.0)	4959 (24.2)	1708 (20.3)	2538 (28.1)	4246 (24.4)
Fruits consumption	Low	2318 (22.1)	1928 (19.2)	4246 (20.7)	2087 (20.5)	2147 (20.7)	4234 (20.6)	1890 (22.5)	2029 (22.4)	3919 (22.4)
	Moderate	3635 (34.6)	3232 (32.2)	6867 (33.4)	4093 (40.2)	3596 (34.7)	7689 (37.4)	3487 (41.5)	3109 (34.3)	6596 (37.8)
	High	4544 (43.3)	4889 (48.7)	9433 (45.9)	4006 (39.3)	4631 (44.6)	8637 (42.0)	3034 (36.1)	3918 (43.3)	6952 (39.8)
PA	<1 h/day	7943 (80.1)	8204 (87.2)	16 147 (83.5)	7775 (80.2)	8404 (88.1)	16 179 (84.1)	6396 (81.4)	6893 (88.7)	13 289 (85.0)
	1 h every day	1978 (19.9)	1208 (12.8)	3186 (16.5)	1926 (19.9)	1141 (12.0)	3067 (15.9)	1465 (18.6)	877 (11.3)	2342 (15.0)
Close friends of the same sex	<3	1626 (15.5)	4485 (45.4)	6111 (30.0)	2149 (21.1)	5202 (50.6)	7351 (35.9)	2135 (25.4)	5646 (62.8)	7781 (44.7)
	3 or more	8863 (84.5)	5404 (54.7)	14 267 (70.0)	8046 (78.9)	5078 (49.4)	13 124 (64.1)	6283 (74.6)	3342 (37.2)	9625 (55.3)
BMI	Normal weight	6173 (76.8)	6018 (83.7)	12 191 (80.0)	6040 (78.6)	7611 (86.3)	13 651 (82.7)	5905 (77.9)	7367 (89.2)	13 272 (83.8)
	Overweight/obese	1868 (23.2)	1175 (16.3)	3043 (20.0)	1646 (21.4)	1212 (13.7)	2858 (17.3)	1672 (22.1)	896 (10.8)	2568 (16.2)
SES	FAS low	1318 (12.9)	1605 (16.2)	2923 (14.6)	953 (9.5)	1258 (12.3)	2211 (10.9)	778 (9.4)	1019 (11.4)	1797 (10.4)
	FAS middle	4604 (45.1)	4570 (46.3)	9174 (45.7)	4045 (40.2)	4382 (42.7)	8427 (41.5)	3271 (39.3)	3737 (41.8)	7008 (40.6)
	FAS high	4287 (42.0)	3706 (37.5)	7993 (39.8)	5060 (50.3)	4632 (45.1)	9692 (47.7)	4266 (51.3)	4190 (46.8)	8456 (49.0)

Note: Consumptions: Low, once a week or less; Moderate, 2–6 times a week; High, daily or more.
BMI: below and above the sex-, and age-specific 75th percentile from Cole *et al.*[18]
a: Sweets, sugared drinks and crisps summed and dichotomized below and over the median values.

Table 2 Binary Logistic Regression Analysis OR and 95%CI predicting an unhealthy food[a] group consumption above the median relation to healthy food consumption, PA, screen-based SB, peer relationships, BMI and SES in 11-, 13- and 15-year adolescents

		Boys 11yo OR (95%CI)	Girls 11yo OR (95%CI)	All 11yo OR (95%CI)	Boys 13yo OR (95%CI)	Girls 13yo OR (95%CI)	All 13yo OR (95%CI)	Boys 15yo OR (95%CI)	Girls 15yo OR (95%CI)	All 15yo OR (95%CI)
Screen-based SB	≤2 h a day	1	1	1	1	1	1	1	1	1
	To 4 h a day	**1.56 (1.24;1.96)**	**2.09 (1.65;2.65)**	**1.77 (1.52;2.06)**	**1.65 (1.25;2.17)**	**1.38 (1.04;1.82)**	**1.51 (1.25;1.83)**	1.12 (0.85;1.49)	**2.39 (1.71;3.34)**	**1.57 (1.27;1.95)**
	To 6 h a day	**2.07 (1.57;2.71)**	**2.48 (1.86;3.31)**	**2.23 (1.80;2.75)**	**2.67 (1.99;3.59)**	**2.20 (1.65;2.93)**	**2.43 (1.99;2.96)**	**1.54 (1.14;2.09)**	**2.90 (2.06;4.07)**	**2.00 (1.60;2.50)**
	>6 h a day	**3.80 (2.69;5.36)**	**5.25 (3.44;8.01)**	**4.31 (3.29;5.65)**	**3.44 (2.53;4.67)**	**4.32 (3.15;5.94)**	**3.89 (3.14;4.82)**	**2.49 (1.81;3.41)**	**5.10 (3.61;7.21)**	**3.44 (2.73;4.33)**
Vegetables consumption	Low	1	1	1	1	1	1	1	1	1
	Moderate	**0.61 (0.50;0.75)**	**0.71 (0.56;0.91)**	**0.66 (0.56;0.77)**	**0.67 (0.54;0.82)**	**0.68 (0.53;0.87)**	**0.68 (0.58;0.79)**	**0.80 (0.65;0.98)**	**0.60 (0.49;0.73)**	**0.70 (0.61;0.81)**
	High	**0.45 (0.33;0.62)**	**0.56 (0.42;0.76)**	**0.50 (0.40;0.63)**	**0.51 (0.38;0.68)**	**0.46 (0.34;0.61)**	**0.49 (0.40;0.60)**	**0.69 (0.51;0.94)**	**0.42 (0.32;0.55)**	**0.54 (0.44;0.66)**
Fruits consumption	Low	1	1	1	1	1	1	1	1	1
	Moderate	0.98 (0.75;1.28)	0.72 (0.54;0.96)	0.87 (0.71;1.06)	**0.62 (0.48;0.82)**	1.08 (0.82;1.41)	**0.82 (0.67;0.99)**	0.97 (0.76;1.24)	0.98 (0.76;1.27)	0.98 (0.82;1.16)
	High	0.91 (0.71;1.18)	0.86 (0.65;1.13)	0.88 (0.73;1.07)	**0.68 (0.51;0.90)**	0.88 (0.68;1.13)	**0.77 (0.63;0.94)**	**0.73 (0.56;0.95)**	**0.70 (0.53;0.92)**	**0.71 (0.59;0.86)**
PA	<1 h/day	1	1	1	1	1	1	1	1	1
	1 h every day	**1.37 (1.07;1.76)**	0.85 (0.63;1.15)	1.17 (0.96;1.43)	1.26 (0.97;1.64)	0.97 (0.70;1.33)	1.13 (0.93;1.37)	0.98 (0.78;1.22)	1.12 (0.81;1.53)	1.04 (0.86;1.24)
Close friendsof the same sex	<3	1	1	1	1	1	1	1	1	1
	3 or more	**1.61 (1.24;2.09)**	1.04 (0.80;1.35)	**1.27 (1.05;1.54)**	**1.34 (1.04;1.73)**	1.05 (0.85;1.28)	1.17 (0.99;1.38)	1.12 (0.92;1.36)	**1.23 (1.01;1.49)**	**1.17 (1.02;1.35)**
BMI	Normal weight	1	1	1	1	1	1	1	1	1
	Overweight/obese	**0.67 (0.56;0.81)**	0.95 (0.74;1.22)	**0.76 (0.65;0.88)**	**0.64 (0.49;0.82)**	**0.59 (0.44;0.79)**	**0.62 (0.52;0.74)**	**0.56 (0.45;0.69)**	**0.60 (0.42;0.84)**	**0.57 (0.47;0.69)**
SES	FAS low	1	1	1	1	1	1	1	1	1
	FAS middle	0.89 (0.66;1.21)	**0.66 (0.51;0.87)**	**0.77 (0.63;0.94)**	1.06 (0.73;1.53)	1.09 (0.81;1.46)	1.07 (0.85;1.35)	0.80 (0.57;1.12)	0.74 (0.52;1.04)	**0.76 (0.59;0.98)**
	FAS high	0.95 (0.70;1.31)	0.79 (0.60;1.04)	0.86 (0.70;1.07)	0.89 (0.63;1.27)	0.99 (0.74;1.34)	0.94 (0.74;1.18)	0.83 (0.60;1.14)	**0.66 (0.46;0.96)**	**0.73 (0.57;0.94)**

Notes: Consumptions: Low, once a week or less; Moderate, 2–6 times a week; High, daily or more.
BMI: below and over the sex- and age-specific 75th percentile from Cole *et al.*[18] Bold entries are reported ORs with significant 95%CI.
a: Sweets, beverage and crisps summed and dichotomized below and over the median value.

an increased servings of junk foods, commonly advertised on television and a reduction of almost one fruit and vegetable serving per week.[27,29,30]

Adolescents are also increasingly exposed to a wide range of influences beyond the family environment including through school, the local community, media and social media. Children and adolescents alike have also been shown to be influenced by what their peers eat.[31] In accordance with these findings, our results showed an increased risk of eating unhealthy food among those with a wide peer network, particularly younger boys.

Our findings also revealed an interesting association between unhealthy food consumption and BMI. Recent studies that explored the relationship between BMI and eating patterns have reported inconsistent results, the large majority of these showing no association between increased BMI and junk food or sweetened drinks consumption.[32] Only a few studies have shown an increase in junk food intake among overweight children.[33] In contrast, we found that the likelihood of being a heavy consumer of unhealthy foods was significantly higher among normal weight adolescents. One explanation for this finding maybe the different control exerted by the parents of overweight adolescents compared with those of normal weight. It is therefore essential that nutritional programmes are targeted at all adolescents and not just those who are currently overweight or obese.

Recently there has been an increased interest in parents feeding practices.[34] In particular, mothers of overweight or obese children seem to exert an active role in reducing the likelihood of consuming unhealthy fatty food.[35] Above all, and independent of child BMI, the use of feeding strategies seems to be dependent on parents' educational and economic background such that the higher the familial SES, the higher the exerted control.[36] Our results were also suggestive of a lower risk of being a heavy unhealthy food consumer in the highest SES, but with inconsistent statistical significance.[37]

Strengths and limitations

The cross-sectional nature of the HBSC study means that we are unable to make any inferences about causal relationships, in particular in identifying specific determinants of eating behaviours. In addition, the study was limited to participants in three specific ages. In relation to screen-based SB, we used proxy measures of time spent in watching TV and using a computer for leisure as two distinct behaviours. Recent evidence, however, suggests that an increased proportion of youth engage in multitasking SB, which means adolescents could differently declare behaviours that happens simultaneously (i.e. surfing Internet or chatting online while watching TV) with further differences among genders.[38] More work is needed to better understand the health impact of engaging in simultaneous sedentary activities.

Strengths of this study were the use of a standardized approach and the representativeness of the sample, increasing both the study validity and its generalizability. No other published research has examined these predictive correlates of behaviours in such a large national representative samples of adolescents in Italy.

Conclusions

In conclusion, our results highlight the importance of recognizing the complexity of behaviours linked to food consumption in adolescence in order to drive and inform further effective nutrition and public health interventions. This means considering diet and nutrition, independently of adiposity status, as an objective of nutritional public health initiatives, especially among those who engage in excessive screen-based SB. These findings suggest that nutritional advice should be aimed both at decreasing the consumption of soft drinks, fast food and snack food and at addressing the role of television in

sending opposite messages.[28] Since school and parents provide the child's main contextual environment,[39] they can be viewed as key players and central agents of change in the prevention of unhealthy eating. More work is needed to explore how school and parents can effectively support adolescents in developing their ability to access, analyse, evaluate, and appropriately use media and technologies to which they are exposed. Parents should therefore be involved in tailored educational initiatives aimed at increasing their awareness of the impact unhealthy food can have on adolescents' health, the influence that television viewing can have on their familial food choices, and of the importance of proactively contributing to the way their children manage their screen time behaviour. Public health efforts should be oriented towards effective health policies for the regulation of television advertising aimed at children.

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Key points

- Increased time spent in screen-based behaviours in adolescence significantly increases the consumption of unhealthy food.
- The increase in unhealthy food consumption decreases the likelihood of consuming healthy food in particular vegetables.
- The likelihood of being a heavy consumer of unhealthy food is higher among normal weight than in overweight adolescents.
- Diet and nutritional interventions targeting adolescents should address both eating behaviours and screen-based behaviours independently of adiposity status.
- Public health efforts should be oriented towards effective health policies for the regulation of television advertising aimed at children and adolescents should actively support actions to develop youth's ability to access and appropriately use media and technologies to which they are exposed.

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Estimating the number of foreign women with female genital mutilation/cutting in Italy

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Background: Female genital mutilation/cutting (FGM/C), is an emerging topic in Europe as a consequence of the increasing proportion of women migrating from Africa. The prevalence of FGM/C is however unknown in Europe, as there are no country-representative surveys on this topic. The aim of this study is to provide an estimate for Italy for the year 2010. **Methods**: This study relies on the results of the First Survey on Women at Risk of FGM/C held in Italy in 2010. This cross-sectional survey involved 1000 migrants from the main FGM/C practicing countries aged 15–49 living in the Italian region of Lombardy. The estimate presented is based on a method combining direct estimates for the communities involved in the survey and indirect estimates for other communities. Indirect estimations were obtained using a refinement of the most general extrapolation-of-country-prevalence-data method. **Results**: It is estimated that some 57 000 foreign girls and women aged 15–49 with FGM/C were living in Italy in 2010. The Nigerian community is the most affected, with around 20 000 women with FGM/C (35.5% of the total number women affected in Italy), followed by the Egyptian community (around 18 600 women with FGM/C; 32.5%). Another 15% of the women affected are from the Horn of Africa, notably from Ethiopia (3200 women; 5.5%), Eritrea (2800 women; 4.9%) and Somalia (2300 women; 4%). **Conclusions**: This study offers an additional methodological advancement by proposing a combination of direct and indirect estimation of FGM/C. The results are crucial information to plan interventions and targeted policies.

Introduction

Female genital mutilation/cutting (FGM/C) is a term that refers to all traditional practices that intentionally alter the female genital organs for non-medical reasons. It is recognized as a form of gender-based violence as well as a violation of the human rights of children and women.[1](Many terms have been used to describe this practice. The term 'female genital mutilation' (FGM) is used, among others, by WHO while others use the more neutral term 'female genital cutting' (FGC). In this paper, we use the most broadly inclusive term ''female genital mutilation/cutting'' (FGM/C) accordingly to United Nations (UN) agencies.) These practices occur predominantly in 27 African countries plus Yemen, Iraq and Indonesia but also in other areas where communities from practicing countries are settled, including Europe.[2,3] During recent years, FGM/C has gained considerable attention in the European Union (EU): experts have repeatedly pointed out the need for a comprehensive strategy based on a gender-sensitive and human-rights approach that empowers women and balances the state measures of protection, prevention and prosecution. Within this framework, an improvement in the collection and dissemination of data has been clearly recognized as an action of primary importance.[4] A determination of the number of migrants with FGM/C is in fact very important for informed decision-making, to determine resource allocation, to monitor progress towards practice abandonment in emigration and to better plan health care and psychological assistance to meet women's special needs.

In practicing countries the main sources of data concerning the FGM/C status of women are the Demographic and Health Survey (DHS) developed by ICF International.[5] and the Multiple Indicator Cluster Survey (MICS) directed by UNICEF.[6] Using national age-specific FGM/C prevalence rates from these surveys along with data on the female population, country by country estimates have been provided for women aged 15–49 and recently also for women aged