



# The impact of healthy lifestyles on academic achievement among Italian adolescents

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## Abstract

We evaluated the association between healthy lifestyles and academic achievement in a sample of 373 adolescent Italian students. Specifically, we investigated on the association between use of illegal drugs, habits to practice a regular physical, typology of diet, levels of social support, levels of self-esteem, level of Internet use, perceived stress and amount of sleep and academic achievement. Academic performance was positively correlated with good diet, perceived social support, and self-esteem. A statistically significant difference emerged between students with high versus low correct grade point averages in relation to lifetime and current use of illegal drugs. Last, academic performance was negatively correlated with Internet use, perceived stress, and bad diet. A multiple regression analysis was conducted in order to predict academic achievement based on good diet, physical activity, self-esteem, sleep hours, perceived stress, problematic Internet use, perceived social support, and lifetime substance use while controlling for age, gender, and years of education. As expected, healthy lifestyles behaviors were highlighted as a significant predictor in academic achievement. Specifically, it was showed that a good diet as well as nonproblematic Internet use significantly predicted academic success. Moreover, it was found that gender did not moderate the relationship between those predictors and academic achievement. The results of our study show that to practice healthy lifestyle behaviors is a relevant factor for a better performance at school, at least in our sample.

**Keywords** Healthy lifestyles · Academic achievement · Health psychology · Educational psychology · School psychology

## Introduction

Behaviors of healthy lifestyles, including eating well, exercising, getting quality sleep, managing stress, abstaining from drug use, relying upon social support, and minimizing screen time, are well-established factors of continued good health (Bodai et al., 2018; Dalle Grave & Mangeri, 2012), by decreasing the risk of illness (Bauer et al., 2016) and increasing well-being (Zucconi & Howell, 2016).

Healthy behaviors are associated with academic achievement in adolescents, which suggests that practicing unhealthy lifestyles

might lower cognitive function and, in turn, the likelihood of succeeding in school (Stea & Torstveit, 2014). Several studies revealed relationships between physical activity and cognitive function in adolescents (Owen et al., 2018; Sigfúsdóttir et al., 2007). A recent one involving 2194 adolescent students indicated that practicing moderate-intensity activity before mathematics lessons improved the students' cognitive engagement (Owen et al., 2018). Moreover, a recent cross-sectional study involving 395 adolescents showed that, when combined, obesity, low-to-medium levels of physical activity, and excessive screen time associated to poor academic achievement (García-Hermoso & Marina, 2017). By contrast, adolescents who participated in at least 60 min of physical activity per day, consumed salad weekly, and ate breakfast every day had significantly higher odds of earning better grades at school (Burns et al., 2018).

Students who perform better at school even prefer healthy, high-quality food (Burns et al., 2018). Burrows et al. (2017) observed that the high consumption of fruits and vegetables was associated to better academic performance, whereas the consumption of sugary drinks and sweets was associated with poor performance. Moreover, it was found that gender can

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moderate the influence of eating habit on the academic performance of students (Uwannah & Mbegbu, 2018).

By interfering with mood and emotional state, sleep deprivation can also negatively affect academic performance (Adriansen et al., 2017). Students with Internet gaming disorder slept significantly fewer h per night than casual online gamers and had grade point averages lower than all other types of gamers (Hawi et al., 2018). Moreover, it seems that male and female students' patterns of Internet use affect their academic performance in different ways: searching for information online has a positive impact on academic achievement both for boys and girls, whereas online socializing makes girls particularly vulnerable, and online gaming damages only boys' academic performance (Chen & Fu, 2009).

Research also confirms the relationship between drug use and cognitive alterations among youth. For one, nicotine exposure during that developmental period causes long-term cognitive deficits in contextual learning (Portugal et al., 2012), while cannabis has been associated to low academic achievement (Meier et al., 2015).

Last, stress management (Liu & Lu, 2011), social support (Ronen et al., 2016), and self-esteem (Palacios et al., 2015) are all important parts of well-being that contribute to academic success (Di Giunta et al., 2013; Wentzel et al., 2018).

Even if researchers investigated associations between academic achievement and healthy lifestyles among adolescents, none have correlated multiple variables of such achievement among adolescent Italian students, at least to the best of our knowledge. In response, we sought to contribute to currently limited knowledge about associations between lifestyles and academic achievement in a sample of secondary-school students in Palermo, Italy. Furthermore, lifestyle predictors of academic success and the moderating effect of gender on these relationships were investigated.

Exploring on these associations could be interesting for better understanding which of those variables is significantly correlated with better academic performance, taking into account a population that live and study in a part of the Mediterranean area (Sicily) where is easy to access to a Mediterranean diet (Grosso et al., 2014; Marventano et al., 2018) or living in an extended family and receiving adequate social support (Lo Cricchio et al., 2019). Moreover, it could be useful to show that to practice healthy lifestyle behaviors is not only necessary for avoiding and reducing health risks, but it is also a way for improving their own academic performance and their own life by staying healthy. In this regard, a recent study showed that to practice a healthy diet can reduce depression and improve self-esteem and quality of life (Maniaci et al., 2020).

To that end, we hypothesized that several aspects of healthy lifestyles such as that the abstention from the use of illegal drugs and the habits to practice a regular physical would be reported by students with a high academic achievement. Conversely, we also hypothesized that the practice of a

good diet, high levels of social support, high levels of self-esteem and higher amount of sleep would be positively correlated with high academic achievement. Furthermore, high level of Internet use and of perceived stress would be positively correlated with a worst academic achievement. Finally, starting from these hypotheses, the role of healthy lifestyles behaviors was explored, in order to predict academic achievement, taking into account age, gender, and years of education.

## Method

### Participants

A sample of 373 students (55.5% young women) in either the Technical Institute for Tourism "Pio La Torre" in Palermo, voluntarily participated in the study. Their mean age was 17.23 years ( $SD = 1.29$ ), and by gender, they did not differ significantly regarding age,  $t(1,363) = .688, p = .492$ .

### Procedure

From January to February 2018, students were recruited as they responded to announcements of the study posted on in-class bulletin boards. The study was described to participants as an investigation into the lifestyles and habits of adolescent students, and they were asked to complete self-report questionnaires anonymously in their classrooms during their free time.

The study was approved by the Ethical Review Board at the AOUP "P. Giaccone", Palermo, Italy (1/2018). All participants or, if they were underage, their parents provided their written informed consent to participate or allow their children to participate in the study. All measures and responses were managed under the respect of privacy.

### Measures

#### Sociodemographic Variables and Lifestyle Questionnaire

A questionnaire was used in order to collect participants' sociodemographic information, including age, sex, marital status, occupation, and habitual residence, as well as grade point average (GPA). A specific questionnaire developed at University of Palermo was also used to investigate participants' daily habits, including about their daily diet and self-reported weekly frequency of eating several foods. That questionnaire also contained self-report items regarding amount of sleep received, consumption of drugs, and physical activity.

**Diet** To measure whether participants have healthy diets, two variables were calculated - good diet and poor diet - according to Sigfúsdóttir et al. (2007). Participants were asked to report how often they eat legumes, cereals, vegetables, fruits, and dried fruits on a 4-point scale (0 = *never*, 1 = *1 or 2 times per*

week, 2 = 3 or 4 times per week, 3 = 5 to 7 times per week). They were also asked to report how often they eat sweets, salty snacks, packaged foods, sauces, sandwiches, and pizza on the same 4-point scale. Total scores were calculated and recorded.

**Perceived Stress** The Measurement of Psychological Stress Scale (Di Nuovo et al., 2000) consists of 49 items responded to on a 4-point Likert scale that refer to different aspects of the participant's perception of his or her stress; the higher the score, the higher the level of perceived stress. The Italian-validated version exhibited good psychometric properties (Cronbach's alpha = .95; test-retest reliability = .68–.80).

**Internet Use** The Internet Addiction Test (Young, 1998) is a 20-item questionnaire employed to investigate Internet use. Replied to on a 5-point Likert scale (1 = *never*, 5 = *always*), the items address the degree to which Internet use affects the individual's daily life, social life, productivity, sleeping patterns, and emotional states. The Italian version of the questionnaire demonstrated good psychometric properties (Cronbach's alpha = .83–.86) (Fioravanti & Casale, 2015).

**Body Mass Index** Participants reported their height and weight, which were used to calculate their body mass index (BMI) as  $W/H^2$ , in which  $W$  is weight (kilogram) and  $H$  is height (meter).

**Perceived Social Support** The Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988) was used to evaluate participants' perceptions of social support available in their social-relational world (e.g., from family, friends, and significant others) to meet needs in their daily lives. The MSPSS consists of 3 subscales with 4 items each, to be rated on a 7-point Likert scale (1 = *completely disagree*, 7 = *completely agree*). The instrument has demonstrated good psychometric properties (Cronbach's alpha = .90–.94) (Di Fabio & Busoni, 2008).

**Self-Esteem** Self-esteem was gauged with the Basic Self-Esteem Scale, a self-report questionnaire that consists of 22 items rated on a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*). The Italian version of the instrument has shown good psychometric properties (Cronbach's alpha = .85; test-retest reliability = .81–.83) (Forsman et al., 2003).

## Statistical Analyses

The formula the University of Palermo applies to evaluate their Erasmus program applicants was used as follows in order to quantify the level of academic achievement: The number of recorded written warnings received by a student during the last year of study.

Points were awarded with reference to *GPA* and number of recorded written warnings, which were calculated using a regularity coefficient (*RC*) to obtain values of correct *GPA* (*CGPA*). The *RC* was based on the number of recorded written warnings in the current school year, such that more than 3 warnings meant an *RC* of 0.90, 2 or 3 warnings meant an *RC* of 0.95, and 1 or no warnings meant an *RC* of 1.00. With the formula  $CGPA = GPA * RC$ , higher scores were given to participants who, while achieving the same *GPA*, reported less recorded written warnings. A correlation analysis was performed using the Pearson correlation coefficient, which expresses the presence of a possible linear relationship between variables. A chi-squared test was used to evaluate significant differences between participants with high *CGPAs* (i.e., scores from 6 to 10) and ones with low *CGPAs* (i.e., scores from 1 to 5) in relation to use of illegal drugs, regular exercise, and hours of sleep received.

A multiple regression analysis was conducted in order to examine how healthy eating habits, physical activity, self-esteem, amount of sleep hours, perceived stress, Internet use, perceived social support, and lifetime substance use varied in relation to academic success while controlling for age, gender, years of education and any potential interaction effects between these variables. Last, the PROCESS 3.5 macro for Statistical Package for the Social Sciences (SPSS) (Hayes, 2013) was employed to explore the moderation indirect effects. In the mediation analysis, gender, age, and year of study were treated as covariates in the model. A 5000 bootstrap samples were used. All analyses were bilateral and the assumed alpha risk was 5%. All statistical analyses were performed in the SPSS version 22.0 for Windows.

## Results

### Descriptive Results

Less than half of participants (43.7%) indicated having good diets according to the definition used in the study. Instead of often eating sweets, french fries, hamburgers, hot dogs, and pizza, they reported regularly eating whole grains, legumes, nuts, and vegetables as part of a Mediterranean-style diet. Among other results, 41% of participants reported not eating breakfast, and 33% reported drinking sugar-sweetened beverages at lunch, while slightly more than 42% reported drinking them at dinner. Only 18.5% of the sample indicated eating vegetables 5 to 7 days per week, and more than 56% reported never eating nuts.

Only 15% of participants were classified as being overweight. Seven participants (1.9%) had Class 1 obesity, 56 (15.4%) were overweight, 249 (68.6%) had a healthy weight, 46 (12.7%) were underweight, and five (1.4%) were severely underweight.

In terms of Internet use, most participants (69.1%) reported moderate Internet use, whereas 30.6% reported excessive use but without losing control over it. Regarding the substance use, 32% of the sample indicated smoking cigarettes. The same amount (32%) reported having used illegal drugs, mostly cannabis (99.8%), at least once in their lifetime, and 12.5% reported currently using illegal drugs. Furthermore, 64.3% of the sample indicated regularly drinking alcohol; most (93.8%) drink alcohol 1 to 3 times per week, and 25.6% drink alcohol with meals.

In relation to physical activity, 50.9% of participants reported regularly participating in athletic activities. Most of them (63.3%) indicated engaging in such activities from 3 to 5 days per week, 12.1% from 6 to 7 days per week, and 18.9% from 1 to 2 days per week. Furthermore, 72.4% reported walk for more than 30 min per day.

Last, concerning amount of sleep, 61.7% of the sample reported sleeping for about 6 to 7 h per night, 18.8% for 4 to 5 h per night, and 15.5% for 8 h or more per night.

### Association between a Healthy Lifestyle and Academic Achievement

According to our hypothesis, data analysis revealed that academic performance was positively correlated with a good diet  $r = .157$ ,  $p = .002$ , with perceived social support  $r = .117$ ,  $p = .036$ , and with self-esteem  $r = .135$ ,  $p = .014$ . Also in line with our hypotheses, academic performance was negatively correlated with a bad diet  $r = -.112$ ,  $p = .032$ , with Internet use  $r = -.227$ ,  $p = .000040$ , and with perceived stress  $r = -.138$ ,  $p = .011$ . No significant correlation was found between academic success and amount of sleep hours  $r = -.094$ ,  $p = .071$ .

Furthermore, amount of sleep hours was positively correlated with perceived social support  $r = .150$ ,  $p = .007$ , and with self-esteem levels  $r = .236$ ,  $p = .00001$ , and negatively correlated with perceived stress  $r = -.276$ ,  $p = .000$ , with Internet use  $r = -.111$ ,  $p = .045$ , and with bad diet  $r = -.125$ ,  $p = .016$ . No significant correlation was found between amount of sleep hours and a good diet  $r = .064$ ,  $p = .221$ .

Moreover, a good diet was positively correlated with self-esteem  $r = .124$ ,  $p = .024$ , and negatively correlated with bad diet  $r = -.243$ ,  $p = 0.000$ , and with Internet use  $r = -.135$ ,  $p = .015$ . No significant correlation was found between good diet and perceived social support  $r = .017$ ,  $p = .767$ , or with perceived stress  $r = .008$ ,  $p = .883$ . By contrast, a bad diet was positively correlated with perceived stress  $r = .107$ ,  $p = .050$ , and with Internet use  $r = .297$ ,  $p = 0.000$ . No significant correlation was found between a bad diet and perceived social support  $r = .015$ ,  $p = .791$ , or with self-esteem  $r = .014$ ,  $p = .805$ .

Furthermore, perceived social support was positively correlated with self-esteem  $r = .474$ ,  $p = .000$ , and negatively correlated with Internet use  $r = -.218$ ,  $p = .000$ . By contrast, perceived stress was positively correlated with Internet use  $r = .361$ ,  $p = 0.000$ , and negatively correlated with self-esteem

$r = -.548$ ,  $p = 0.000$ . Finally, self-esteem was negatively correlated with Internet use  $r = -.302$ ,  $p = 0.000$ .

A statistically significant difference surfaced between participants with high CGPAs and ones with low CGPAs in relation to the lifetime use of illegal substances,  $\chi^2(2) = 27.224$ ,  $p = .000001$ , and current consumption of such substances,  $\chi^2(1) = 22.05$ ,  $p = .000002$ . No statistically significant differences emerged between participants with high CGPAs and ones with low CGPAs in relation to frequency of athletic activity,  $\chi^2(1) = 1.065$ ,  $p = .302$ .

### Predictors of Academic Achievement

A multiple regression analysis was conducted in order to predict academic achievement based on good diet, physical activity, self-esteem, sleep hours, perceived stress, Internet use, perceived social support, and lifetime substance use while controlling for age, gender, and year of study. Multicollinearity was assessed using the variance inflation factor (VIF). No issues of multicollinearity emerged in the model as VIF for all variables is  $< 10$ .

The overall model was significant  $F(9, 301) = 5.293$ ,  $p < 0.000$ , and explained 13.7% of the variance, as indexed by the  $R^2$  value. Specifically, it was showed that a good diet [ $b = .146$ ,  $t(301) = 2.651$ ,  $p = .008$ ] as well as Internet use [ $b = -.141$ ,  $t(301) = -2.268$ ,  $p = .024$ ] significantly predicted academic success. The other variables did not contribute significantly to the model (Table 1).

Next, the SPSS PROCESS macro was used to explore the possibility of moderation. "Model 1", the moderated regression model, was selected. Concerning the relationship between good diet and academic success moderated by gender, controlling for age and years of education, a significant model was found  $R^2 = .073$ ,  $F(5, 356) = 5.561$ ,  $p < .000$ . Although a good diet [ $b = .116$ ,  $t(356) = 2.860$ ,  $p = .004$ ] significantly predicted academic success, neither gender [ $b = .539$ ,  $t(356) = 1.625$ ,  $p = .105$ ] nor their interaction term [ $b = -.058$ ,  $t(356) = -1.109$ ,  $p = .268$ ] significantly predicted academic success.

Last, with regard to the relationship between Internet use and academic success moderated by gender, controlling for age and year of study, a significant model was highlighted  $R^2 = .095$ ,  $F(5, 310) = 6.491$ ,  $p < .000$ , showing that although Internet use [ $b = -.034$ ,  $t(310) = -3.641$ ,  $p < .000$ ] significantly predicted academic success, neither gender [ $b = -.5886$ ,  $t(310) = -1.089$ ,  $p = .277$ ] nor their interaction term [ $b = .017$ ,  $t(310) = 1.451$ ,  $p = .148$ ] significantly predicted academic success.

### Discussion

In our investigation of associations between behaviors of healthy lifestyles and academic achievement among adolescent students, we assumed that healthy lifestyles positively affect

**Table 1** Multiple regression analyses predicting academic achievement

Factor	Model 1					Model 2				
	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Age	-.149	.082	-.134	-1.817	.070	-.185	.081	-.165	-2.291	.023
Gender	.171	.157	.061	1.090	.276	.241	.160	.087	1.503	.134
Year of study	.420	.124	.249	3.381	.001	.430	.121	.255	3.559	.000433
Good diet	–	–	–	–	–	.074	.028	.146	2.651	.008
Perceived stress levels	–	–	–	–	–	-.007	.004	-.120	-1.705	.089
Internet use	–	–	–	–	–	-.015	.007	-.141	-2.268	.024
Perceived social support	–	–	–	–	–	.000	.005	-.005	-.075	.941
Self-esteem	–	–	–	–	–	.003	.007	.029	.399	.690
Lifetime substance use	–	–	–	–	–	-.012	.007	-.098	-1.809	.071

psychophysical well-being, cognitive activities, and, ultimately, academic performance. Among our findings, dietary habits related to academic performance, such that academic achievement improved with the adoption of healthy diets (Dalle Grave & Mangeri, 2012; Sigfúsdóttir et al., 2007). Furthermore, a significant positive correlation between a good diet and self-esteem was found. Interventions to build self-esteem and reduce stress may prevent unhealthy eating and subsequent obesity in adolescents (Martyn-Nemeth et al., 2009). Moreover, an unhealthy diet is negatively correlated to the amount of sleep hours, as underlined by Chaput and Dutil (2016). Furthermore, unhealthy diet habits were positively correlated with Internet use. According to the findings of a longitudinal study with a sample of 621 adolescents, Internet use could reinforce an already existing risk of being overweight (Barrense-Dias et al., 2016). Finally, an unhealthy diet was positively associated with perceived stress; this result is consistent with findings reported by a recent review and meta-analysis (Hill et al., 2018).

High CGPAs were observed among students who did not use illegal substances, although a high percentage of the sample reported currently using illegal drugs, especially cannabis. The use of cannabis, particularly in early age, can have insidious consequences, including a higher likelihood of developing psychosis (Di Forti et al., 2013, 2019).

Our findings also highlight the relationship between stress levels and academic performance, such that students exposed to high levels of stress had poor academic performance. Those results align with the findings of Liu and Lu (2011), who observed that students' stress negatively predicted their academic achievement.

A positive relationship was detected between the perception of good social support in the family and academic achievement. However, the age of participants might have influenced our results, because most were minors who live with their parents. Parents influence how their children regard their academic performance and can motivate them to pursue academic success (Ruholt et al., 2015).

High levels of self-esteem were also positively related to academic achievement. Such results are consistent with the findings of a study which showed that the association between self-esteem and academic achievement was mediated by personal resources (Whitesell et al., 2009).

It is quite sound that academic achievement and sleep habits are negatively influenced by Internet addiction (Hawi et al., 2018). The results of our study confirm those findings, given that academic performance was negatively correlated with Internet use, and Internet use was negatively correlated with sleep. Indeed, a recent systematic review and meta-analysis revealed a significant reduced sleep duration among individuals with Internet addiction (Alimoradi et al., 2019). Furthermore, perceived social support was negatively correlated with Internet use. This result is confirmed by a cohort study' findings that revealed that less social support can be a risk factor for adolescents' online addiction (Chen et al., 2007).

Contrary to our hypotheses, no significant correlation appeared between hours slept each night and academic performance. That lack of significance could be explained by the sample size. Despite this, the amount of sleep hours was positively correlated with perceived social support and negatively with perceived stress. Those results are similar to the findings of a recent study, that showed that social support increased sleep quality and moderated the effects of academic stress on sleep (Van Schalkwijk et al., 2015). Moreover, the amount of sleep hours was positively correlated with self-esteem levels. Indeed, according to Lemola et al. (2013), individuals with positive personality characteristics, such as optimism and high self-esteem levels, report a good and sufficient sleep.

In accordance with the hypothesis of the present study, there's a strong relationship between healthy lifestyles behaviors and academic achievement. Specifically, practicing a healthy diet and a nonproblematic Internet use were highlighted as significant predictors of academic success in our sample. These results are in line with previous research, (Burns et al., 2018; Chen & Fu, 2009; Hawi et al., 2018; Sigfúsdóttir et al.,

2007). Contrary to our hypotheses, the other variables taken into account did not contribute significantly to academic performance; moreover, it was found that gender does not represent a moderator of those relationships with academic success. Our study entailed some limitations. The sample was not especially large and it represented only one school, which could have affected our results about lifestyle habits. Furthermore, sample size was not calculated, since a convenience sample was used. Future research should investigate healthy and unhealthy lifestyles in a larger sample in order to clarify how students' habits can influence their academic achievement. Moreover, because the measure of academic achievement used was based on participants' estimates of their grades, it is possible that participants overestimated their academic performance. However, Schiller (2002) has suggested that self-reports of academic performance among high-school students are reliable. Moreover, students chose to voluntarily participate to the study without receiving any reward, so it is reasonable to hypothesize that they were well motivated to report the truth.

### Implications for Research and Practice

The results of our study can guide schools in promoting information campaigns and initiatives about the importance of healthy lifestyles as a means to not only reduce the risk of pathologies but also achieve life goals. Schools can also take advantage of the findings by introducing healthier snacks in vending machines and more hours of athletic activity in school programs. In the future, researchers should investigate healthy lifestyles in a larger sample of youth in order to clarify how healthy habits can influence their academic performance and how behaviors of healthy lifestyles can be promoted.

**Availability of Data and Material** Research data are not shared. Due to the sensitive nature of the questions asked in this study, participants were assured raw data would remain confidential and would not be shared.

**Code Availability** Not applicable.

**Authors' Contributions** Giuseppe Maniaci: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing, Formal analysis, Resources. Caterina La Cascia: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing, Formal analysis, Resources. Alessandra Giammanco: Writing – original draft, Writing – review & editing, Visualization, Resources. Laura Ferraro: Visualization, Resources. Alessia Palumbo: Investigation, Writing – original draft, Resources. Giovanni F. Saia: Investigation, Writing – original draft, Resources. Gaia Pinetti: Investigation, Resources. Manuela Zarbo: Investigation, Resources. Daniele La Barbera: Conceptualization, Project administration, Supervision, Writing – original draft, Writing – review & editing.

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### Declarations

**Conflict of Interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethics Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethical Review Board at the AOUP “P. Giaccone”, Palermo, Italy (1/2018). All participants or, if they were underage, their parents provided their written informed consent to participate or allow their children to participate in the study. All measures and responses were managed under the respect of privacy.

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