Relationship between Healthy Lifestyle and Sociodemographic Factors in Adolescents in Catalonia: Application of VISA-TEEN Questionnaire

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Abstract

Introduction

There is a clear relationship between the way of life and the health of individuals, and there-fore, we can speak of healthy and unhealthy lifestyles. There are different surveys and questionnaires that evaluate the lifestyles of adolescents, but none of them offers a final score that can quantify the healthfulness of an adolescent's lifestyle. It was with this goal that the VISA-TEEN questionnaire is developed and validated. The objective of this study is to apply the questionnaire to a sample of adolescents who attend school in Catalonia to evaluate the healthfulness of their lifestyles and to relate the scores obtained to different sociodemographic variables.

Methods

Cross-sectional study. A total of 2,832 students from 25 schools in Catalonia responded to the questionnaire. A descriptive analysis was performed, calculating the mean (Standard deviation), median (p_{25}, p_{75}), and confidence interval. The results were calculated for the total population, factoring according to gender, age, urban/rural population, origin (native/immigrant), and family wealth, which was based on the Family Affluence Scale (FAS II). The significance of the difference was calculated for each factor with the appropriate statistical test.

Results

For the total score of healthy lifestyle, the youngest students and those with the highest family wealth obtained higher scores. With respect to eating habits, girls scored higher than boys, and higher scores were observed in natives and those with high family wealth. For physical activity, boys scored higher, as well as younger individuals, natives, and those from rural areas. With respect to substance abuse, the worst scores were found in older

individuals, students from rural areas, and natives. The rational use of leisure technology was only associated with age (worsening scores with older age). Lastly, hygiene was better with girls, decreased with age, and was worse with natives than immigrants.

Introduction

There is a clear relationship between the way of life and the health of individuals, and therefore, we can speak of healthy and unhealthy lifestyles. The World Health Organization (WHO) defines lifestyle as the way of living based on identifiable patterns or behaviors that are determined by the interaction between individual and personal characteristics, social relationships, and socioeconomic and environmental factors. [1]. With respect to adolescents, the WHO, in its Health Behaviour in School-aged Children (HBSC) survey, considers behaviors related to diet, physical activity, rest, addictions, injuries, hygiene, and sexuality for the lifestyle analysis [2].

There is evidence with respect to how and how much the behaviors evaluated in the HBSC, i.e., diet [3–11], physical activity [12–18], rest [19–26], addictions [27–39], personal hygiene [40–43], and screen-time [44] influence the health of adolescents.

There are different surveys and questionnaires that evaluate the lifestyles of adolescents that are periodically used at the national or supranational level to monitor the habits of this population, and thus, plan health prevention and promotion policies. The WHO promotes the HBSC, a questionnaire that gathers data from 43 countries relative to different areas including, amongst others, nutrition and diet, substance abuse, and sedentary activities in adolescents [45]. The FRESC survey [46] monitors the tendencies of the main risk factors of adolescents in Barcelona and compiles information on the same areas that the HBSC does. Other population studies focus their attention on concrete areas related to lifestyle. The European School Survey Project on Alcohol and other Drugs (ESPAD) gathers information every 5 years regarding tobacco and drug use in adolescents from the 26 countries of the European Union [47]. The Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) exploits data gathered with respect to nutrition and physical activity in adolescents from 10 European countries [10, 11, 23, 48, 49]. The National Survey of Child and Adolescent Nutrition (in Spanish "Encuesta Nacional de Alimentación en la población Infantil y Adolescente: ENALIA") evaluates the nutrition of children and adolescents in Spain [50]. However, these surveys are limited to making percentage-wise evaluations of the responses of each one of the proposed items, and none of them offers a total score that allows for the quantification of the lifestyle healthfulness of adolescents.

For this reason, the VISA-TEEN is developed and validated to evaluate the healthfulness of the lifestyles of adolescents [51]. The questionnaire offers a total score for lifestyle healthfulness and scores on the following 5 components: diet, physical activity, substance abuse, Rational Use of Leisure Technology (RULT), and hygiene. The total score ranges from 0 to 45 points (from least healthy to most healthy), and the scores of the different components range from 0 to 3 points (least healthy to most healthy). The questionnaire offers an acceptable reliability for population studies ($\alpha = 0.66$; $\alpha_{est} = 0.77$) and a very good test-retest correlation (CCI = 0.860).

The objective of this study is to apply the questionnaire to a sample of adolescents who attend school in Catalonia to evaluate the healthfulness of their lifestyles and to correlate the scores obtained with the following socio-demographic variables: age, gender, origin (native or immigrant), family wealth, and urban/rural residence.

Methods

Sample

The units of analysis were secondary education schools/institutes and vocational training colleges of Catalonia. The 1170 schools that provide these courses were used to define the sample size. Table 1 shows the number of recruited schools stratified by province and ownership. This sample size allowed us to estimate the total score with a precision of ±2 points and with a 95% confidence interval. To ensure the feasibility of the study and the number of schools in each stratum, nonprobability convenience sampling was conducted. Recruiting was performed based on contacts facilitated by the Department of Education of the Catalan government and the education delegations of the different religious congregations (Salesianum, Jesuit, and Gabrielistes). The directors of the centers who agreed to participate signed the corresponding informed consent form and decided, based on internal organizational criteria, what class groups would be surveyed.

The researcher and two interviewers trained for this purpose visited the schools to present the objectives of the study and to distribute the questionnaires. It was stressed that the questionnaire was anonymous and voluntary. Lastly, a total of 2,832 students completed the questionnaire.

Each school was offered the option of receiving its own results in addition to the global study results.

Data analyses

The data gathered were entered into the SPSS 20.0 (IBM, Chicago, Illinois, U.S.) for subsequent analysis. The total and factorial scores, Cronbach's α, and stratified α (which indicates when the scales have more than one dimension) [52–54] were calculated to confirm reliability. The factorial scores (of each component) were calculated with the average of the scores from each item that composed them. A descriptive analysis was conducted to calculate the mean (standard deviation), median (p_{25}, p_{75}), and their corresponding confidence interval. The results were calculated for the total population, factoring according to gender, age, urban/rural location, origin (native/immigrant), and family wealth, which was based on the Family Affluence Scale (FAS II). The significance of the difference was verified for each factor using the appropriate statistical test, i.e., t-Test or analysis of variance (ANOVA), according to the number of categories of the factor. The association between the scores and age was evaluated with Pearson's r linear correlation coefficient. The magnitude of the effect was calculated with Cohen's d in all cases in which significant differences were detected to measure those differences. To interpret the magnitude of the effect, the values proposed by Cohen [55] and expanded by Rosenthal [56] were considered: values between 0.2 and 0.5 imply a small value, between 0.5 and 0.8 indicate a moderate value, between 0.8 and 1.3 indicate a large value, and values greater than 1.3 indicate a very large value. The significance level was 0.05.

Table 1. Stratified sampling of the schools based on ownership and province.

	Public schools	% of the total of schools in Catalonia	n of the public sample	Private schools	% of the total schools in Catalonia	n of the private sample
Barcelona	370	32	8	499	43	11
Girona	70	6	1	34	3	1
Lleida	53	5	1	26	2	1
Tarragona	81	7	2	37	3	1
Total	574		12	596		13

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Ethics

Ethics approval was obtained from the Research Ethics Committee (Faculty of Psychology, Education and Sport Sciences, University Ramon Llull). The study was conducted in accordance with the tenets of the Declaration of Helsinki. This study was a self-administrated questionnaire, and at the end, the decision to answer it was from the own students. The school accepted to participate in the project, and the Head of the institution signed the consent. The questionnaire was anonymous, and we guaranteed that the data and the results were going to be totally confidential, and they would only be used globally (the sample of all the schools), not to evaluate particularly each student. The confidentiality was also maintained during data analysis by delinking questionnaire data from any personal identification information. For those over 16, It was not required an informed consent, as it was considered that if students answered the questionnaire, implied an informed acceptance to participate in the study. For those under 16, the researchers did not require parental consent and the principal's blessing and signature were regarded as sufficient, given that Catalonia school boards and principals should inform parents and collect their consent regarding any extracurricular activity. The research ethics committee also confirmed that the Head's signature covered the permission to analyse the data of each class group. The Research Ethics Committee approved specifically the informed consent procedure for all participants in our study.

Results

Of the 2,832 students, 1,717 (60.6%) were students in secondary education, 882 (31.1%) were bachelor's students, and 233 (8.3%) were vocational students. Table 2 summarizes the

Table 2. Socio-demographic characteristics of the sample.

	n (%) or $\bar{x}$ (SD)
Gender	
Boy	1,208 (50.1)
Girl	1,202 (49.9)
Age	
Mean (SD)	15.26 (1.5)
Boy	15.32 (1.53)
Girl	15.21 (1.47)
Adolescent Origin	
Native	2,087 (86.7)
Immigrant	319 (13.3)
Parent origin	
Both native	1,910 (79.8)
Mixed	128 (5.3)
Both immigrant	354 (14.7)
School ownership	
Public	1736 (72)
Private	674 (28)
Family wealth (FAS II)	
Low	37 (1.6)
Middle	535 (22.4)
High	1,813 (76)

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socio-demographic characteristics of the sample. The α and stratified α were 0.61 and 0.69, respectively.

Descriptive analysis of the total scores

The mean (SD) of the score was 33.6 (5.5) points, and the median (p_{25}-p_{75}) was 34 (30–38) points. No significant differences were observed in the total score with respect to gender, urban/rural location, and origin of the adolescent (native/immigrant). However, significant differences were observed in the total score with respect to age and family wealth. With respect to age, the score decreased significantly as age increased (r = -0.391, p<0.01), and the ANOVA test confirmed that there were significant differences between the different ages (p<0.001). S1 Fig shows the mean of the scores and 95% CI for each age.

With respect to family wealth, the score was 2.35 points greater at the high level than at the low level and 1.03 points greater at the high level than at the middle level. The difference between the low and middle levels was 1.31 points. The ANOVA test was significant (p<0.001), and post-hoc analysis showed that the significance could be found between the high and middle levels and between the high and low levels.

Table 3 shows the descriptive statistics and level of significance of all analyses with the total score.

Table 3. Descriptive statistics of the total score with respect to the different factors.

	x̄ (SD)	95% CI			p	Cohen's d
Gender						
Boy	33.41 (5.57)	33.09	-	33.74	n.s.[1]	
Girl	33.80 (5.51)	33.48	-	34.13		
Age						
13	36.54 (4.80)	36.01	-	37.06		
14	35.65 (4.58)	35.23	-	36.08		
15	34.35 (5.00)	33.92	-	34.79	< 0.001[2]	1.49[3]
16	32.20 (5.34)	31.70	-	32.69		
17	30.80 (5.35)	30.27	-	31.34		
18	30.23 (6.04)	29.02	-	31.43		
19	28.81 (6.35)	26.72	-	30.90		
Location						
Urban	33.64 (6.13)	32.66	-	34.61	n.s.[1]	
Rural	33.61 (5.50)	33.37	-	33.84		
Origin						
Native	33.57 (5.59)	33.32	-	33.82	n.s.[1]	
Immigrant	33.88 (5.21)	33.28	-	34.48		
Family wealth						
Low	31.53 (6.18)	29.30	-	33.76		
Middle	32.84 (5.89)	32.33	-	33.36	< 0.001[2]	0.40[4]
High	33.88 (5.40)	33.62	-	34.13		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

[4] Magnitude of the effect between high and low levels;

n.s. = not significant

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Descriptive analysis of the scores for each component

Diet. The mean (SD) of the score for the diet component was 2.04 (0.5) points, and the median (p_{25}-p_{75}) was 2 (1.66–2.33) points. No significant differences in diet were observed with respect to urban/rural location. However, significant differences were observed with respect to gender, age, origin (native/immigrant), and family wealth. Girls scored 0.32 points higher than boys ($p<0.001$). With respect to age, the ANOVA test showed significant differences between the different ages ($p<0.01$). At 13 years of age, the score was 0.22 points higher than at 19 years of age. With respect to origin, the score was 0.17 points higher for natives than for immigrants. With respect to family wealth, the score was 0.33 points greater at the high level than at the low level and 0.10 points greater at the high level than at the middle level. Table 4 shows the descriptive data, significance, and magnitude of the effect of diet analyses.

Physical activity. The mean (SD) of the score for the physical activity component was 2.29 (0.85) points, and the median (p_{25}-p_{75}) was 2.66 (2–3) points. No significant differences were observed with respect to origin (native/immigrant). However, significant differences were observed with respect to gender, age, location, and family wealth. Boys scored 0.35 points higher than girls ($p<0.001$). With respect to age, the ANOVA test showed significant differences between the different ages ($p<0.01$). From 15 years of age, the score decreased as age increased. With respect to origin, the score was 0.17 points higher for natives than for immigrants. With respect to location, the score was 0.24 points higher for those in rural areas

Table 4. Descriptive analysis of the diet component with respect to the different factors.

	x̄ (SD)	95% CI			P	Cohen's d
Gender						
Boy	1.88 (0.46)	1.85	-	1.91		
Girl	2.20 (0.49)	2.17	-	2.22	< 0.001[1]	0.67
Age						
13	2.11 (0.49)	2.06	-	2.17	< 0.01[2]	0.46[3]
14	2.04 (0.50)	1.99	-	2.08		
15	2.07 (0.49)	2.03	-	2.11		
16	1.99 (0.52)	1.94	-	2.03		
17	2.03 (0.51)	1.98	-	2.08		
18	1.97 (0.50)	1.87	-	2.06		
19	1.89 (0.45)	1.75	-	2.03		
Location						
Urban	2.04 (0.50)	2.02	-	2.06	n.s.[1]	
Rural	2.03 (0.51)	1.94	-	2.12		
Origin						
Native	2.06 (0.50)	2.04	-	2.08	< 0.001[1]	0.32
Immigrant	1.89 (0.53)	1.83	-	1.95		
Family wealth						
Low	1.74 (0.58)	1.54	-	1.93		
Middle	1/96 (0.52)	1.93	-	2.01	< 0.001[2]	0.61[4]
High	2.07 (0.49)	2.04	-	2.09		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

[4] Magnitude of the effect between high and low levels;

n.s. = not significant

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Table 5. Descriptive analysis of the physical activity component with respect to the different factors.

	$\bar{x}$ (SD)	95% CI			P	Cohen's d
Gender						
Boy	2.47 (0.76)	2.42	-	2.51	< 0.001[1]	0.42
Girl	2.12 (0.9)	2.06	-	2.17		
Age						
13	2.44 (0.75)	2.36	-	2.53	< 0.001[2]	0.66[3]
14	2.46 (0.70)	2.40	-	2.53		
15	2.42 (0.75)	2.36	-	2.49		
16	2.25 (0.85)	2.17	-	2.33		
17	1.97 (1.01)	1.87	-	2.07		
18	2.06 (0.92)	1.88	-	2.24		
19	1.87 (0.96)	1.55	-	2.18		
Location						
Urban	2.28 (0.86)	2.24	-	2.31	< 0.001[1]	0.30
Rural	2.52 (0.69)	2.41	-	2.63		
Origin						
Native	2.30 (0.84)	2.26	-	2.34	n.s.[1]	
Immigrant	2.26 (0.89)	2.15	-	2.36		
Family wealth						
Low	2.12 (0.98)	1.78	-	2.76		
Middle	2.18 (0.92)	2.10	-	2.26	< 0.01[2]	0.23[4]
High	2.33 (0.82)	2.29	-	2.37		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

[4] magnitude of the effect between high and low levels;

n.s. = not significant

(p<0.001). With respect to family wealth, the score was 0.15 points greater at the high level than at the middle level (p<0.01). Table 5 shows the descriptive statistics, significance, and magnitude of the effect of physical activity analyses.

Substance abuse. The mean (SD) of the substance abuse score was 2.50 (0.69) points, and the median (p_{25}-p_{75}) was 3 (2.25–3) points. No significant differences were observed in substance abuse with respect to gender or family wealth. However, significant differences were observed with respect to age, location (urban/rural), and origin (native/immigrant). With respect to age, the ANOVA test showed significant differences between the different ages (p<0.001), and the post hoc analyses showed that the score decreased with every year that age increased. With respect to location, the score was 0.20 points higher in urban locations than in rural locations (p<0.01). With respect to origin, the score was 0.18 points higher for immigrants than for natives (p<0.001). Table 6 shows the descriptive statistics, significance, and magnitude of the effect of all substance abuse analyses.

Rational use of leisure technology (RULT). The mean (SD) of the score for the RULT component was 1.95 (0.66) points, and the median (p_{25}-p_{75}) was 2 (1.33–2.33) points. Significant differences were only observed with respect to age (p<0.001) and not for the other factors. For each year, the score decreased until reaching 17 years, at which point no significant differences were observed. Table 7 shows the descriptive statistics, significance, and magnitude of the effect for all RULT analyses.

Table 6. Descriptive analysis of the substance abuse component with respect to the different factors.

	x̄ (SD)	95% CI			P	Cohen's d
Gender						
Boy	2.48 (0.70)	2.44	-	2.52	n.s.[1]	
Girl	2.51 (0.67)	2.47	-	2.55		
Age						
13	2.85 (0.43)	2.81	-	2.90	< 0.001[2]	1.41[3]
14	2.75 (0.53)	2.71	-	2.80		
15	2.54 (0.66)	2.48	-	2.59		
16	2.31 (0.73)	2.24	-	2.37		
17	2.20 (0.71)	2.14	-	2.27		
18	2.19 (0.75)	2.05	-	2.34		
19	1.89 (0.86)	1.62	-	2.17		
Location						
Urban	2.51 (0.68)	2.48	-	2.54	< 0.01[1]	0.27
Rural	2.31 (0.78)	2.18	-	2.43		
Origin						
Native	2.48 (0.70)	2.44	-	2.50	< 0.001[1]	0.27
Immigrant	2.66 (0.60)	2.59	-	2.72		
Family wealth						
Low	2.58 (0.71)	2.33	-	2.83	n.s.[2]	
Middle	2.49 (0.70)	2.43	-	2.55		
High	2.50 (0.68)	2.47	-	2.53		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

n.s. = not significant

Hygiene. The mean (SD) of the score for the hygiene component was 2.38 (0.63) points, and the median (p_{25}-p_{75}) was 2.5 (2–3) points. No significant differences in hygiene were observed with respect to location (urban/rural) or family wealth. However, there were significant differences with respect to gender, age, and origin (native/immigrant). Girls scored 0.17 points higher than boys (p<0.001). With respect to age, the ANOVA test showed significant differences between the different ages (p<0.05). The lowest score was seen at 18 years of age. With respect to origin, the score was 0.21 points higher for immigrants than for natives (p<0.001). Table 8 shows the descriptive statistics, significance, and magnitude of the effect for all hygiene analyses.

Comparative summary of all components and factors. S2 Fig is a summary of the differences found in each analyzed component. Highlighted are the factors that showed significant differences, and the magnitude of the effect and the direction of the observed difference (indicating which category had the highest score or, rather, indicating the tendency) are shown inside each box.

Discussion

Analysis of the total VISA-TEEN scores

The goal of the study is to place the adolescents in a continuum, and therefore, no cutoff points are provided. However, some general considerations may be made with respect to the scores,

Table 7. Descriptive analysis of the RULT component with respect to the different factors.

	$\bar{x}$ (SD)	95%CI			P	Cohen's d
Gender						
Boy	1.95 (0.69)	1.91	-	1.99	n.s.[1]	
Girl	1.95 (0.63)	1.91	-	1.99		
Age						
13	2.16 (0.66)	2.09	-	2.24	< 0.001[2]	0.66[3]
14	2.10 (0.65)	2.04	-	2.15		
15	2.00 (0.62)	1.95	-	2.06		
16	1.84 (0.63)	1.78	-	1.90		
17	1.75 (0.63)	1.69	-	1.81		
18	1.70 (0.72)	1.56	-	1.83		
19	1.71 (0.72)	1.78	-	1.94		
Location						
Urban	1.95 (0.66)	1.92	-	1.98	n.s.[1]	
Rural	1.96 (0.73)	1.85	-	2.08		
Origin						
Native	1.96 (0.66)	1.93	-	1.99	n.s.[1]	
Immigrant	1.92 (0.66)	1.84	-	1.99		
Family wealth						
Low	1.93 (0.75)	1.68	-	2.17	n.s.[2]	
Middle	1.91 (0.67)	1.85	-	1.96		
High	1.96 (0.65)	1.93	-	1.99		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

n.s. = not significant

understanding that scores on the VISA-TEEN lower than 22.5 imply a lifestyle that negatively affects the health of the adolescent (the score ranges from 0 to 45 points). Scores higher than 30 (2 points on average for each of the 15 items) may be considered a lifestyle that positively favors health, although interpretations should be made carefully because the case could arise that certain items have high scores while others have low scores.

The majority of adolescents scored between 35 and 40 points, and only a few scored lower than 22.5. If we factor according to the socio-demographic variables, there are significant differences with respect to age and family wealth. With respect to age, there is a drop of almost 8 points between 13 and 19 years of age, with a very large magnitude of the effect (d = 1.49). With respect to family wealth, adolescents at the high levels had scores 2.3 points higher than those at the low levels, with a small magnitude of the effect (d = 0.40). These results are comparable with those obtained by Ramos [57], who correlates the global health of Spanish adolescents with their lifestyle. Ramos concludes that there are significant differences in global health with respect to age and family wealth. With regards to age, that author observes that the magnitude of the effect between 12 and 18 years of age is 1.09, a value lower than that obtained by the VISA-TEEN but that may be considered high [55,56]. With respect to family wealth as evaluated based on the FAS II, he obtains a magnitude of the effect of 0.40, exactly the same as what was obtained by the VISA-TEEN. Thus, we may conclude that age and family wealth are associated with the healthy lifestyles of adolescents, but the age effect is greater.

Table 8. Descriptive analysis of the hygiene component with respect to the different factors.

	x̄ (SD)	95%CI			P	Cohen's d
Gender						
Boy	2.28 (0.67)	2.25	-	2.32	< 0.001[1]	0.28
Girl	2.46 (0.58)	2.43	-	2.50		
Age						
13	2.44 (0.60)	2.37	-	2.50	< 0.05[2]	0.33[3]
14	2.41 (0.60)	2.35	-	2.46		
15	2.35 (0.65)	2.30	-	2.40		
16	2.38 (0.61)	2.33	-	2.44		
17	3.34 (0.67)	2.28	-	2.40		
18	2.22 (0.7)	2.09	-	2.36		
19	2.51 (0.68)	2.29	-	2.72		
Location						
Urban	2.37 (0.63)	2.34	-	2.40	n.s.[1]	
Rural	2.43 (0.62)	2.34	-	2.53		
Origin						
Native	2.35 (0.64)	2.32	-	2.37	< 0.001[1]	0.35
Immigrant	2.56 (0.55)	2.50	-	2.62		
Family wealth						
Low	2.20 (0.76)	1.94	-	2.45	n.s.[2]	
Middle	2.33 (0.67)	2.28	-	2.39		
High	2.39 (0.62)	2.36	-	2.42		

[1] significance calculated with Student's t-test;

[2] significance calculated with the ANOVA test;

[3] Magnitude of the effect between 13 and 19 years of age;

n.s. = not significant

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Score analysis of the different VISA-TEEN components

The range of the scores on each component is between 0 and 3 points, where 0 is an unhealthy lifestyle and 3 is the closest to the recommendations that favor good health.

Diet. In contrast to the VISA-TEEN, other studies that evaluate the quality of the diet do not evaluate the consumption of water and carbonated beverages and do evaluate variables that the VISA-TEEN does not, such as the number of portions or daily breakfast intake. These differences in the gathered information make comparisons difficult, but it may be assessed if the observed tendencies are similar. The mean of the scores for the diet component was 2 points. This value corresponds to habits that may not be considered negative for health but that can be improved. In the studies presented by Ayechu in 2010 [58] and Rodríguez et al. in 2012 [59], the results of the Mediterranean diet's quality index, KIDMED, in 13- to 16-year-old Spanish adolescents are analyzed. In both cases, the largest group is that categorized as "needing improvement". Similar studies are obtained from the Spanish state by Kontogianni et al. [60], who conclude that the modal group amongst Greek adolescents is also that of "needs improvement".

Thus, despite evaluating different aspects, the evaluation of our sample and the evaluations of the other aforementioned studies suggest that improvements are needed with respect to the aspects related to the eating habits of adolescents. However, this suggestion should take into account that the results are not extremely negative.

Upon analyzing the relationship of the diet component with the gender variable, it is confirmed that the score is significantly higher for girls (2.20 points on average) than it is for boys (1.88 points on average). We shall again refer to studies that do not evaluate the same variables for comparison. In those cases, the results contradict those obtained by the VISA-TEEN because the studies [58–60] suggest a poorer diet is observed with girls than with boys. This difference lies in the fact that the KIDMED evaluates, amongst other practices, daily breakfast consumption. This question is associated with a negative score, and the percentage of girls who do not eat breakfast daily is greater than that of boys. The study by Dinzeo et al. in 2013 [61] amongst 18- to 25-year-old individuals evaluates cholesterol, sugar, sodium, fruit, and vegetable intake. In the study, as in the VISA-TEEN, girls have higher scores than boys do.

Older adolescents have lower scores than the younger adolescents. This same association between diet and age is also observed in the HBSC-2010, which analyzes fruit, vegetable, carbonated beverage, and daily breakfast intake [2]. This tendency is also seen in the FRESC-2012 [46] study on Catalan adolescents.

With respect to origin, native adolescents scored higher than immigrants. The 2011 study by Prado et al. [62] obtained similar results when it analyzed the eating habits of adolescents from Madrid with the KIDMED. The scores of natives were higher than those of immigrants, except in the case of the Maghrebians, who other studies had already been shown to have eating habits similar to those of Spanish people, possibly due to their origin from a Mediterranean country [63].

With respect to the positive association between family wealth and diet, other studies also show the same relationship. Vereecken et al. [64] concludes that adolescents at the lowest family wealth levels skip more lunches, and the HBSC-2010 [2] also found that in the Spanish state, the adolescents at the lowest levels ate breakfast fewer days per week, ate fewer fruits and vegetables, ate more sweets, and had a higher intake of sweetened beverages.

Physical activity. The results on this component, without taking into account socio-demographic factors, may be considered satisfactory. The mean is 2.29 points, and the majority of adolescents (56.61%) scored between 2.5 and 3 points. The inclusion of physical education in the secondary educational curriculum plays an important role in this good score [65]. That the score decreases significantly after 16 years of age, at which time secondary education ends, stands as proof of this assertion.

When physical activity is analyzed with respect to gender, we observe that the score is significantly higher for boys than for girls. Similarly, the analysis of the HELENA-2009 [48] and the HBSC-2010 [2] studies shows that boys have more hours of daily moderate-to-vigorous physical activity than girls do. Other more objective studies, based on measurements taken with an accelerometer, conclude that sedentary lifestyle is greater in girls [66, 67].

Age is also a determining factor in this component. There is a decrease of 0.57 points between the youngest and oldest adolescents, with a moderate magnitude of the effect (d = 0.66). This tendency towards a decrease in physical activity with increased age is also observed in the abovementioned studies, i.e., HELENA-2009 [48] and HBSC-2010 [2]. In 2013, Mitchell et al. published a study [68], based on accelerometer measurements, in which they obtained results in the same direction. The daily median dedicated to moderate or vigorous physical activity decreased from 38.4 minutes at 12 years of age to 27.6 minutes at 15 years of age.

Ortega et al. arrived at the same conclusion in a cohort study of Estonian and Swedish adolescents, showing that in that population, daily physical activity decreased for every year of growth by 2.5 minutes for boys and 1 minute for girls [69].

Location has also been shown to significantly influence physical activity. In rural settings (less than 10,000 inhabitants), adolescents scored 2.5 points higher than in urban settings.

These data are comparable with other studies that evaluate the physical condition of school-aged children, conclude that it is superior in rural areas [70, 71], and obtain magnitudes of the effects similar to those obtained by the VISA-TEEN.

Lastly, the same relationship between physical activity and family wealth, based on the FAS II, is observed by the HBSC-2010 [2], Telama et al. [72], the HELENA-2009 study [49], and Borraccino et al. [73]. When comparing the physical activity of adolescents at the low and high family wealth levels, the magnitude of the effect observed in this last study was d = 0.23 for boys and d = 0.27 for girls, values that are comparable to those obtained in the present study (d = 0.23 with no gender difference).

Substance abuse.   This component is where a stronger influence from one of the factors is produced. Age is clearly associated with the score obtained, with a magnitude of the effect of d = 1.41. Given that the mean was 2.5 points, the analysis of the global score in this component may thus be deceiving. The perspective changes radically when we analyze the data on the different ages. In this case, the score decreases progressively from 2.85 points at 13 years of age to 1.89 at 19 years of age. This association between age and substance abuse coincides with the conclusions published by the health department of the Government of Catalonia when the results from the ESTUDES-2010 survey for Catalonia were analyzed [74] and also with the conclusions published by the Public Health Agency of Barcelona in its report on the risk factors for secondary education students (FRESC-2012) [46].

Urban/rural location was another factor in which significant differences have been found. The adolescents from rural areas scored lower than those from urban areas (the means are 2.31 and 2.51 points, respectively). These results are comparable with those obtained in 2008 in Andalucía [75], where it was concluded that alcohol consumption and illegal drug use patterns are higher in adolescents from rural areas, while tobacco use had no significant differences.

Lastly, origin was also related to substance abuse. Immigrant adolescents had higher scores than natives did. In 2009, Luengo et al. showed that the group of immigrant adolescents in Spain is not uniform, and they recommended approaching the topic of drug consumption in immigrants by segregating according to country of origin [76]. In our analysis, we did not take this possibility into account, given that the resulting groups would have been too small to reach any conclusions.

Nonetheless, given that the largest group in our study is Latin American, we may compare our results with those obtained by Tortajada et al. in 2008 [77]. Their study concludes that alcohol, cannabis, tobacco, amphetamine, hallucinogen, and tranquilizer use is higher in native adolescents.

Rational Use of Leisure technology (RULT).   This component is the least influenced by sociodemographic factors (it only showed a relationship with age), and it is the component on which the adolescents have the lowest scores. The use of new technologies to access the internet and connect with others has become universal in recent years. In the last third of 2014, 2.4 million adolescents used the internet [78]. This generalization of internet use increasingly leads to questioning the meaning of rational use and when problematic, abusive, or addictive use may be discussed [79, 80].

The mean score obtained in this component was 1.95 points, and the largest group was between 1.5 and 2 points (32.75%). More than a quarter of respondents had a score lower than 1.5, i.e., had habits that may negatively affect their health. There was no comparable measure in other studies that evaluated the same component of leisure technology use and hours of sleep. Thus, any comparison made would be incomplete. The results obtained by the FRESC-2012 study showed that 40% of adolescents in Barcelona spent more than 2 hours in front of a computer with no academic purpose [46]. More than 2 hours per day is the value that, according to Tsitsika et al., correlates to a problematic use of the internet [81].

With respect to the relationship between RULT and age, the score decreased significantly from 13 to 17 years of age. These data coincide with the results obtained by the FRSC-2012 [46], which observed that the hours dedicated to using the computer for non-academic purposes during the school week increased with age. A study in Japan with nearly 100,000 adolescents [82] concluded that there was an increase in mobile phone use (to talk as well as to chat) at sleep time with age and showed that this negatively influenced the quality of sleep, which decreased with age.

Hygiene. On this component, the adolescents obtained a mean score of 2.38 points. Thus, we can consider that it is satisfactory but could improve. The habits of adolescents are close to the recommendations for the frequency of hand washing and tooth brushing. The good score on dental hygiene may be due to the information campaigns by the Catalan government that started in 2006 [83]. The HBSC-2010 [2] concluded that nearly two-thirds of Spanish adolescents brushed their teeth more than once per day, a value that coincides with that obtained by Artácoz et al. in 2007 in the province of Navarra [84]. The frequency of hand washing in adolescents is not well studied at the Spanish level, but the adolescents surveyed by the VISA-TEEN have lived through the campaigns that started with the inauguration of Global Handwashing Day in 2008 [85]. These campaigns had special repercussions after the Type A flu pandemic arrived in Spain in 2009, and even today, there are still many health portals directed to adolescents and the general population [85–87]. These campaigns have contributed, in our opinion, to the good hygienic habits amongst adolescents in Catalonia.

Place of origin is associated with this component. Immigrant adolescents score higher on this component of the VISA-TEEN than native adolescents do. This fact contradicts the findings of other studies, which conclude that there is an inverse relationship. Ramos [88] concludes that immigrant adolescents in Andalucia wash their hands less, and Molina and Pastor show that immigrant children have worse dental health than do native children [89]. By contrast, the results published by Artácoz et al. [84] are similar to those found in our study and note that immigrants brush their teeth with more frequency than natives do.

Thus, this is a controversial component that should be analyzed in more depth, taking into account the country or area of origin of the immigrants.

Age also shows a relationship with hygiene. Once again, we find that the score decreases as age increases, dropping from 2.35 points at 13 years of age to 2.09 at 18 years of age. This tendency towards a worsening of hygienic habits with age is not seen in the HBSC-2010, which concludes that there is no difference in the frequency of tooth brushing amongst the different age groups, although the data from the HBSC-2010 may be masked by gender, i.e., while the frequency increases in girls, it decreases in boys [2].

Lastly, gender was also a factor associated with hygiene. Boys had lower scores than girls. This relationship was also observed, as noted above, in the HBSC-2010, which concluded that, at both the European level and the Spanish national level, the frequency of tooth brushing was higher for girls than for boys. This relationship may be attributed to girls' concern with body image [2, 90]. Similarly, the study by Vadiakas et al. of 2,481 12- to 15-year-old Greek adolescents shows that girls had a better level of oral hygiene [91].

In conclusion, we may accept that in general terms, the lifestyles of adolescents in Catalonia are satisfactory but that there are components (such as substance abuse and RULT) that need substantial improvement. It is also established that any study of adolescent lifestyles should take into account the socio-demographic factors that influence it, i.e., age, gender, urban/rural location, origin (immigrant/native), and family wealth level.

Supporting Information

S1 Fig. Total score with respect to age. The red line indicates the general mean.
(TIF)

S2 Fig. Differences in the lifestyle components with respect to gender, age, location, origin, and family wealth (FAS II). [1] RULT = Rational use of leisure technology; [2] FAS II: Family wealth measured based on the Family Affluence Scale II. Highlighted boxes are where significant differences were found. The direction of the differences in the score is shown with the mathematical symbols $<$, $>$, or $=$. Higher scores indicate healthier lifestyles in that component. The magnitude of the effect is also indicated with Cohen's d value. The score tendency is also shown for the age variable.
(TIFF)

S1 File. Rough data used in our study. A supplementary file with all the data has been uploaded in an Excel file, in order to offer guarantee to access data sources.
(XLSX)

S2 File. Multivariable analysis.
(XLS)

Author Contributions

Conceptualization: LC MG.

Formal analysis: LC.

Methodology: LC MG.

Supervision: LC.

Writing – original draft: LC MG.

Writing – review & editing: LC MG.

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