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ORIGINAL ARTICLE

Analysis of knowledge about healthy breakfast and its relation to life style habits and academic performance in compulsory secondary students☆

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Abstract

Objectives: The main objective of the study is to analyze whether students of Compulsory Secondary Education (ESO) of Badajoz city known foods that are part of a healthy breakfast. It also intends to see the relationship of this knowledge with lifestyle habits and academic performance.

Materials and methods: A representative sample of 1197 secondary students in the city of Badajoz (Spain) (50.1% female) was calculated their Body Mass Index (BMI) and were asked to fill in a questionnaire, previously validated in a pilot study, which included sociodemographic items as well as others related with life style habits. They were also asked to choose among a series of food, which of them were a part of a healthy breakfast.

Results: 49.2% of adolescents know foods which are a part of a healthy breakfast. Very low correlations were obtained between all the variables analyzed and knowledge of foods that make up a healthy breakfast. However, within a few variables are significant differences (*p* < .05) between subgroups, such as families of students with low cultural level of aided schools, repeaters, without reading habit, passing lot of time with friends, who have been on a diet, make less than 3 meals a day and spend less than 10 min for breakfast and know the amount of fruit that should be consumed daily.

Conclusions: Life style habits of adolescents are not related to the knowledge about the foods that are part of a healthy breakfast.

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Análisis de los conocimientos sobre el desayuno saludable y su relación con los hábitos de estilo de vida y el rendimiento académico en la enseñanza secundaria obligatoria

Resumen

Objetivos: El objetivo principal del estudio es analizar si los alumnos de la enseñanza secundaria obligatoria (ESO) de la ciudad de Badajoz conocen los alimentos que forman parte de un desayuno saludable. Además se pretende ver la relación que tiene este conocimiento con los hábitos de estilo de vida y el rendimiento académico.

Material y método: A una muestra representativa formada por 1.197 alumnos de ESO de la ciudad de Badajoz, 50,1% de mujeres, se les calculó el índice de masa corporal (IMC) y contestaron un cuestionario previamente validado en un estudio piloto que incluía variables sociodemográficas y otras relacionadas con los hábitos de estilo de vida. Además se les pidió que seleccionaran entre una serie de alimentos aquellos que formaban parte de un desayuno saludable.

Resultados: Un 49,12% de los adolescentes conoce los alimentos que forman parte de un desayuno saludable. Se obtienen correlaciones muy bajas entre todas las variables analizadas y el conocimiento de los alimentos que conforman un desayuno saludable. A pesar de ello, dentro de algunas variables se observan diferencias significativas ($p < 0,05$) entre los subgrupos, como es el caso de alumnos con familias de nivel cultural bajo, de centros concertados, repetidores, sin hábito de lectura, que pasan mucho tiempo con los amigos, que han hecho dieta, hacen menos de 3 comidas diarias y dedican menos de 10 min al desayuno y desconocen la cantidad de fruta que deben consumir diariamente.

Conclusiones: Los hábitos de estilo de vida de los adolescentes no tienen correlación con el conocimiento sobre los alimentos que conforman un desayuno saludable.

Introduction

Breakfast is considered to be one of the most important daily meals, may have positive effects on health,[1] and has been shown to be an important indicator of a healthy lifestyle.[2] It should allow young students to maintain an adequate level of physical and, especially, intellectual activity throughout the morning.[3] Missing or inadequate or insufficient breakfast is common among adolescents, and may condition an inadequate diet and malnutrition status.[4–6] Despite the nutritional relevance of breakfast, modern, faster lifestyles are responsible for the hasty intake of breakfast, which is therefore of low nutritional quality, leading to a negative evaluation of food consumption in the breakfast of adolescents.[7]

Breakfast should provide 20–30% of daily energy requirements,[8] and its nutritional quality depends on the inclusion of the triad consisting of dairy products, cereals and fruit or fresh fruit juice, which may be supplemented with other food items.[9] In our geographic and/or cultural environment, when one speaks about breakfast, a distinction should be made between breakfast proper and a second breakfast, taken at the educational center and complementing the morning intake.[7]

Adolescents who attend educational centers after a very light, incomplete, or no breakfast show decreased attention and concentration capacity and lower morning physical performance than those who have taken an adequate breakfast. This may be because it increases cognitive function related to memory.[10] Thus a well balanced breakfast helps in preventing such effects as decreased attention, fatigue, headache, and drowsiness, all of which are reported by

teachers and which decrease intellectual performance.[9] This is the most marked effect in children at nutritional risk.[11] However, the effects of breakfast on academic performance also depend on the interaction of several factors, including curriculum, student characteristics (malnutrition), and school organization.[12]

If an adequate breakfast is not taken, it is very difficult to achieve daily dietary recommendations, especially of vitamins and minerals. This has prompted some countries to launch institutional campaigns to promote breakfast.[13,14]

The primary study objective was to analyze whether adolescents are aware of which food items should be part of a healthy breakfast. In addition, this knowledge is compared to actual intake reported in other national and international studies on adolescents. Finally, we attempt to establish the profile of adolescents who do not know the food items which are part of a healthy breakfast, taking into account a number of socio-demographic variables and other variables related to different lifestyle habits. We will also analyze the relationship between this knowledge and academic performance, both overall and in the field of physical education.

Subjects and methods

Sample selection

A survey was conducted of 1197 students from the city of Badajoz aged 12–18 years (mean, 14 years) 50.1% of them females. The sample was randomly selected using cluster sampling.

A quantitative methodology was used, and the study had a cross-sectional design. The confidence level was ±2.5%, with a confidence interval of 95.4%.

Collection of information

A questionnaire consisted of 24 closed questions, each of which corresponded to a dependent variable. Variable distribution was as follows: 5 for socio-demographic factors, 5 related to the study, 3 about toxic consumption, 5 about free and leisure time, 3 about rest, 3 about body composition, and 5 related to diet.

In addition, a question that requested selection among a number of food items of those which were part of a healthy breakfast was included as an independent variable.

The content of the questionnaires was previously validated by an expert panel and on a sample of 295 students.

To classify the types of breakfast, it was decided use the same criteria as in the enKid[15] and Herrero and Fillat[16] studies, which classified them based on quality as follows: good quality (containing at least one food from each of the 3 groups: dairy products, cereals, and fruit); improvable quality (one of the groups is lacking); inadequate quality (two food items are lacking); poor quality (all three food items are lacking).

Since the study was not intended to analyze intake quality but to assess if they knew the food items which were part of a healthy breakfast, the following classification was used: very healthy (good quality); healthy (improvable quality); not very healthy (inadequate quality); unhealthy (poor quality).

The mean final marks of the course of all participants were also calculated, and the mean overall mark in the subject of physical education (PE) was found.

Procedure

For data collection and statistical analysis, an Internet domain was registered, in which software in PHP and JavaScript language was installed, together with a database specifically designed for the study using Mysql.

The whole field work was directed by a single researcher who explained informed consent to participants before they started to individually and anonymously answer the questionnaire in the computers in their own classrooms or at the computing rooms of educational centers and gave them indications about how should they answer.

While some of them answered the questionnaire, others had their height and weight measured with an analogical MB 201 Plus scale which was constantly calibrated.

The mean time for questionnaire completion and anthropometric measurements was approximately 12 min.

Statistical data analysis

To assess behavior in each of the questionnaire items, a descriptive analysis which provided percentages and means was carried out, and standard deviation was calculated. All of this provided the required information about the opinions given by the surveyed students. To establish the relationship between the variables, a Pearson's Chi-square test was used.

To see whether statistically significant differences existed between items of the same dependent variable as compared to the independent variable, a Student's t test for independent samples and a one-factor ANOVA were used, with a 95% confidence interval (95% CI). To establish differences between the groups in each of the variables showing statistically significant differences, post hoc tests were performed using the Bonferroni method.

Finally, the Pearson's method was used to obtain the correlation between the variables.

Results

Table 1 shows that approximately 50% of study subjects knew the food items which are part of a ''very healthy'' breakfast, while 2% completely ignored them.

In Table 2, showing the socio-demographic variables, a relationship showing statistically significant differences ($p < 0.05$) was only seen with the cultural level of the family; however, the correlation is very low ($r = 0.08$). Significant differences were also found between families with low and high cultural level.

In Table 3, all variables show a correlation $r < 0.10$ to the independent variable, which is significant for some of them. As regards type of center, statistically significant differences were seen between students attending state-assisted and public centers. Significant differences were also found between students who repeated a year and ''non-repeaters''. As regards reading time, significant differences were found between participants who ''read nothing or almost nothing'' and those who read ''between 30 and 60 min daily'' and those who read ''between one and two hours daily''.

Annex I shows an indirect trend between knowledge of breakfast quality and smoking. However, this trend was not seen with smoking or illegal drugs. The correlation values for all variables are less than 0.09 and not significant.

Table 1 Description of sample for assessing knowledge of breakfast quality.

	Unhealthy	Not very healthy	Healthy	Very healthy	No.	Mean[a]	SD
Knowledge of breakfast quality							
No.	25	158	425	588	1197	2.32	0.782
%	2.17%	13.20%	35.51%	49.12%			

SD, standard deviation.

[a] Mean is calculated giving a value to each type of breakfast: 0, unhealthy; 1, not very healthy; 2, healthy; 3, very healthy.

Table 2 Relationship between knowledge of breakfast quality and socio-demographic variables.

	No.	Unhealthy	Not very healthy	Healthy	Very healthy	Mean[a]	SD	X^2	Hypothesis testing	Pearson's correl.
Knowledge of breakfast quality										
Sex										
Male	597	2.0%	12.2%	34.3%	51.4%	2.35	0.5	0.434	Student's t $p > 0.05$	−0.04 $p > 0.05$
Female	600		14.2%	36.7%	46.8%	2.28				
Age										
12	223	3.1%	13.9%	35.4%	47.5%	2.27	1.45	0.584	One-factor ANOVA $p > 0.05$	0.03 $p > 0.05$
13	291	2.7%	12.4%	38.8%	46.0%	2.28				
14	286	1.7%	15.7%	31.8%	50.7%	2.31				
15	222	1.4%	8.1%	36.0%	54.5%	2.44				
16	111	1.8%	18.0%	35.1%	45.0%	2.23				
17	49	2.0%	12.2%	38.8%	46.9%	2.31				
18	15		13.3%	26.7%	60.0%	2.47				
Type of family										
Single-parent	79	3.8%	11.4%	32.9%	51.9%	2.33	0.61	0.326	One-factor ANOVA $p > 0.05$	0.01 $p > 0.05$
Nuclear	253	1.6%	15.4%	36.4%	46.6%	2.28				
Extended	852	2.1%	12.8%	35.9%	49.2%	2.32				
Dysfunctional	13	7.7%	7.7%	7.7%	76.9%	2.54				
Economic status of the family										
Low	178	2.2%	11.8%	37.6%	48.3%	2.32	0.65	0.800	One-factor ANOVA $p > 0.05$	0.01 $p > 0.05$
Middle	740	2.2%	14.5%	34.6%	48.8%	2.30				
High	279	2.2%	10.8%	36.6%	50.5%	2.35				
Cultural level of the family										
Low[b]	110	5.5%	20.0%	26.4%	48.2%	2.17	0.53	0.04	One-factor ANOVA $p < 0.05$	0.08 $p > 0.01$[*]
Middle	495	2.4%	12.9%	39.0%	45.7%	2.30				
High[b]	592	1.4%	12.2%	34.3%	52.2%	2.35				

SD, standard deviation.

[*] Correlation is significant at the 0.01 level.

[a] Mean is calculated giving a value to each type of breakfast: 0 unhealthy; 1 not very healthy; 2 healthy; 3 very healthy.

[b] Significant differences (*post hoc*).

Data given in Annex II (free and leisure time) again show that although there was a relationship with some variables, there was no significant correlation with any of them.

Statistically significant differences were found between ''weekly physical activity time'', ''weekly time spent in cultural activities'', and ''time spent with friends daily''. As regards the latter, those who spent ''more than 3 h'' were more poorly informed about what constituted a healthy breakfast.

A detailed study of data in Annex III (rest) shows no significant correlation between any of the variables tested and the dependent variable.

Analysis of the variables related to body composition (Annex IV) again shows values of $r < 0.06$ between these and the dependent variable. The BMI percentile shows statistically significant differences. It should be noted that those

with greater knowledge of what a healthy breakfast consists of were those with the lowest percentile (low weight). However, one variable which showed statistically significant differences related to the use of dieting in order to lose weight. Those who had never followed a diet had a higher level of awareness.

The results in Annex V show that all variables related to nutrition are related to knowledge of a quality breakfast, and three of them also show statistically significant differences. However, as with all the other independent variables tested in the study, the correlation is not significant, and values of r are close to 0.1.

Post hoc analysis revealed significant differences in three variables: between students who ate ''4 or 5 meals daily'' and those who ate ''only 2 or less'' meals daily; between those who devoted ''10–20 min'' to breakfast and those

Table 3 Relationship between knowledge of breakfast quality and study-related variables.

		Unhealthy	Not very healthy	Healthy	Very healthy	Mean[a]	SD	X^2	Statistics	Pearson's correl.
Knowledge of breakfast quality										
Type of center										
Public[b]	696	2.2%	10.8%	35.2%	51.9%	2.37	0.53	0.03	One-factor ANOVA $p < 0.05$	−0.07 $p > 0.01$[*]
	477		17.0%	35.4%	45.3%	2.24				
State-assisted[b]										
Private	24		8.3%	45.8%	45.8%	2.37				
Repeater										
No	863	1.6%	12.1%	35.3%	51.0%	2.36	0.44	0.022	Student's *t* $p < 0.05$	−0.08[*] $p > 0.01$
Yes	334	3.6%	16.2%	35.9%	44.3%	2.21				
Daily study time										
None	63	4.8%	19.0%	38.1%	38.1%	2.10	0.96	0.190	One-factor ANOVA $p > 0.05$	0.03 $p > 0.01$
Less than 1 h	294	3.4%	9.9%	36.7%	50.0%	2.33				
1–2 h	534	1.7%	13.5%	35.4%	49.4%	2.33				
2–3 h	221	1.8%	15.8%	31.2%	51.1%	2.32				
More than 3 h	85		11.8%	41.2%	47.1%	2.35				
Daily reading time										
None or almost none[b]	388	2.8%	17.8%	35.8%	43.6%	2.20	1.19	0.04	One-factor ANOVA $p < 0.05$	0.10 $p > 0.01$[*]
Less than 30 min daily	319	1.9%	13.5%	35.1%	49.5%	2.32				
More than 30 and less than 60 min daily[b]	287	2.1%	10.8%	34.5%	52.6%	2.38				
1–2 h daily[b]	134	.7%	7.5%	39.6%	52.2%	2.43				
More than 2 h daily	69	2.9%	7.2%	31.9%	58.0%	2.45				
No. of monthly absences for a whole day										
None	828	2.1%	12.2%	36.2%	49.5%	2.33	1.05	0.314	One-factor ANOVA $p > 0.05$	−0.04 $p > 0.01$
2	304	1.6%	15.8%	32.9%	49.7%	2.31				
4	53	5.7%	15.1%	35.8%	43.4%	2.17				
6	12	8.3%	8.3%	50.0%	33.3%	2.08				

SD, standard deviation.

[*] Correlation is significant at the 0.01 level.

[a] Mean is calculated giving a value to each type of breakfast: 0, unhealthy; 1, not very healthy; 2, healthy; 3, very healthy.

[b] Significant differences (*post hoc*).
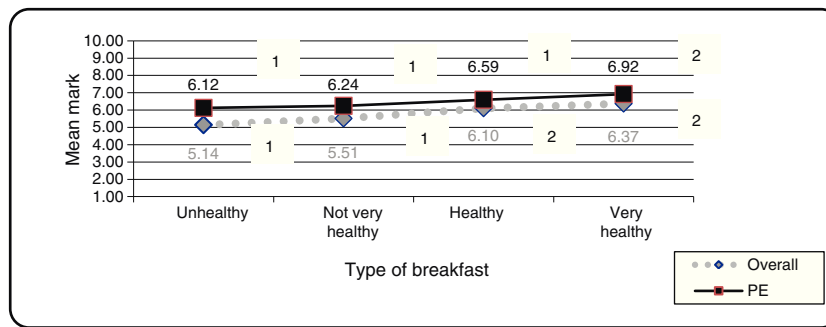
Source: Prepared by study authors
Statistics: One-factor ANOVA-overall: p≤0.001; PE: p<0.001
Pearson's correlation (overall): r=0.17; p>0.01 (signif. at 0.01 level)
Pearson's correlation (PE): r=0.13; p>0.01 (signif. at 0.01)
[1-2]Significant differences (post hoc)

Figure 1   Final marks related to awareness of breakfast quality. PE, physical education.

who devoted ''less time or had no daily breakfast'', with the latter having the poorest knowledge; finally, statistical differences were also found between those who thought they should eat ''1–3 pieces of fruit weekly'' and those who thought they should eat ''2 or more pieces of fruit daily''.

Knowledge about healthy breakfast tended to increase with a better academic performance, overall and in PE, as is shown in Fig. 1. This variable had a very significant influence ($p \leq 0.001$) on academic performance, both overall and in PE. However, the correlation is lower than 0.2 and not significant in either variable.

Overall, two comparisons may be made between different subgroups with statistically significant differences: the first subgroup, with the poorest results, comprising students with no or a poor knowledge about what constitutes a healthy breakfast, and the second subgroup consisting of students with a healthy or a very healthy knowledge. Of these, the latter performed better academically.

In PE, significant differences were found between students who were aware that breakfast is very healthy, on the one hand, and the rest, with the former performing better academically.

Discussion

Before the data are discussed, some study limitations should be noted.

Since actual breakfast consumption by the sample was not available and no studies analyzing knowledge of a healthy breakfast were found, any discussion must be limited to the comparison of actual consumption studies and studies on awareness regarding what constitutes a healthy breakfast. Therefore, any statements are made with all due caution. Moreover, the variety of methods used in the analyzed studies makes comparison of the different studies difficult.

Finally, as the questionnaire was answered at the centers on a computer instead of on paper, the results for some variables, particularly toxic consumption, were found to be very different from those seen in studies conducted both in the same city[17,18] and in the whole country.[19] This suggests that students were not completely sincere, which may be attributed to the suspicion on the part of some of them that

their answers would be transmitted to their parents or the educational center.

The discussion will focus on the results, taking as the reference point the actual consumption by the adolescent population in those variables in which significant differences were found, in order to analyze academic performance.

The occasional missing of breakfast is very common both in Europe and the United States (30% and 10% respectively).[10] The proportion of people who do not have breakfast daily is 5–10% (range, 2–15%).[2,8,9,20–24] However, Spanish[25] and European[26,27] studies show a trend to an increased quality of breakfast and a higher number of adolescents who have breakfast daily.[5,28,29] But only 5–10% of children and adolescents who usually have breakfast take an optimum breakfast.[15,30] Fifty percent of our students knew the food items which are part of a healthy breakfast, which means that 40–45% of them do not have one despite knowing what they should be having for breakfast.

It is estimated that approximately 60% of adolescents have an inadequate breakfast.[31] In this regard, the difference between those who know the food items which are part of a completely healthy breakfast (50%) and those who do not actually have one (60%) is reduced, and there is therefore some agreement. It should be noted, however, that 15% know none or only one of the components of a healthy breakfast. It is natural to conclude that these are more likely to have unhealthy breakfasts out of ignorance.

Sociodemographic variables

Males usually have breakfast more frequently than girls,[2,9] with a significant relationship between female sex and the missing of breakfast.[20,25,32] However, it cannot be stated that there is a relationship between knowledge of what a healthy breakfast consists of and sex.

The literature shows an inverse relationship between daily breakfast consumption and age,[23,33] which does not agree with the knowledge of breakfast found in our study, as no relationship was found between the variables. However, these data provide information supporting the idea that educational programs are ineffective, because older students, who are more likely to have received information

about healthy breakfast in educational centers, do not have greater awareness than younger students.

Adolescents living in extended families show a trend to an increased frequency of breakfast, while the opposite is true for students from single-parent families.[2,27,34–36] However, this does not appear to affect knowledge about breakfast quality. Surprisingly, students from dysfunctional families have the greatest knowledge, although the sample was very small (n = 13) and we should, therefore, be cautious before drawing any conclusions in this regard.

Frequency of breakfast is inversely related to socioeconomic status,[37,38] with the missing of breakfast being associated with a low socioeconomic status.[32,39] No relationship of this variable to knowledge of healthy breakfast was found.

Adolescents with parents with a high educational level show a positive relationship to breakfast consumption.[2] In this regard, our results show a trend similar to actual consumption.

Study-related variables

The type of educational center represents a variable in which significant differences between students attending public and state-assisted schools were found, with those from public schools having a greater knowledge of healthy breakfast. A study in depth, which would be extremely complex, would be required to clarify the reason. This variable could also fluctuate depending on the sample, the place, or other type of variable. We, therefore, consider it inappropriate to try to establish any causality.

Repeaters have significantly less knowledge about healthy breakfast than non-repeaters. This agrees with actual consumption data suggesting that a low educational level in adolescence is a factor statistically associated with the missing of breakfast.[32]

As regards daily reading time, according to the statistical data, adolescents who read nothing or almost nothing every day have less knowledge about healthy breakfast.

Variables related to consumption of toxic substances

Frequency of breakfast consumption is inversely related to alcohol consumption and smoking,[20,37] with both variables significantly affecting the omission of breakfast.[32] Our data did not show any relationship regarding any of the variables related to the consumption of toxic substances. However, the sample distribution was far below the actual consumption in adolescents and, therefore, unreliable.

Variables related to free and leisure time

Breakfast consumption frequency is directly related to the practice of physical activity.[20,37] In other words, an uncommon practice is significantly associated with the more frequent missing of breakfast.[32] No coincidence with knowledge of a healthy breakfast could be established for this variable.

Differences were found in the daily time spent with friends: those who spent more than 3 h daily had less knowledge about healthy breakfast. However, finding the reason for this would require an additional study.

Variables related to rest

Today, the main reasons for missing breakfast are lack of time and the gradual disappearance of the breakfast habit.[40] Too much hurry in the morning is associated with a less healthy and less frequent breakfast.[41] However, no relationship exists between knowledge of a healthy breakfast and any of the variables related to rest time.

Variables related to body composition

Regular breakfast consumption is associated with an absence of eating disorders.[42] Frequency of breakfast is inversely related to diet and weight control.[37] The results recorded in actual quantification are similar to those found in our study on healthy breakfast awareness.

Adequate breakfast is considered to be one of the determinant factors for obesity prevention in children and adolescents.[43] Studies show that the prevalence of overweight and obesity is lower in adolescents who eat a healthier, higher quality breakfast, and show inverse, statistically significant relationships between energy intake at breakfast and breakfast frequency with BMI increase.[32,44–46] In addition, having a regular breakfast over a long period promotes its control at adequate levels, so preventing overweight during adolescence.[39,47] However, not all studies relate missing breakfast to overweight.[10,48] Nor was any agreement between knowledge and actual consumption found in our study.

Variables related to diet and nutrition

School hours significantly influence breakfast quality, with a greater quality of breakfast being found in those who have more time to eat it. However, this does not appear to influence whether breakfast is missed or taken.[49] The results of our research were similar as regards knowledge of healthy breakfast, that is, those who devoted 10–20 min to breakfast had greater knowledge.

In secondary education students, breakfast usually provides adequate energy coverage, which does not mean that breakfast is healthy, because there is usually an excess intake of refined sugar and a deficient intake of cereals and fruit.[7] Irregular breakfast consumption is significantly associated with a low intake of fruit and vegetables in adolescents, especially girls.[50] In our case, this was only related to knowledge of the amount of fruit that should be taken daily, because those who said that more than two pieces of fruit should be taken daily had significantly greater knowledge.

Academic performance

Children who have no breakfast have deficiencies in their nutritional state and show significant failures in their

sequential, simultaneous, and compound processing of information. Cognitive function is also affected in healthy children,[51,52] resulting in a decreased academic achievement in both sexes.[53] All of this emphasizes the importance of lifestyle in general, and breakfast in particular for school achievement.[54] Breakfast quality is a significant component in the relationship between lifestyle factors and mental health in adolescence.[30]

Mean marks have been shown to significantly increase as breakfast quality increases, with a direct relationship between both variables.[16] However, this relationship is not so clear when individual subjects are considered. Surprisingly, one study even showed that, the poorer the quality of the students' breakfast, the higher they were rated in PE,[3] which hardly agrees with studies showing that the omission of breakfast significantly affects the physiological responses of the body to exercise.[55] Analysis of our results found that students who knew which food items form parts of a very healthy breakfast achieved greater academic performance, both overall and in PE, with significant differences as compared to all other students.

Conclusions

After analyzing the data collected, we can state that the variables which are related to the lifestyle habits tested have no relationship to the awareness of secondary school students in Badajoz regarding those food items which are part of a healthy breakfast.

It cannot be stated that ignorance regarding the food items which are part of a healthy breakfast is one of the reasons why both the quality and frequency of breakfast has decreased in adolescents.

Additional studies on healthy breakfast awareness are, nevertheless, required in order to establish its relationship to actual consumption.

Some of the variables analyzed show agreement with the results reported in studies quantifying actual consumption or the omission of breakfast. These include: the academic level of the family, being a repeater, having been on a diet, the time devoted to breakfast, and knowing the amount of fruit that should be eaten.

Virtually half of the students did not know the basic triad (fruit, dairy products, and cereals) of food items which are part of a healthy breakfast. For this reason, official intervention is needed to implement nutritional education programs emphasizing the importance of breakfast at this stage of life. These programs, in addition to being coordinated by nutritionists, should mainly be directed to that specific population of students who do not know which food items are necessary parts of a healthy breakfast. This profile is defined through the habits analyzed in this study and is as follows:

The student belongs to a family of low cultural level, attends a state-assisted school, is a repeater, has no daily reading habit, spends more than 3 h daily with friends, has been on a diet at least once, eats less than three meals daily, has no breakfast or devotes to breakfast less than 10 min daily, and does not know the amount of fruit to be taken daily.

As regards academic performance, those who had better achievement, both overall and in PE, know better those food items which are part of a healthy breakfast.

Conflicts of interest

The authors state that they have no conflicts of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.endoen.2014.04.004.

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