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A HEALTHY EATING AND LIFESTYLE SCHOOL INTERVENTION: CONCEPTUAL AND ATTITUDINAL CHANGE BUT NO BEHAVIOURAL CHANGE

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ABSTRACT

Low fruit and vegetables intake in adolescence is among main risk factors for obesity and other chronic diseases, including diabetes, cardiovascular disease and cancer. Establishing healthy eating habits in adolescents is of paramount importance to lead to future healthy adults, and school is the best place to take forward an effective approach to improve their food choices. The aim of this study was to investigate how far a specific school intervention is able to promote conceptual, attitudinal and behavioural changes, as far as healthy eating and physical activity are concerned.

Sixty five adolescents of 11 to 13 years-old participated in this follow-up study: 36 (55.4%) boys and 29 (44.6%) girls. The methodology was based on four steps with three evaluation periods: 1st evaluation and characterization of the sample ("baseline"); 2nd evaluation after a three-month intervention; 3rd evaluation one year after the intervention. All evaluations included adolescents' nutritional status assessment (by anthropometric measurements) as well as eating knowledge, food consumption and physical activity (by self-reporting questionnaire). The 3rd evaluation also included gathering adolescents' opinions on their participation in the healthy habits intervention and how relevant they had found it.

Along the three evaluations, adolescents' knowledge and their attitudes towards healthy habits tended to improve and they became aware of the importance of adopting healthy eating habits. However, no statistically significant differences in lifestyle behaviours were found, such as in daily intake of fruits and vegetables and physical activity changes. Results from this initial study have the potential to guide future research for planning a larger and deeper intervention programme in order to improve not only adolescents' attitudes towards healthy food choices but also improving their healthy behaviours.

Key words: Adolescents, health eating habits, school intervention, obesity prevention.

1. Introduction

There has been growing evidence that lifestyle and environment play an important role in obesity and other chronic diseases, including atherosclerosis, diabetes, cardiovascular disease and cancer (Riboli & Norat, 2001; Weisburger, 2002; WHO, 2005). The scientific literature also suggests that such disorders can be prevented by healthy lifestyles, such as physical activity and healthful diet (e.g. WHO, 2003; Anand et al., 2008; Shaya et al., 2008). In fact, unhealthy dietary habits in childhood and adolescence have been shown to be risk factors for adults' obesity and other chronic diseases (WHO, 2005). Particularly, low fruit and vegetable intake is among the main risk factors contributing to obesity epidemic and other chronic diseases (WHO, 2003). Switching to healthy eating habits and lifestyle will decrease not only chronic diseases but will also reduce both the costs and resources that are required to treat them, therefore, it is important to establish healthy eating habits in adolescence and so adults may become disease-free (WHO, 2005).

An effective school approach adapted to educate and drive on for adolescents to improve their healthy lifestyle can help them to prevent chronic diseases in the future. Indeed, the school is the best place to begin and take forward the whole process to move on an environment based on health and well-being. Young people spend more than 1200 hours a year at school (WHO, 2003). Being the heart of learning it is also a good place for trying to involve all stakeholders such as parents, family and local authorities and making them to be responsible for their healthy life (IUHPE, 2008).

The present study intended to answer to the following research question: Is a specific school intervention able to promote conceptual, attitudinal and behavioural changes, as far as healthy eating and physical activity are concerned?

2. Methodology

2.1- Study Design

This study was structured in four steps (Figure 1): *(i)* evaluation before the intervention (baseline), *(ii)* intervention implementation, *(iii)* evaluation immediately after the intervention and *(iv)* a third evaluation 1-year after the intervention.
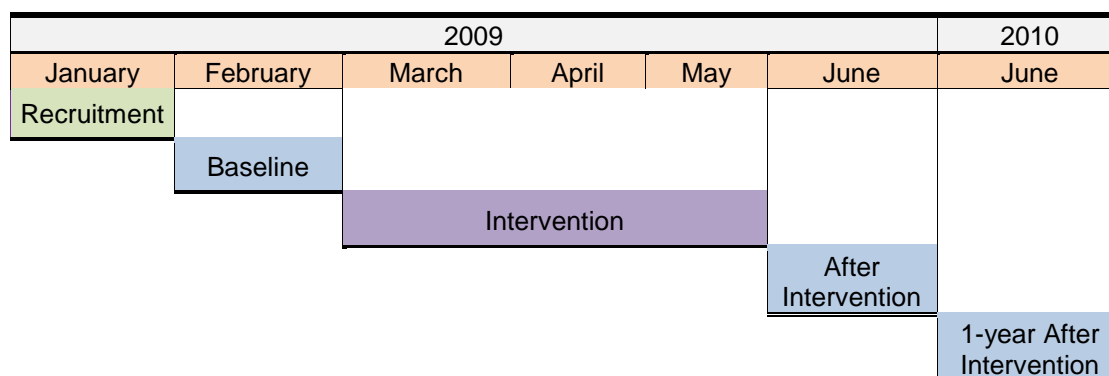
Figure 1. Study flow chart.

2.2- Participants

Of the initial 212 students of grade 6 (11/12 years old) participating in 2009 (in the 1st evaluation, in the project implementation and in the 2nd evaluation), 65 were again studied in the 3rd evaluation, in 2010. The inclusion criterion was the adolescents who attended the three evaluations. Of the 65 adolescents, 36 (55.4%) were boys and 29 (44.6%) girls.
The study was approved by the Pedagogical School Board. All parents gave their informed written.

2.3- School Intervention

A set of two learning activities were developed within a period of three months in the school. The educational support (focusing healthy eating habits and physical activity) were assisted by tasks carried out by students, in a motivating way, showing willingness and creativity. These activities took place during school classes of "Monitored Study", "Project Area", "Catholic Religion & Moral Education" and "Visual Education".

Teachers and parents were called to participate on a new healthy environment planned by students and some teachers who wished to participate. Parents were invited at the beginning of the pilot project to a briefing session on a school evening meeting to explain what would be done in the following months. During the intervention process, educational messages were addressed to those parents who attended the meeting. These educational messages were: eat fruits and vegetables everyday; eat vegetables soup in the beginning of lunch and dinner; increase fish intake and decrease meat intake; make healthy food choices for in between-meals; primarily drink water; have breakfast everyday; be active at least 1 hour a day. After the intervention, a closing event was held to give feedback of the project preliminary results to all students, teachers and parents.

2.4- Data collection

The three evaluations were identical. Each evaluation process included: *(i)* the nutritional state assessment by anthropometric methods (WHO, 1995) and *(ii)* a self-reporting questionnaire (Table 1).

Table 1. Measurement tools

Study Measures	Data collected
Anthropometric assessment	Height, Weight, BMI, Waist Circumference
Questionnaire	Age, parents' level of education and employment and number of persons at home Food frequency Alcohol intake Food knowledge Physical activity Watching TV, Computer, Videogames

2.4.1- Nutritional state assessment

The anthropometrical data were collected during the physical education lessons with sport clothing (shorts and t-shirt; without footwear) using standard procedures (WHO, 1995, p. 427-429 of TRS854 annex).

The height was measured to nearest 1 millimetre using a portable stadiometer (*Seca* 214, Hamburg, Germain). The body weight was recorded to the nearest 0.1kg using a Tanita digital scale (model UM-051). The waist circumference was assessed measured to nearest 1 millimetre by using a tape-measure.

BMI values were calculated according to the following formula: weight in kilograms divided by the square of height in meters. The cut off points for body mass index, defined by Cole and collaborators (2000; 2007), were used to define overweight and obesity as well as for classify thinness.

2.4.2- Self-reporting questionnaire

The self-reporting questionnaire was organized in 5 parts:
  i) demographics and social data: age, parents' level of education and type of employment, and number of persons at home;
  ii) dietary assessment: a 24-item questionnaire on food quality and frequency was used to define adolescent`s food intake habits;
  iii) alcohol intake first experience;
  iv) food basic knowledge questions for students' learning assessment;
  v) physical activity questions to know students' physical activity habits;
  vi) watching TV/computer/videogames habits.

In the third evaluation, the questionnaire included an extra section addressing opinion questions about their participation in the school intervention.

The questionnaire was applied in the "Project Area classes" to be completed in 25 minutes approximately and according to the organization and schedule of classes. Students were informed about the procedures for filling in the questionnaire and were encouraged to complete the questionnaire individually, with no colleagues' interference.

2.5- Statistical analyses

Not only changes in nutritional status through BMI but also changes in the improvement of eating habits (especially the increase intake of fruits and vegetables per day, progress in food knowledge and more weekly physical activities) were analysed. All tests were conducted with the standard statistical software (SPSS version 17.0). Descriptive analyses were based on means and standard deviations for quantitative variables and frequencies for categorical variables.

The main purpose of statistical analysis was to investigate whether there were differences between results obtained in the three evaluations of the study. Statistical differences were considered significant when $p \leq 0.05$. In order to investigate the relationship between two

categorical variables under study, the chi-square test (χ^2) was applied; and to compare continuous data in the assessments Student's *t* test for paired samples was used.

3. Results and Discussion

3.1- Sample description

The sample consists of 65 students, ages 11 to 13-y-olds: 36 (55.4%) boys and 29 (44.6%) girls running the 6th grade of a Portuguese urban school. The mean age was 11.38 ± 0.60.

3.2- Nutritional status

Changes in the mean of BMI over the three assessments are summarized in the Table 2. As expected, no significant changes in Body Mass Index (BMI) and in waist circumference were found before (1st evaluation) and just after the intervention (2nd evaluation). However, one year after the intervention (3rd evaluation), a significant BMI increase was recorded in both anthropometric assessments.

Table 2. Comparison of the anthropometric measures *(i)* before the intervention (baseline), *(ii)* after intervention and *(iii)* one year after intervention

Variables	Baseline		After intervention			1-year after intervention		
	Mean	SD	Mean	SD	*P*	Mean	SD	*p*
BMI (Kg/m^2)	19.8	2.9	19.8	2.9	0.481[†]	20.7	3.0	0.000*
Waist Circumference (mm)	74.1	8.5	74.5	8.4	0.720[†]	77.7	8.8	0.000*

Student's *t* tests were applied to compare the baseline data with either: after intervention data or 1-year after intervention data.
[†]No significant differences ($p > 0.05$) and *significance differences ($p \leq 0.05$) were found.

Similarly, other studies, using control groups, have also shown that BMI does not improve from baseline in neither the intervention nor the control group students (Katz et al., 2011).

BMI values tend to increase normally as children grow up. Using the cut-off points established by Cole et al. (2007) and following adjustment by sex and age, the students were categorised by their BMI as "underweight", "normal", "overweight" and "obese". Table 3 shows students' distribution by these four categories at baseline, after intervention and 1-year after intervention.

Table 3. BMI classification *(i)* before the intervention (baseline), *(ii)* after intervention and *(iii)* one year after intervention

BMI Classification	Baseline		After intervention		1-year after intervention	
	n	%	n	%	n	%
Underweight	1	1.5	1	1.5	0	0.0
Normal	42	64.6	46	70.8	49	75.3
Overweight	18	27.7	15	23.1	12	18.5
Obese	4	6.2	3	4.6	4	6.2
Total	**65**	**100.0**	**65**	**100.0**	**65**	**100.0**

Although no statistical differences ($p > 0.05$) were found between "after intervention" and "baseline" or between "1-year after intervention" and "baseline" (data not shown), a tendency for increasing the proportion of the "normal" BMI values could be found: 64.6%, 70.8% and 75.3%, respectively (Table 3). In contrast, a tendency for the decrease of overweight was found: 27.7%, 23.1% and 18.5%, respectively. The lack of statistical differences ($p \leq 0.05$) can be due to the sample small size, used in this preliminary study.

3.3- Food knowledge and eating habits

Compared to the baseline, the students' food knowledge tended to improve with the intervention and remaining 1-year after intervention (Figure 1), but no statistical differences could be found ($p > 0.05$).
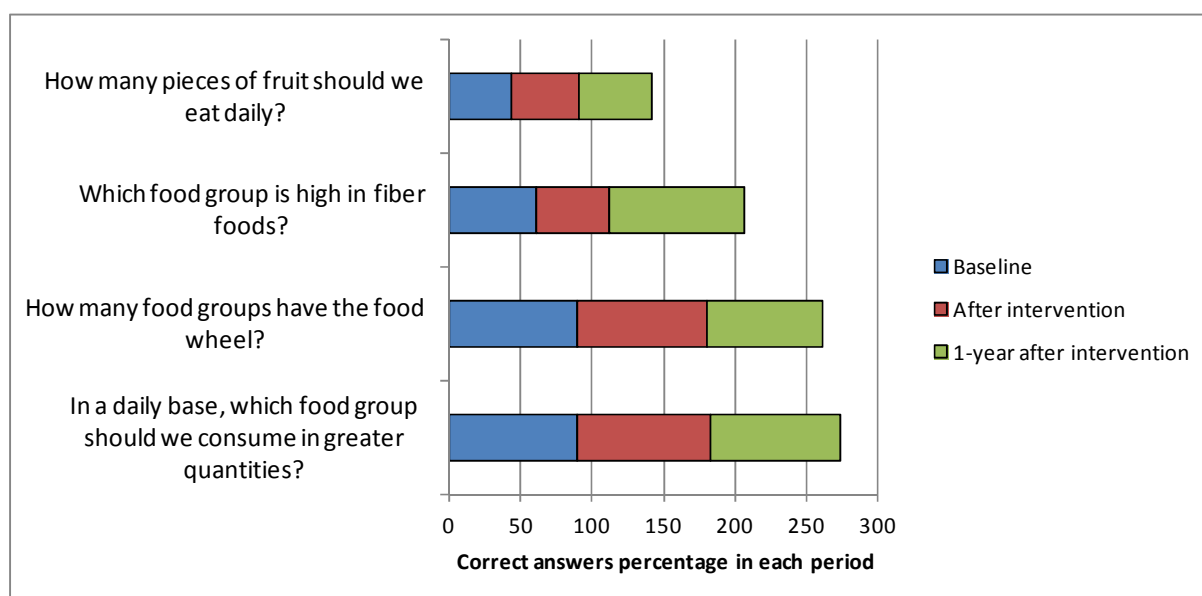

Figure 1. Knowledge about healthy food.

This little effect may result of their positive and enthusiastic attitude towards the intervention. The adolescent's opinion about this kind of programmes showed they were motivated to learn

about healthy eating habits and, possibly, acquire the habits too. It is expected that the more they learn about foodstuffs better they grow awareness and get ready for making best choices.

However, when analysing their reports about their eating habits, it seems the school intervention did not cause enough improvements on the intake of fruit and vegetables, since there was global low fruit and vegetables consumption in each period: "baseline", "after intervention" and "1-year after intervention" (Figure 2).
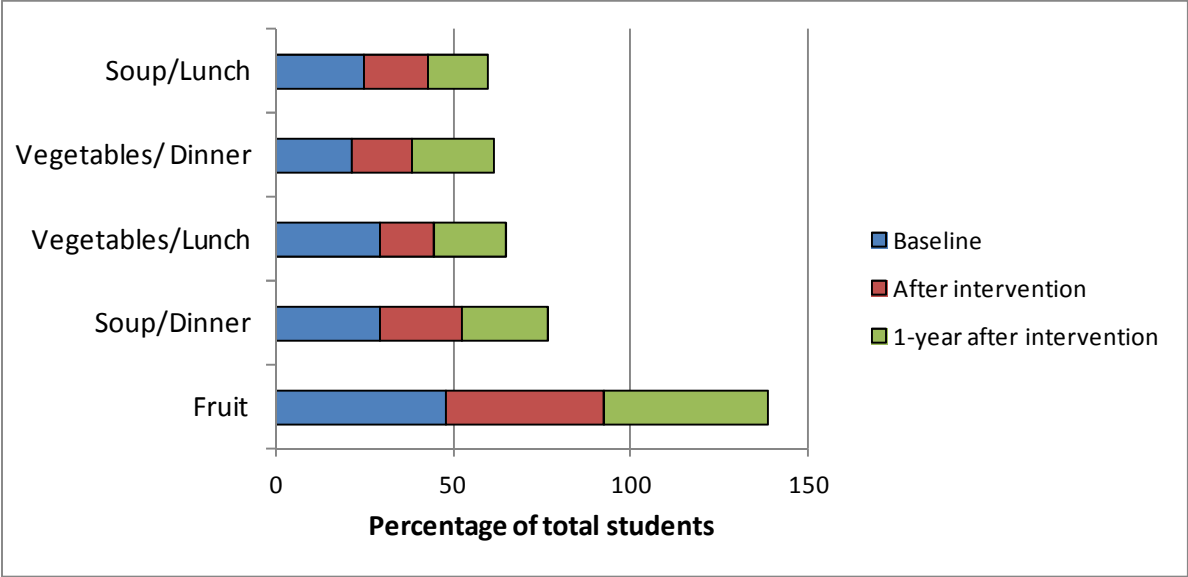

Figure 2. Eating habits (daily intake) of fruit and vegetables.

In addition, the majority of the adolescents (84.6%) reported drinking water daily. Those who reported at the "baseline" never drinking water, or only once or twice a week, "after intervention" they improved to 3 to 4 times a week. Daily eating breakfast was also reported by the majority of the group (84.6%), however the last evaluation showed that 10 adolescents (15.5%) had not this important daily habit. Regarding alcohol intake, 30.8% of the students reported they had already had their first experience, being the boys with mean age of 10.25 ± 1.21 expressing the highest frequency, 38.9%.

When asked for their opinion about the healthy eating and lifestyle school intervention, the majority of the students (89.2%) enjoyed being part of it and said it helped them to change their own eating habits (83.1%). Most of the changes they reported were primarily "less sweets" (18.5%) and "less fat" (13.8%), but no significant changes in "more fruit", "more vegetables", "more physical activity" and "take breakfast" were reported (Figure 3), indicating that the behaviour change was not effective in this study.
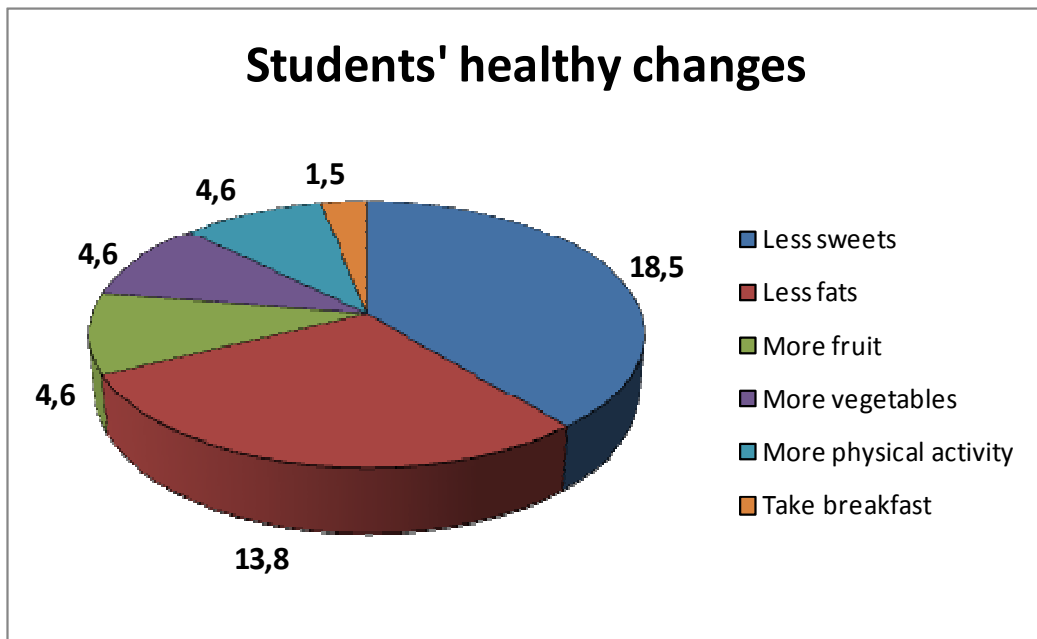
Figure 3. Changes in healthy habits as reported by the intervention participant students.

3.4- Physical activity

This study showed that 50.8% of the students did not have any daily or regular physical activity (Figure 4A), a result much worse than the results found in a previous Portuguese study (Gouveia et al., 2007), where the inactivity reached the 33.5%. It was observed that the adolescents of this study spent more time per day watching TV than practicing physical activity per week (Figure 4), a typical situation described in other studies (WHO, 2005). In fact, weight gain results not only by excessive caloric intake but also from physical inactivity. Therefore, sedentary lifestyle contributes strongly to increase weight and reaching overweight rates and develop diseases (Kushi et al., 2006).

No significant changes in physical activity were reported when comparing "after the intervention" or "1-year after intervention" with the "baseline", indicating that this intervention was not efficient for the behaviour change. Improving both healthy diet and physical activity are hard objectives to achieve but it is the best solution to prevent diseases linked to unhealthy nutrition and to reduce young people overweight and obesity, which is becoming a world problem, including in Portugal (Padez et al., 2005; Gouveia et al., 2007; Leitão et al, 2011).
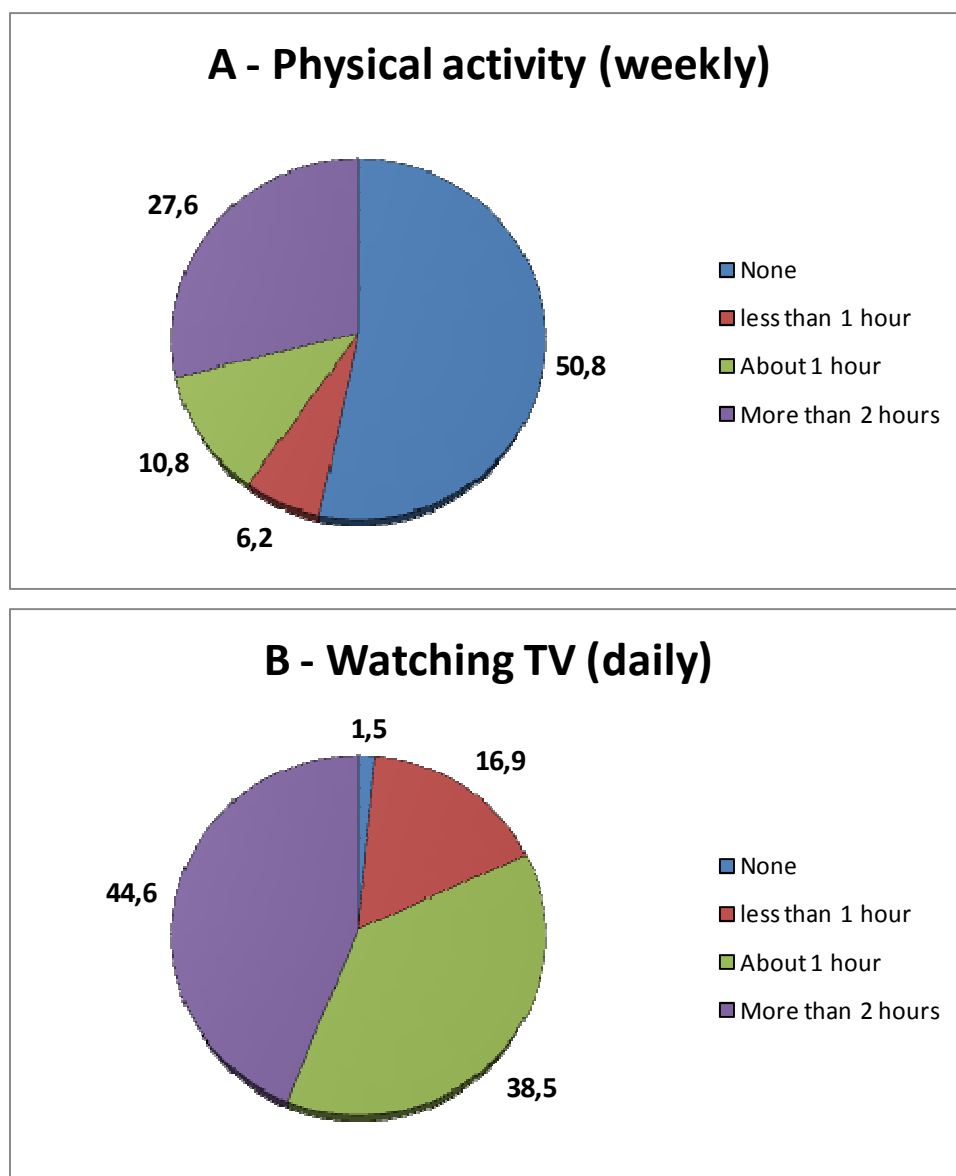
A - Physical activity (weekly)

27,6

50,8

10,8

6,2

- None
- less than 1 hour
- About 1 hour
- More than 2 hours

B - Watching TV (daily)

1,5

16,9

44,6

38,5

- None
- less than 1 hour
- About 1 hour
- More than 2 hours

Figure 4. Physical activity practice and TV watching at the "baseline" period.

4. Conclusions and Perspectives

Along the three evaluation periods ("baseline", "after intervention" and "1-year after intervention"), adolescents' knowledge and their attitudes towards healthy habits tended to improve and they became aware of the importance of adopting healthy eating habits. However, no statistically significant differences in lifestyle behaviours were found, such as in daily intake of fruits and vegetables and physical activity changes. These results can be explained by two main reasons: short intervention period and small sample.

Indeed, this preliminary study consisted of an intervention program of learning activities sessions carried out in only three months period. It can be considered a short time to produce effective behaviour change, *i.e.* healthier eating and more physical activity.

This pilot study was carried out in a small sample (65 students), which hampered the finding of statistical significant differences but it provided an excellent opportunity to test

pedagogical tools, to develop research skills and to understand what potential barriers one can face at drawing a more serious intervention with more complete planning that will lead to more consistent and valid conclusions. Thus, results from this study gave information to guide future research, with deeper planning, in order to be more effective on adolescents' healthy diet learning outcomes and in promoting their healthier attitudes and behaviour changes.

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