

Article

Mobile Applications and Healthy Habits of Adolescents, a Strange Couple: Pilot Study of the Efficacy of the Healthy Jeart App

María Ángeles Merino-Godoy ^{1,*}, Carmen Yot-Domínguez ², Patricia Villaciervos-Moreno ³
and Emilia Moreno-Sánchez ⁴

¹ Faculty of Nursing, University of Huelva, Campus de El Carmen, 21007 Huelva, Spain

² Faculty of Education, University of Seville, 41013 Sevilla, Spain; carmenyot@us.es

³ Faculty of Education, Valencian International University, 46002 Valencia, Spain; patricia.villaciervos@campusviu.es

⁴ Faculty of Education, University of Huelva, Campus de El Carmen, 21007 Huelva, Spain; emilia@uhu.es

* Correspondence: angeles.merino@denf.uhu.es



Citation: Merino-Godoy, M.Á.;

Yot-Domínguez, C.;

Villaciervos-Moreno, P.;

Moreno-Sánchez, E. Mobile

Applications and Healthy Habits of

Adolescents, a Strange Couple: Pilot

Study of the Efficacy of the Healthy

Jeart App. *Sustainability* **2022**, *14*,

5249. [https://doi.org/10.3390/](https://doi.org/10.3390/su14095249)

[su14095249](https://doi.org/10.3390/su14095249)

Academic Editors: Rosabel Roig-Vila,

Jordi M. Antolí-Martínez,

Antonio Cortijo, Vicent Martines,

Santiago Mengual Andrés,

Elena Sánchez-López, Fabrizio

Manuel Sirignano and Alexander

López Padrón

Received: 8 March 2022

Accepted: 22 April 2022

Published: 26 April 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: The present study aims to analyse the healthy habits of a group of adolescents before and after an educational intervention using the Healthy Jeart mobile app. This is the first pilot study on Healthy Jeart, based on a single intervention with experimental and control groups. The participants were secondary education students in the third and fourth years, from an educational centre in Huelva (Spain). They were distributed between a control group and an experimental group. Information about their habits was obtained through a questionnaire prepared from the HSBC (Health Behaviour in School-aged Children) instrument, which was administered before and after the intervention. Although the results do not indicate a substantial change in the habits of the participants, there were some intragroup differences. In the experimental group, a difference was obtained in the feeling of being fit and healthy. The global perspective on health of the app would explain this change.

Keywords: health promotion; habits; child–adolescent population; mobile applications; educational intervention

1. Introduction

In adolescence, important changes are experienced. The healthy habits that adolescents adopt will influence adult health. Adolescence is presented as an ideal time to educate people on healthy lifestyles and to correct unhealthy habits that may have been acquired in childhood. Healthy Jeart is considered a “healthy app” by the Andalusian Agency for Healthcare Quality. It is a mobile application aimed at promoting healthy lifestyle habits among people aged 8–16 years. This study presents the first evaluation of these habits, as a pilot study with a single intervention based on the app.

2. Background

Mobile applications are very useful tools for the promotion of health [1]. Their use in primary prevention contributes to improvements in nutrition and physical activity [2–4]. Apps can also help to reduce the consumption of alcohol [5]. Sousa et al. [6] found a significant effect on positive life perspectives and global lifestyle, among other aspects.

The strategy for health promotion and prevention in the Spanish National Health System [7] proposes the progressive development of interventions aimed at increasing health. Health interventions based on digital technologies, including mobile applications, are optimal for complementing existing sanitary tools [8], and therefore the World Health Organization [9] has recently published a guide for their design, development and implementation. Some eHealth apps for adolescents have been designed [10,11], and interventions with apps such as that of Benavides et al. have been documented [12]. However,

the potential of digital technologies and applications for the promotion of health and for risk prevention in young people has not yet been thoroughly addressed [13]. This is an incipient line of research.

Although there are numerous applications available, especially for adults [14], there are very few applications for the child–adolescent population that consider physical, mental and social well-being jointly. According to Schoeppe et al. [15], the overall quality of the apps available for improving diet and physical activity and preventing sedentary behaviours in children and adolescents is moderate. While functionality is the best-rated aspect, content quality is the worst. There is also a widely shared perception that apps are boring [16]. This led to the development of Healthy Jeart. This free application, designed to be used by people aged 8–16 years, was evaluated, before its dissemination, as a “healthy app” by the Andalusian Agency for Healthcare Quality [17]. This distinction recognises the quality and safety of mobile health applications.

The design of Healthy Jeart began with an exploratory qualitative and interdisciplinary study. Through nominal groups of children and adolescents, the content that potential end users considered should be addressed in the app was identified [18]. This content was organised, after analysis, into seven areas of health: physical activity, nutrition, physical and psychological well-being, toxic substances and addictions, affection–sexuality and new technologies.

Healthy Jeart contains practical advice and suggestions using brief and simple messages (tips) related to these health areas. See Figure 1. Children and adolescents can obtain further information by checking the recommended additional resources. Experts in these areas at the national level reviewed the tips to ensure their suitability and adequacy. The language is adapted to the target population.

In addition to the tips, there is a game through which the users can recognise the different elements that benefit health and consolidate the knowledge acquired about healthy habits. Healthy Jeart also includes a forum for sharing healthy ideas, which are evaluated by the administrators. Based on the evaluation, the user can obtain rewards for the game. The evaluation is manifested in stars, which the users can exchange for gems for the game. The gems allow the avatar in Healthy Jeart to be changed. The main character in the game is Jeart, a likable, heart-shaped alien. See Figure 2.

Moreover, Healthy Jeart offers educational activities that teachers can use in their lessons, as well as monthly health challenges, where students can participate and compete with other educational centres. The challenges refer to activities that must be developed in the classroom for at least 21 days, for instance, carrying out a breathing exercise after the break. Of all the centres participating in each challenge, one will be the winner and will be awarded a certificate, which will be automatically issued by the app [19]. Thus, Healthy Jeart implements various behaviour-change strategies, transcending the application itself [20]. Specifically, the instructions on how to engage in a behaviour, the feedback on that behaviour and the modelling of behaviours are promoted through challenges and activities, which must be implemented in the classroom under the guidance of the teacher. The challenges and activities are also based on the strategy of social support, as their purpose is to stimulate the interactions, collaboration, etc., which take place within groups of peers.

This study derives from the conviction that adolescence is a key stage for the promotion of a healthy life, during which it is fundamental to correct unhealthy habits that may have been acquired in childhood [21]. In Spain, various studies have warned that young people are not following balanced diets [22,23]; thus, it is necessary to intervene in order to improve eating habits as a preventive measure for adolescents, with therapeutic actions in cases of obesity depending on their excess body weight and their comorbidities [24]. Furthermore, on average, Spanish children and adolescents do not achieve the recommended levels of physical activity, especially girls [25,26]. Thus, educational interventions are needed to reduce sedentary behaviour in the young population [27], for psychological vulnerability reasons as well as sanitary reasons [28]. Adolescents do not have healthy

lifestyles [29], and they develop significantly less-healthy practices during the transition to young adulthood [30]. It is an urgent matter to help them improve their habits and sensitize them to the importance of avoiding risks to their present and future state of health [31].

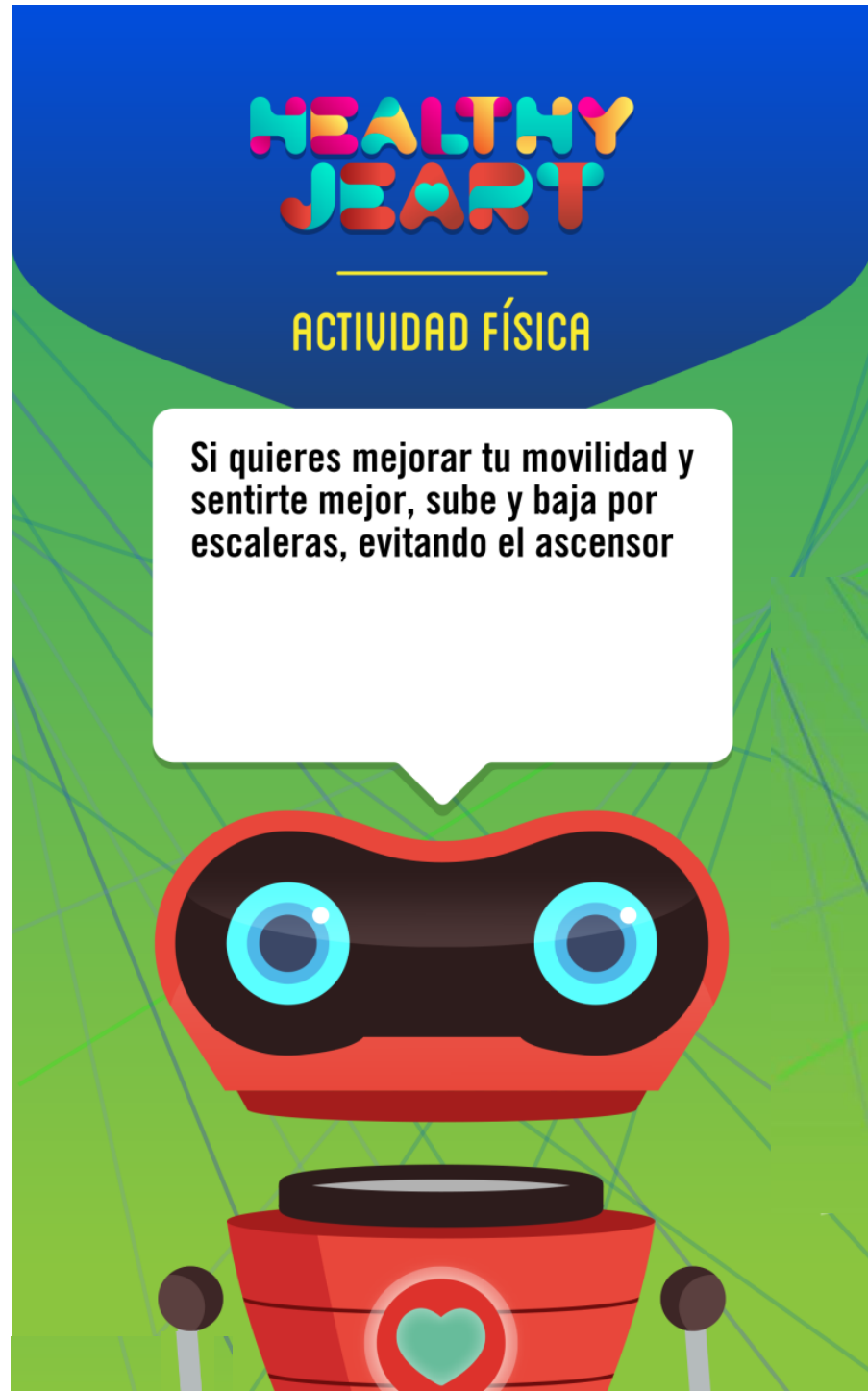


Figure 1. Screenshot of a tip in Healthy Jeart (<https://www.healthyjeart.com> (accessed on 7 March 2022)). Explanation of non-English content in the figure: PHYSICAL ACTIVITY. If you want to improve your mobility and feel better, use the stairs instead of the lift.

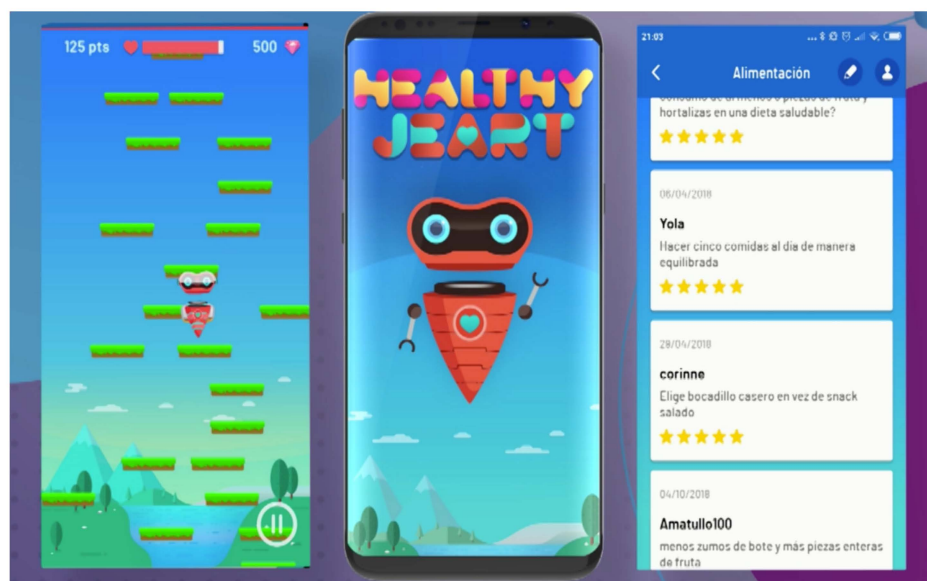


Figure 2. Screenshots of the game in Healthy Jeart. Explanation of non-English content in the figure: EATING. . . . green vegetables in a healthy diet? Yola: Having five meals per day in a balanced manner; corinne: Choose homemade sandwich instead of salty snack; Amatullo100: less packed juices and more whole pieces of fruit.

The aim of this study was to analyse the changes in nutrition and physical activity habits, as well as in indicators of psychological well-being, in a group of adolescents after an educational intervention, differentiating between an experimental group that used the mobile application designed by the research team, i.e., Healthy Jeart, and a control group.

3. Materials and Methods

An empirical intervention study was conducted. This was the first evaluation of adolescents' healthy habits, in a pilot study with a single intervention using Healthy Jeart. A total of 4 class groups from an educational centre in Huelva city (Spain) participated in the study. Randomly, the 'A' class groups in the third and fourth year of secondary education were selected to organise the control group, and the 'B' class groups in the same years were assigned to the experimental group. The educational centre has two class groups per year.

3.1. Instrument

The data were gathered through a questionnaire of closed questions based on the validated HBSC (Health Behaviour in School-aged Children) instrument, which can be found at <https://www.hbsc.es/> (accessed on 7 March 2022). Neither translation nor cross-cultural adjustment of the instrument was necessary. A Spanish version of the instrument is available. The first seven questions were related to the sociodemographic dimension (sex, year and class group, month of birth, age, education level of the parents and economic position of the family). The rest of the questions explored the habits of the participants regarding:

- (1). Nutrition (3 items): the frequency with which the respondent has breakfast on weekdays and at weekends, and the frequency with which certain foods and drinks are consumed (fruit, sweets, energy drinks, etc.).
- (2). Body weight control (5 items): weight, height, perception of one's own body, feelings toward one's body and whether the respondent is on a diet.
- (3). Physical activity (2 items): the frequency with which the respondent feels they are active in the week and frequency with which he/she engages in physical activity in his/her leisure time.

- (4). Dental hygiene (1 item): the frequency with which the respondent brushes his/her teeth.
- (5). Assumption of risk (8 items): the frequency with which the respondent smokes, drinks alcohol or takes drugs, as well as the type of the latter, if applicable.
- (6). Violence (2 items): the frequency with which the respondent suffers injuries and becomes involved in physical fights.
- (7). Positive health (12 items): subjective perception of health and diverse aspects of life.

The questionnaire was digitalised using Survey Monkey and made available to the participants on the first day of contact and on the last day of the intervention. In the initial version, a last question was added at the end, which asked the participants to indicate the areas of Healthy Jeart for which they believed they should improve their habits. The participants received precise instructions on how they should access and answer the questionnaire (indications about what was asked in each part, not about the type of answer). The students answered the questionnaire in class. Their teachers knew the instrument well and were able to assist them.

3.2. Programme

The intervention focused on the three areas that scored the highest on the last question of the questionnaire after the first round of data collection, which were nutrition, physical activity and positive health. It was conducted by a trained person, who did not belong to the research team, in a weekly one-hour session considered as part of the tutorial action plan of the third trimester. The informed consent of the participants' parents or legal guardians had previously been obtained. Moreover, the Research Ethics Committee of the province of Huelva approved the study. The committee is constituted and acts according to the regulations in force and the guidelines of the International Conference on Good Clinical Practice.

The control group followed the class-based intervention. Different activities were developed in the classroom: looking for information about the properties (vitamins, nutrients, benefits, etc.) of certain foods, designing posters to raise awareness of the benefits of each food group, reflecting on scenes from a short film, etc. One activity was developed per session, and the programme was made up of 12 activities in total. The activities were designed and revised by experts in the areas within the framework of the app creation project and are available both on Healthy Jeart and on the Web at <https://www.healthyjeart.com/actividades-didacticas/> (accessed on 7 March 2022) as suggestions for teachers. These activities did not involve the use of the app. Therefore, this group did not interact with Healthy Jeart.

The dynamics of the sessions with the experimental group adhered to the following scheme, considering that the participants had access to Healthy Jeart:

- (1). Play the game, challenging the students to beat their own scores.
- (2). Visualise the tips for healthy habits.
- (3). Participate in the forum of ideas.
- (4). Develop the same didactic activity to consolidate healthy habits as in the control group.

This pilot study was conducted after presentation of the tool to the management team and the teachers in a specific seminar.

3.3. Participants

A total of 89 students completed the questionnaire before the intervention (39 in the control group and 50 in the experimental group). Of these, 59 completed the questionnaire after the intervention (36 in the control group and 23 in the experimental group). Thirty students were lost to follow-up as a result of not completing the final evaluation, since participation was voluntary. There were 44 girls (49.4%) and 45 boys (50.5%) in the first round of data collection (pre-test), and 24 girls (40.7%) and 35 boys (59.3%) in the second round of data collection (post-test). The numbers of students per year and per class group at each of the time points are shown in Figure 3.

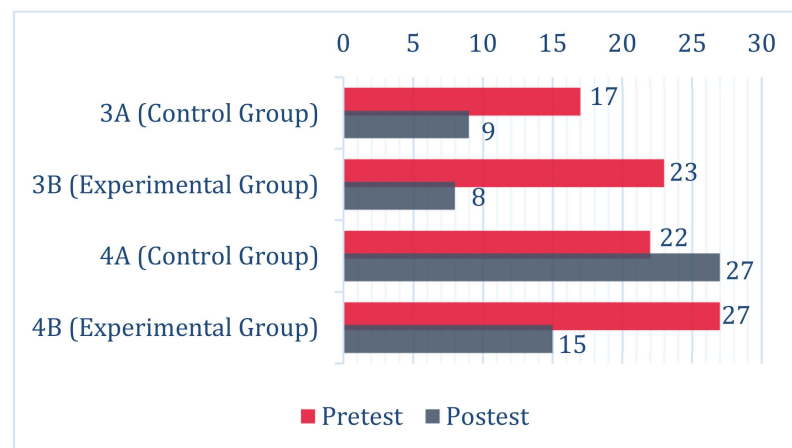


Figure 3. Years and class groups of the participants.

3.4. Data Analysis

To identify changes in behaviour for the variables related to the priority intervention areas (dependent variables) after the educational intervention (independent variable), hypotheses testing was used. Using these statistical tests, applied to the data for the experimental and control groups, the aim was to determine whether statistically significant differences occurred in the nutritional, physical activity and positive healthy habits of the participants, before and after the experience. Therefore, the null hypothesis (H0) was the absence of significant differences in the results before and after the educational intervention. The alternative hypothesis (H1) was the existence of differences between the results obtained at the two time points.

The Mann–Whitney *U*-test for independent samples was applied. For the analysis of the data, the statistical package IBM SPSS Statistics V.25.0. (IBM Spain S.A., Madrid, Spain) was used. It is important to highlight the fact that, since the selected samples were not representative of the population from which they came and the study variables did not show a normal distribution, a non-parametric contrast was used (the Kolmogorov–Smirnov test was applied to verify the normality of the data, obtaining significance levels below 0.05 in all cases).

4. Results

4.1. Healthy Habits of Young People: Pre-Test

Healthy eating involves the intake of healthy and varied foods, in controlled amounts and at different times. In the control and experimental groups, 46.2% and 58%, respectively, usually had something more than a glass of milk or fruit juice for breakfast from Monday to Friday, whereas 38.5% and 24%, respectively, never had breakfast on weekdays; 82.1% and 76%, respectively, had breakfast at the weekends; 28.2% and 34%, respectively, ate fruit either never, less than once per week or only once per week; 23.7% and 32%, respectively, ate vegetables either never, less than once per week or only once per week; 20.5% and 20% drank soft drinks and other drinks that do not contain sugar once per week; and 33.3% and 60% drank energy drinks 2–4 days per week. There were no significant differences between the groups in the consumption of soft drinks and energy drinks (Table 1).

Table 1. Differences in the consumption of soft drinks and other drinks that do not contain sugar and energy drinks between the control group and the experimental group.

	Mann–Whitney <i>U</i> -Test	Wilcoxon <i>W</i>	<i>Z</i>	Asymptotic Significance (Bilateral)
Soft drinks and other drinks that do not contain sugar	945.500	1725.500	−0.248	0.804
Energy drinks	882.500	1662.500	−0.817	0.414

Physical activity takes place when practising sports, in school subjects, in playing with peers or when moving to and from school. Less than 15% of the sample (12.8% in the control group and 14% in the experimental group) felt they were physically active for at least 60 min every day of the week. Only 2.6% and 8% (control and experimental group, respectively) carried out some physical activity in their free time every day, that is, outside the school schedule. Lastly, 17.9% and 18% (control and experimental group, respectively) felt they were never physically active.

To determine the positive health of the students, information was gathered about their perception of their general health state and the emotions that improved or worsened their health. Most of them evaluated their health state as good or excellent (47.4% and 13.2%, respectively, in the control group and 59.2% and 16.3%, respectively, in the experimental group); 7.9% and 10.2% (control and experimental group, respectively) felt quite well and in good shape the week before data collection; 34.2% and 38.8% (control and experimental group, respectively) felt quite sad; 18.4% in both groups felt quite lonely. There were no significant differences between groups in the subjective perception of health (Table 2). Data can be found at Appendix A.

Table 2. Differences in the perception of general health state and emotions between the control group and the experimental group.

	Mann–Whitney U-Test	Wilcoxon W	Z	Asymptotic Significance (Bilateral)
General health state	808.500	2033.500	−1.157	0.247
In this last week, you felt ...				
Good and in good shape	790.500	2015.500	−1.239	0.215
Happy	927.500	2152.500	−0.031	0.975
Sad	820.000	1561.000	−0.991	0.322
Lonely	760.500	1501.500	−1.556	0.120
Focused	864.000	2089.000	−0.596	0.551

4.2. Differences in Healthy Habits between Pre-Test and Post-Test

In the control group, there was a change in the weekly consumption of soft drinks and other drinks that do not contain sugar ($p = 0.011$), as well as energy drinks ($p = 0.027$) (Table 3). In the Mann–Whitney test, the effect size is given by the rank biserial correlation. Its values were -0.338 and 0.6 , respectively. There was an increase in the consumption of soft drinks and other drinks that do not contain sugar. A total of 7.7% of the participants claimed, in the pre-test, that they consumed such beverages every day at least once, whereas in the post-test, 13.9% made the same claim. This tendency in the results was also observed in those who consumed these types of beverages 6 times per week, going from 2.6% before the intervention to 27.8% after the intervention. The changes recorded regarding the consumption of energy drinks were caused by a considerable decrease in their consumption after the pre-test; thus, the percentage went from 53.8% of the sample who consumed such drinks 4 or more times per week to 0%.

Table 3. Differences in nutritional habits between the pre-test and post-test.

Weekly Consumption of:	Mann–Whitney U-Test	Z		Asymptotic Sig. (Bilateral)	Mann–Whitney U-Test	Z		Asymptotic Sig. (Bilateral)
		Control Group				Experimental Group		
Fruit	652.000	−0.543		0.587	474.500	−1.214		0.225
Chips and salty snacks	588.500	−1.110		0.267	459.500	−1.573		0.116
Vegetables	625.500	−0.456		0.648	542.500	−0.402		0.687
Sweets	523.500	−1.565		0.118	465.000	−0.773		0.439
Soft drinks or other drinks that do not contain sugar	464.500	−2.546		0.011	479.500	−0.581		0.561
Soft drinks or other drinks that contain sugar	625.500	−0.823		0.411	536.000	−0.470		0.638
Packed juices	604.000	−1.055		0.292	573.000	−0.024		0.981
Energy drinks	39.000	−2.227		0.027	424.500	−0.008		0.994

In the experimental group, there was a change in the feeling of being well and in shape ($p = 0.022$) (Table 4). The effect size was -0.319 . Specifically, 12.2% of the participants claimed to be fairly fit before the intervention, and after the intervention the percentage increased considerably (30.4%).

Table 4. Differences in feelings between the pre-test and post-test.

Feelings in the Last Week	Mann–Whitney <i>U</i> -Test	Z		Asymptotic Sig. (Bilateral)	Mann–Whitney <i>U</i> -Test	Z		Asymptotic Sig. (Bilateral)
		Control Group				Experimental Group		
Well and in shape	602.500	−0.917		0.359	383.500	−2.292		0.022
Full of energy	680.000	−0.045		0.964	548.000	−0.195		0.846
Sad	651.500	−0.369		0.712	445.500	−1.479		0.139
Lonely	649.000	−0.184		0.854	436.500	−1.642		0.101
Focused	588.000	−1.106		0.269	459.500	−1.294		0.196

The habits related to physical activity showed no changes (the significance value was always >0.05).

5. Discussion

The habits of the sample of participants in this study were in line with the results of the study entitled “Health Behaviour in School-aged Children” (HBSC 2018), conducted in Andalusia [32], although it warns, to a slightly greater extent, of lacks/problems in their lifestyles due to a worsening of behaviours among some of the students.

After the class-based intervention, the results demonstrated a partial effect in the nutritional area, which did not occur after the intervention implemented with Healthy Jeart. It is worth clarifying that, in Healthy Jeart, health is approached globally, and consequently nutrition is one of the seven areas tackled. In the first moments of the sessions dedicated to nutrition, the students did not focus exclusively on eating habits through the tips, the game and the forum. This occurred in every session. These students did not focus only on the content tackled in the didactic activities in each session, unlike the control group. We believe that the activities worked well in both groups, although the interaction with the app in the sessions on nutrition counteracted the effects for this reason. The content of this area and the work proposals in the app should therefore be reviewed.

The results show the need for the updates that have been planned for the application, which are aimed at extending the functionality with a new system about eating. These enable young people to search for nutritional information: (1) manually, (2) through the direct scanning of a bar code, (3) by providing the bar code manually or (4) through image recognition. In this way, the users are offered an attractive way of checking the ingredients of a product, the level of processing of a food product through the NOVA group to which it belongs and the meaning of these groups, the nutritional information provided and the allergens the product contains. This functionality, which allows users to obtain correct information while selecting foods for consumption, ignoring the influence of marketing and fashion, is already found in other applications [11].

We cannot confirm that the mHealth intervention was more effective than the class-based intervention in the promotion of healthy behaviours [6], or that it was less successful. The educational intervention carried out, whether it took place with or without the support of Healthy Jeart, did not result in substantial changes in healthy life habits in the sample of participants. The results did not show a general positive improvement. Therefore, among the limitations of the study, firstly, it is important to point out the use of a measurement instrument that is widely used internationally but which was not adjusted to the content of the application or to the activities. For this reason, we worked on the writing and validation of a scale that increased the effectiveness of the evaluation. This evaluation instrument can be found at <https://www.healthyjeart.com/> (accessed on 7 March 2022). Secondly, it is also important to admit that the last round of data collection coincided with the termination of the intervention, although changes in habits are shown in the medium or long term,

according to the existing scientific evidence. Thirdly, the sample size was small. Lastly, the intervention duration was short, which conditioned its effect. The low reach and exposure of the intervention could explain its low impact, as was the case in other experiences and studies [33].

We agree that technology can be a good ally in promoting healthy habits [34,35]. We should highlight the effect detected in the group that worked with Healthy Jeart on feeling good and in shape. The global perspective on health of the app would explain this change. Advice and suggestions help adolescents become aware of different lifestyle domains.

6. Conclusions

The promotion of healthy habits in adolescent students deserves proper attention. Mobile applications can be very functional tools as part of health promotion strategies. Healthy Jeart was designed to foster healthy lifestyles. We intend to transform it into a useful health promotion tool. In this work, we verified that it serves to help adolescents feel good in general. We also found that improvements are required to support the adoption of habits, especially in the area of nutrition. Healthy Jeart was developed at low cost. However, its impact on the physical, psychological and social well-being of young people is expected to be high.

The results presented support the need to maintain activities in the classroom and interaction with the app in future interventions, perhaps focusing attention, in the app, only on the content for working with the activities to reinforce achievements. However, it is necessary to revise and expand the programme, and extend it to a greater number of participants. The interdisciplinary team that conducted the study intends to continue the research along these lines.

Author Contributions: Conceptualization, M.Á.M.-G.; methodology, M.Á.M.-G.; formal analysis, P.V.-M.; writing—original draft preparation, C.Y.-D. and P.V.-M.; writing—review and editing, M.Á.M.-G., C.Y.-D., P.V.-M. and E.M.-S.; project administration, M.Á.M.-G.; funding acquisition, M.Á.M.-G. All authors have read and agreed to the published version of the manuscript.

Funding: This study was framed within the research project entitled “Design of a mobile application to educate young people in healthy habits”, code PI 047/16, funded by the Board of Health, according to the Resolution of 20 December 2016 of the General Secretariat for Research, Development and Innovation in Health, which granted funds to finance biomedical research, development and innovation in health sciences in Andalusia for the year 2016, for “Lines of Innovation, Development and Innovation Projects in Biomedicine and Health Sciences”. This was the only project funded in Huelva in this call of the Progress and Health Foundation in 2016. In 2020 and 2021, funding was continued through chairs. Recently, the continuation of the project has been funded within the framework of the Operational Program ERDF Andalusia 2014–2020, named “App para educar a los jóvenes en hábitos saludables basada en la evaluación mediante Ciencia de los Datos” (Ref. UHU-202062) (title translated into English: “App to educate young people in healthy habits based on evaluation through data science”).

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Research Ethics Committee of the province of Huelva (approval code: AMG-APP-2016-01, 28 September 2016). The committee is constituted and acts according to the regulations in force and the guidelines of the International Conference on Good Clinical Practice.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: The authors thank all the participating families and the CEIP (Early Childhood and Primary Education School) “Salesianos” Cristo Sacerdote, for their selfless participation in the data gathering process, as well as the entities that collaborated in this project, funded by the Board of Health, since their economic and generalised support keeps this project alive: Atlantic Copper Foundation, Ceimar (Campus de Excelencia Internacional del mar), EXMO, Colegio Oficial De Enfermería de Huelva, Cátedra Aiqbe, Cátedra de Innovación Social de Aguas de Huelva, Cátedra de la Provincia de la Diputación de Huelva and Cátedra CEPESA. The authors also thank the following

Table A4. Perception of health state of the control group and the experimental group.

		Control Group %	Experimental Group %
General health state	Excellent	13.2	16.3
	Good	47.4	59.2
	Average	36.8	18.4
	Poor	2.6	6.1
	Total	100	100

Table A5. Feelings in the last week of the control group and the experimental group.

	In This Last Week, You Felt ...									
	Good and in shape Group %		Happy Group %		Sad Group %		Lonely Group %		Focused Group %	
	Cont.	Exper.	Cont.	Exper.	Cont.	Exper.	Cont.	Exper.	Cont.	Exper.
Very much	21.1	12.2	18.4	20.4	7.9	4.1	7.9	4.1	10.5	22.4
Much	10.5	22.4	28.9	30.6	13.2	8.2	10.5	6.1	31.6	32.7
Quite a lot	7.9	10.2	39.5	30.6	34.2	38.8	18.4	18.4	47.4	20.4
A little	44.7	12.2	10.5	12.2	31.6	26.5	26.3	16.3	7.9	18.4
None	15.8	42.9	2.6	6.1	13.2	22.4	36.8	55.1	2.6	6.1
Total	100	100	100	100	100	100	100	100	100	100

Table A6. Physical activity of the control group and the experimental group.

	Physical Activity in the Last Week	Control Group %	Experimental Group %
In the last week, on how many days did you feel physically active for at least 60 min?	0	10.3	10.0
	1	2.6	8.0
	2	17.9	22.0
	3	7.7	16.0
	4	20.5	16.0
	5	25.6	8.0
	6	2.6	6.0
	7	12.8	14.0
	Total	100	100
Outside the school schedule, how often do you do any physical activity in your free time?	Never	17.9	18.0
	Less than once a month	12.8	6.0
	1 time a month	2.6	2.0
	1 time per week	10.3	12.0
	2 or 3 times a week	33.3	32.0
	4 to 6 times a week	20.5	22.0
	Every day	2.6	8.0
Total	100	100	

References

- Dute, D.J.; Bemelmans, W.J.E.; Breda, J. Using Mobile Apps to Promote a Healthy Lifestyle Among Adolescents and Students: A Review of the Theoretical Basis and Lessons Learned. *JMIR mHealth uHealth* **2016**, *4*, e39. [[CrossRef](#)] [[PubMed](#)]
- Fiedler, J.; Eckert, T.; Wunsch, K.; Woll, A. Key facets to build up eHealth and mHealth interventions to enhance physical activity, sedentary behavior and nutrition in healthy subjects—An umbrella review. *BMC Public Health* **2020**, *20*, 1605. [[CrossRef](#)] [[PubMed](#)]
- Lee, A.M.; Chavez, S.; Bian, J.; Thompson, L.A.; Gurka, M.J.; Williamson, V.G.; Modave, F. Efficacy and Effectiveness of Mobile Health Technologies for Facilitating Physical Activity in Adolescents: Scoping Review. *JMIR mHealth uHealth* **2019**, *7*, e11847. [[CrossRef](#)] [[PubMed](#)]
- Šmahel, D.; Macháčková, H.; Šmahelová, M.; Čeveliček, M.; Almenara, C.A.; Holubčíková, J. Using Mobile Technology in Eating Behaviors. In *Digital Technology, Eating Behaviors, and Eating Disorders*; Šmahel, D., Macháčková, H., Šmahelová, M., Čeveliček, M., Almenara, C.A., Holubčíková, J., Eds.; Springer: Cham, Switzerland, 2018; pp. 101–118. [[CrossRef](#)]
- Carrà, G.; Crocamo, C.; Bartoli, F.; Carretta, D.; Schivalocchi, A.; Bebbington, P.E.; Clerici, M. Impact of a Mobile E-Health Intervention on Binge Drinking in Young People: The Digital-Alcohol Risk Alertness Notifying Network for Adolescents and Young Adults Project. *J. Adolesc. Health* **2016**, *58*, 520–526. [[CrossRef](#)]
- Sousa, P.; Martinho, R.; Reis, C.I.; Dias, S.S.; Gaspar, P.J.S.; Dixe, M.A.; Luis, L.S.; Ferreira, R. Controlled trial of an mHealth intervention to promote healthy behaviours in adolescence (TeenPower): Effectiveness analysis. *J. Adv. Nurs.* **2020**, *76*, 1057–1068. [[CrossRef](#)] [[PubMed](#)]

7. Ministry of Health, Social Services and Equality. *Estrategia de promoción de la salud y prevención en el SNS (The Prevention and Health Promotion Strategy of the Spanish National Health System)*; Government of Spain: Madrid, Spain, 2014.
8. Rose, T.; Barker, M.; Jacob, C.M.; Morrison, L.; Lawrence, W.; Strömmer, S.; Vogel, C.; Woods-Townsend, K.; Farrell, D.; Inskip, H.; et al. A Systematic Review of Digital Interventions for Improving the Diet and Physical Activity Behaviors of Adolescents. *J. Adolesc. Health* **2017**, *61*, 669–677. [[CrossRef](#)] [[PubMed](#)]
9. WHO. *Youth-Centred Digital Health Interventions: A Framework for Planning, Developing and Implementing Solutions with and for Young People*; World Health Organization: Geneva, Switzerland, 2020.
10. Caon, M.; Carrino, S.; Condon, L.; Ascolese, A.; Facchinetti, S.; Mazzola, M.; Perego, P.; Velickovski, F.; Andreoni, G.; Mugellini, E. PEGASO Companion: A Mobile App to Promote Healthy Lifestyles Among Adolescents. In *Wireless Mobile Communication and Healthcare, Proceedings of the 6th International Conference on Wireless Mobile Communication and Healthcare (MobiHealth 2016), Milan, Italy, 14–16 November 2016*; Perego, P., Andreoni, G., Rizzo, G., Eds.; Springer: Cham, Switzerland, 2017; pp. 53–61. [[CrossRef](#)]
11. Wong, M.W.; Ye, Q.; Kylar, Y.K.C.; Pang, W.-M.; Kwan, K.C. A Mobile Adviser of Healthy Eating by Reading Ingredient Labels. In *Wireless Mobile Communication and Healthcare, Proceedings of the 6th International Conference on Wireless Mobile Communication and Healthcare (MobiHealth 2016), Milan, Italy, 14–16 November 2016*; Perego, P., Andreoni, G., Rizzo, G., Eds.; Springer: Cham, Switzerland, 2017; pp. 29–37. [[CrossRef](#)]
12. Benavides, C.; Benítez-Andrades, J.A.; Marqués-Sánchez, P.; Arias, N. eHealth Intervention to Improve Health Habits in the Adolescent Population: Mixed Methods Study. *JMIR mHealth uHealth* **2021**, *9*, e20217. [[CrossRef](#)]
13. Diego-Cordero, R.; Fernández-García, E.; Badanta-Romero, B. Uso de las TIC para fomentar estilos de vida saludables en niños/as y adolescentes: El caso del sobrepeso. *Rev. Esp. Comun. Salud* **2017**, *8*, 79–91. [[CrossRef](#)]
14. Bol, N.; Helberger, N.; Weert, J.C.M. Differences in mobile health app use: A source of new digital inequalities? *Inf. Soc.* **2018**, *34*, 183–193. [[CrossRef](#)]
15. Schoeppe, S.; Alley, S.; Rebar, A.L.; Hayman, M.; Bray, N.A.; Van Lippevelde, W.; Gnam, J.-P.; Bachert, P.; Direito, A.; Vandelanotte, C. Apps to improve diet, physical activity and sedentary behaviour in children and adolescents: A review of quality, features and behaviour change techniques. *Int. J. Behav. Nutr. Phys. Act.* **2017**, *14*, 83. [[CrossRef](#)]
16. Chan, A.; Kow, R.; Cheng, J.K. Adolescents' Perceptions on Smartphone Applications (Apps) for Health Management. *J. Mob. Technol. Med.* **2017**, *6*, 47–55. [[CrossRef](#)]
17. Palacios-Gálvez, M.S.; Yot-Domínguez, C.; Merino-Godoy, A. Healthy Jeart: Promoción de la salud en la adolescencia a través de dispositivos móviles. *Rev. Esp. Salud Pública* **2020**, *94*, e202003010. [[CrossRef](#)]
18. Palacios-Gálvez, M.S.; Andrés-Villas, M.; Vélez-Toral, M.; Merino-Godoy, Á. Nominal Groups to Develop a Mobile Application on Healthy Habits. *Healthcare* **2021**, *9*, 378. [[CrossRef](#)] [[PubMed](#)]
19. Duarte-Hueros, A.; Yot-Domínguez, C.; Merino-Godoy, Á. Healthy Jeart. Developing an app to promote health among young people. *Educ. Inf. Technol.* **2020**, *25*, 1837–1854. [[CrossRef](#)]
20. Michie, S.; Richardson, M.; Johnston, M.; Abraham, C.; Francis, J.; Hardeman, W.; Eccles, M.P.; Cane, J.; Wood, C.E. The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions. *Ann. Behav. Med.* **2013**, *46*, 81–95. [[CrossRef](#)]
21. WHO. *Salud para los Adolescentes del Mundo: Una Segunda Oportunidad en la Segunda Década*; Organización Mundial de la Salud: Geneva, Switzerland, 2014.
22. Mariscal-Arcas, M.; Monteagudo, C.; Hernández-Elizondo, J.; Benhammou, S.; Lorenzo, M.S.; Olsea-Serrano, F. Differences in food intake and nutritional habits between Spanish adolescents who engage in ski activity and those who do not. *Nutr. Hosp.* **2015**, *31*, 936–943.
23. Roura, E.; Milà-Villarroel, R.; Lucía Pareja, S.; Adot Caballero, A. Assessment of Eating Habits and Physical Activity among Spanish Adolescents. The “Cooking and Active Leisure” TAS Program. *PLoS ONE* **2016**, *11*, e0159962. [[CrossRef](#)]
24. Martínez-Villanueva, J. Obesidad en la adolescencia. *Adolescere* **2017**, *5*, 43–55.
25. Mayo, X.; Luque-Casado, A.; Jimenez, A.; del Villar, F. Physical Activity Levels for Girls and Young Adult Women versus Boys and Young Adult Men in Spain: A Gender Gap Analysis. *Sustainability* **2020**, *12*, 6265. [[CrossRef](#)]
26. Virginia-Añez, E.; Fornieles-Deu, A.; Sánchez-Carracedo, D. Longitudinal study of physical activity in Spanish young adolescents: Weight status and gender differences. *Rev. Psicol. Deporte* **2020**, *29*, 57–66.
27. Mielgo-Ayuso, J.; Aparicio-Ugarriza, R.; Castillo, A.; Ruiz, E.; Avila, J.M.; Aranceta-Bartrina, J.; Gil, A.; Ortega, R.M.; Serra-Majem, L.; Varela-Moreiras, G.; et al. Sedentary behavior among Spanish children and adolescents: Findings from the ANIBES study. *BMC Public Health* **2017**, *17*, 94. [[CrossRef](#)] [[PubMed](#)]
28. Debbia, F.; Rodríguez-Muñoz, P.M.; Carmona-Torres, J.M.; Hidalgo-Lopezosa, P.; Cobo-Cuenca, A.I.; López-Soto, P.J.; Rodríguez-Borrego, M.A. Association between Physical Activity, Food Consumption and Depressive Symptoms Among Young Adults in Spain: Findings of a National Survey. *Issues Ment. Health Nurs.* **2020**, *41*, 59–65. [[CrossRef](#)] [[PubMed](#)]
29. Marques, A.; Loureiro, N.; Avelar-Rosa, B.; Naia, A.; Matos, M.G. Adolescents' healthy lifestyle. *J. Pediatr.* **2020**, *96*, 217–224. [[CrossRef](#)] [[PubMed](#)]
30. Frech, A. Healthy behavior trajectories between adolescence and young adulthood. *Adv. Life Course Res.* **2012**, *17*, 59–68. [[CrossRef](#)]
31. Castro-Jiménez, R.A.; Fonseca del Pozo, F.J.; Jiménez-Moral, G.; Fruet-Cardozo, J.V. Analysis of health habits, vices and interpersonal relationships of Spanish adolescents, using SEM statistical model. *Heliyon* **2020**, *6*, e04699. [[CrossRef](#)]

32. Moreno, C.; Ramos, P.; Rivera, F.; Jiménez-Iglesias, A.; García-Moya, I.; Sánchez-Queija, I.; Moreno-Maldonado, C.; Paniagua, C.; Villafuerte-Día, A.; Ciria-Barreiro, E.; et al. *Informe Técnico de los Resultados Obtenidos por el Estudio Health Behaviour in School-aged Children (HBSC) 2018 en Andalucía*; Ministerio de Sanidad: Madrid, Spain, 2020.
33. De Cock, N.; Van Lippevelde, W.; Vangeel, J.; Notebaert, M.; Beullens, K.; Eggermont, S.; Deforche, B.; Maes, L.; Goossens, L.; Verbeken, S.; et al. Feasibility and impact study of a reward-based mobile application to improve adolescents' snacking habits. *Public Health Nutr.* **2018**, *21*, 2329–2344. [[CrossRef](#)]
34. Carrion, C.; Arroyo Moliner, L.; Castell, C.; Puigdomènech, E.; Gómez, S.F.; Domingo, L.; Espallargues, M. Utilización del teléfono móvil para el fomento de hábitos saludables en adolescentes. Estudio con grupos focales. *Rev. Esp. Salud Publica* **2016**, *90*, e1–e11.
35. Fedele, D.A.; Cushing, C.C.; Fritz, A.; Amaro, C.M.; Ortega, A. Mobile Health Interventions for Improving Health Outcomes in Youth: A Meta-analysis. *JAMA Pediatr.* **2017**, *171*, 461–469. [[CrossRef](#)]