Article

Relationship of Physical Activity and Sleep Duration with Self-Concept, Mediterranean Diet and Problematic Videogame Use in Children: Structural Equation Analysis as a Function of Gender

Gabriel González-Valero [1], Hadi Nobari [2], Georgian Badicu [3,*], Carlos Javier López-Gutiérrez [1], Guillermo Moreno-Rosa [1] and Manuel Castro-Sánchez [1]

[1] Department of Didactics of Musical, Plastic and Corporal Expression, Melilla Campus, University of Granada, 52005 Melilla, Spain; ggvalero@ugr.es (G.G.-V.); cjlopez@ugr.es (C.J.L.-G.); gmoreno@ugr.es (G.M.-R.); manuelcs@ugr.es (M.C.-S.)

[2] HEME Research Group, Faculty of Sport Sciences, University of Extremadura, 10003 Cáceres, Spain; hadi.nobari1@gmail.com

[3] Faculty of Physical Education and Mountain Sports, Transilvania University of Brasov, 500068 Brasov, Romania

[*] Correspondence: georgian.badicu@unitbv.ro

Abstract: Engagement in physical activity and sleep duration are crucial to the adequate psychosocial and healthy development of children. Thus, the aim of this study was to develop an explanatory model of the relationships of physical activity and sleep duration with self-concept, Mediterranean diet and problematic use of videogames. Accordingly, a structural model was contrasted by means of a multi-group analysis according to gender. A non-experimental study was conducted with a descriptive, cross-sectional design for a sample of 1154 students aged 11–12 years (M = 11.41 ± 0.49). An ad hoc questionnaire was used to record sociodemographic and physical-health attributes (physical activity time and sleep). Adherence to a Mediterranean diet was assessed using the KIDMED questionnaire, self-concept was assessed using "self-concept form-5" (AF-5) and problematic videogame use was assessed using the "Video Game-Related Experiences Questionnaire". For data analysis, a multi-group structural equation analysis was performed. The results showed that physical activity was positively associated with self-concept, while sleep duration and self-concept were negatively related to problematic videogame use. In boys there was a direct effect of self-concept on sleep duration and adherence to the Mediterranean diet, while girls did not generate such differences. Although there is a negative association between physical activity and problematic videogame use in the theoretical model and in boys, girls showed a direct association between these factors. Finally, physical activity and sleep duration were directly related in boys and indirectly related in girls.

Keywords: physical activity; sleep; self-concept; Mediterranean diet

1. Introduction

The primary school stage, which is from 6 to 12 years old, is a decisive period of life, since it corresponds to the moment of compulsory schooling of students, a very important stage for the development of habits and personal growth. It is also characterized by physical growth and psychomotor development, as well as adaptive and psychosocial changes due to the interrelationship between equals. Specifically, the age ranging from 10 to 12 years is considered a crucial moment, with initial pre-adolescent changes presenting in boys and girls due to various changes at a psychophysical and social level. They no longer feel like children, but they are not mature enough to feel the same as adults either. There is need for greater autonomy and a tendency to know what they do not want, but also difficulties in knowing what they want, ambivalent situations that cause them a lot of uncertainty.

Similarly, as it is a variable maturation stage among children, the differences between them are usually quite remarkable [1].

In the same way, the different lifestyles of families have a fundamental influence on the habits that shape the way schoolchildren act. At present, we find different factors associated with each other that can make up a worrying cocktail of unhealthy lifestyle habits. Physical activity, leisure time, rest and food, as well as their relationship with self-concept, are elements to consider [2–5].

The educational model more or less focused on controlling food and rest, and the dedication to the free time and leisure of children are tremendously relevant in terms of lifestyle and will determine whether it is more or less healthy. In relation to this comment, the relevance of family participation in the generation of habits and practice related to physical activity and nutritional intake, since in the case of those parents who transmit these values, better levels of self-concept are detected in their children [6].

This final stage of pre-adolescence is especially important due to the physical, mental and social changes that boys and girls experience; they influence self-concept and the way in which children relate to others and understand themselves. That is why intervening in the improvement of these aspects becomes a priority when approaching the stage in the best possible conditions, and a cornerstone in relation to self-concept, linked to a good psychophysical and emotional development, is engagement in physical activity. In this sense, both physical activity and physical condition can be differentiating elements of multidimensional self-concept in children aged between 8 and 12 years [7]. Being physically active and having a higher level of fitness could predict a more positive self-concept in childhood and adolescence. It is worth noting the importance of the role that gender plays in the relationship between the perception of real and perceived motor competence, with boys performing better and perceiving themselves as more competent than girls in object control skills, while girls show better performance and perceive themselves as more competent in body control skills [8]. At the same time, our results reinforce the evidence for the negative association of body mass index and the perception of competence. On the other hand, our results generally found a high level of self-concept among schoolchildren, social and family dimensions being the most valued, followed by academic, physical and emotional aspects [9]. Boys tend to be more physically active, while girls have a better academic and family self-concept. In addition, it is worth noting that there are no major differences in the other dimensions. Schoolchildren who engage in regular physical activity have a better physical self-concept than sedentary children, and the values of the other dimensions of self-concept are also slightly higher.

In this sense, we are understanding the need for a regular practice of physical activity in its relationship with self-concept, but also and in parallel, different studies show the importance and relevance of nutritional health through a Mediterranean diet and its relationship with activity, concluding that in the prevention of obesity in schoolchildren, factors of increased physical activity are mixed, as well as a work focused on education and assessment of nutritional aspects [10]. In the same sense, several studies consider that adherence to a Mediterranean diet is one of the key factors in the acquisition of healthy lifestyles, as a good diet is associated with greater physical activity, good rest, as well as less use of technology during leisure time, avoiding a sedentary lifestyle, thus also favoring the parameters that have an impact on the improvement of self-concept [11]. Such an approach improves both academic and social self-concept [5]. This is very important, as students with a lower self-concept have greater problems with the use of videogames, with academic, social and physical self-concept being the most affected [12]. Therefore, a responsible use of digital screens, new technologies and videogames must be developed, as this can be a problem for the youngest students, due to the time they are exposed to them [13]. Thus, we find, for example, that those young people who register more hours of sleep and more hours of physical activity obtain higher values at an academic, emotional, family and physical level, and those whose diet is more appropriate do not show problems with videogames. By contrast, when the use values are higher, they are related to serious

problems at the levels of social, emotional, rest and physical self-concept [14]. It has also been shown that users with potential and severe problems with videogames show greater relational and overt aggression [9].

A review of problem gaming behavior suggests that it is significantly associated with a wide range of harmful health-related outcomes [15]. The fundamental variables that explain the problematic use of videogames are as follows: first, awareness of the problem and participation in the game, that is, thinking that one is in control and losing awareness of the time that he or she is dedicating to gaming; secondly, the cognitive distortions associated with videogames [16]. Additionally, there is a higher addiction in managing online games, mainly among boys over school-aged girls [17]. Researchers in this study found a significant relationship between internet gaming disorder, parenting styles and behavioral disorder.

When it becomes problematic, leisure time devoted excessively to playing videogames also leads to alterations in resting behaviors. Stressful situations can worsen sleep quality, and poor sleep quality leads to worse rest, irritability and more aggressive behaviors [18]. Sedentary leisure (number of hours of television, computer and console) is significantly and inversely related to hours of sleep and physical activity [19]. For this reason, it is considered necessary to have the appropriate number of hours of sleep for the relevant age group, as insomnia can negatively affect children's performance [20,21].

We agree with these authors that stress or the environment negatively affect sleep and show that physical exercise improves quality of sleep. Sleep quality is associated with behavioral problems in both sexes, as well as emotional symptoms of hyperactivity, inattention and peer-relationship problems in boys. Although they occur independently, the importance of good-quality sleep and physical activity to improve and maintain mental health is highlighted [22]. Sleeping for a shorter duration as well as oversleeping in relation to the so-called intermediate sleep pattern (between 6 and 9 h) has adverse consequences for both physical and psychological health, in the same way that the quality of such sleep also influences other health benefits. Consequently, those interventions that reduce sleep disturbance or deprivation will tend to improve quality of life and prevent disease.

Given the multiple challenges and problems discussed that schoolchildren face in their health habits, this study aims to analyze the relationship of physical activity and sleep duration with self-concept, Mediterranean diet and problematic use of videogames in children, in terms of gender function.

2. Materials and Methods

2.1. Participants

A quantitative and experimental study (ex post facto) was carried out, with a descriptive and cross-sectional design. Convenience sampling was used for the selection of participants, and a single measurement was performed for a single group. The stucco sample comprised a total of 1154 primary-school students aged 11–12 years (M = 11.41 ± 0.49). A homogeneous distribution was obtained with respect to gender, representing 56.8% (*n* = 656) male and 43.2% (*n* = 498) female. Those students who were in their last year of primary education were invited to participate. Thus, a total of 73 questionnaires were invalidated for not meeting this inclusion criterion or for being poorly completed.

2.2. Instruments

Ad hoc questionnaire. A self-prepared and self-registration questionnaire (ad hoc) was used to collect the sociodemographic and physical-health aspects. Participants' gender (male or female) and age were recorded. Thus, the duration (minutes) of physical-activity practice per day and sleep (hours) were recorded.

Form-5 Self-Concept Questionnaire (AF-5). This instrument was used to record the self-concept of the young people. It was prepared by García and Musitu [23] and is based on the theoretical model of Shavelson et al. [24]. This questionnaire has been validated in various stages and contexts [25]. It comprises 30 items that are answered using a Likert-type

scale with five answer options (1 = "never" and 5 = "always"). The self-concept comprises five dimensions such as academic self-concept (items 1, 6, 11, 16, 21, and 26), social self-concept (items 2, 7, 12, 17, 22, and 27), emotional self-concept (items 3, 8, 13, 18, 23, and 28), family self-concept (items 4, 9, 14, 19, 24, and 29), and physical self-concept (items 5, 10, 15, 20, 25, and 30). Through these dimensions, the questionnaire allows a summary to be extracted and the general self-concept variable made. In the original study by García and Musitu [23], a reliability determined by Cronbach's alpha of $\alpha = 0.810$ was obtained, a value similar to that of this study ($\alpha = 0.793$).

KIDMED questionnaire. Through this tool, the adherence to a Mediterranean diet was assessed. The KIDMED questionnaire developed by Serrá-Majem et al. [26] based on a previous study conducted with children and adolescents, called EnKid. It comprises 16 dichotomous items with affirmative or negative answers, which refer to the patterns that are related to a Mediterranean diet model. Overall, 12 of the items are valued positively (+1), while the remaining 4 have negative connotations (−1). The final score can range between −4 and +12 points, and in this way, it is possible to calculate the sum of the eating pattern. The reliability of the original instrument was determined as $\alpha = 0.854$, while in the present study it was $\alpha = 0.706$.

Problematic use of videogames. The Video Game-Related Experiences Questionnaire (CERV in Spanish) was used to assess the problematic use of videogames. It was prepared by Chamarro et al. [27] through the versions previously proposed by Beranuy et al. [28]. It comprises 17 items that are assessed using a Likert-type scale with four response options (1 = "almost never" and 4 = "almost always"). This instrument allows the evaluation of the problematic use of videogames through a summary and by establishing tertiles to categorize the variable. The original study by Chamarro et al. [28] presented a reliability of $\alpha = 0.870$, while for this study identical values were obtained ($\alpha = 0.871$).

2.3. Process

First, a review of the scientific literature in the young adolescent population was conducted to gather information and establish some of the premises that may form a problematic situation today. Subsequently, the collaboration of the educational centers and legal guardians of the young people was requested through an informative letter prepared by the Department of Didactics of Musical, Plastic and Body Expression of the University of Granada. In this, the nature and objective of the study was disclosed and the informed consent of the legal guardians and educational centers was requested.

After obtaining the consent of the participants, the questionnaires were distributed and answered during school hours and in the presence of the teachers of the center, so that they were administered correctly and to answer any questions from the students. To check that the questions had not been filled in randomly and to ensure the reliability and bias of the answers, two items were duplicated. In this way, a total of 73 questionnaires were eliminated that did not meet the inclusion criteria or were poorly completed.

Furthermore, this study followed the ethical principles of research established by the Declaration of Helsinki ensuring anonymity and respecting the rights of the participants. In addition, the approval of the research was granted by the Ethics Committee of the University of Granada (1230/CEIH/2020).

2.4. Analysis of Data

For the descriptive analysis carried out through frequencies (%), means (M) and standard deviations (SD), the statistical software SPSS 25.0 (IBM Corp, Armonk, NY, USA) was used, as well as the Cronbach's alpha to determine the internal consistency of the instruments, establishing the reliability index at 95%. A multigroup analysis of the structural equations was developed with AMOS software version 23.0 (IBM Corp., Armonk, NY, USA). The level of significance was established at 0.05 using Pearson's chi-square test.

The structural equation model (SEM) was used to establish the relationships between variables that make up the theoretical model (Figure 1) for both groups (male and female

gender). A general model was carried out to establish the relationships of the study population and two differentiated models in order to verify the existing associations between the variables and as a function of gender. The SEM developed was elaborated from five observable variables that provided explanations of the relationships. The causal explanations of the variables were made considering the reliability of the measurements and the associations observed between the indicators. Measurement errors for endogenous variables were included in order to control them directly and interpret them as multivariate regression coefficients. The two-way arrows (covariances) connect the exogenous variables, while the one-way arrows reveal the direct and indirect effects between the endogenous variables. The estimation of the parameters was made using the maximum likelihood estimation method, since it is coherent, unbiased and not affected by the type of scale. Similarly, the level of significance established through Pearson's chi-square test was 0.05.
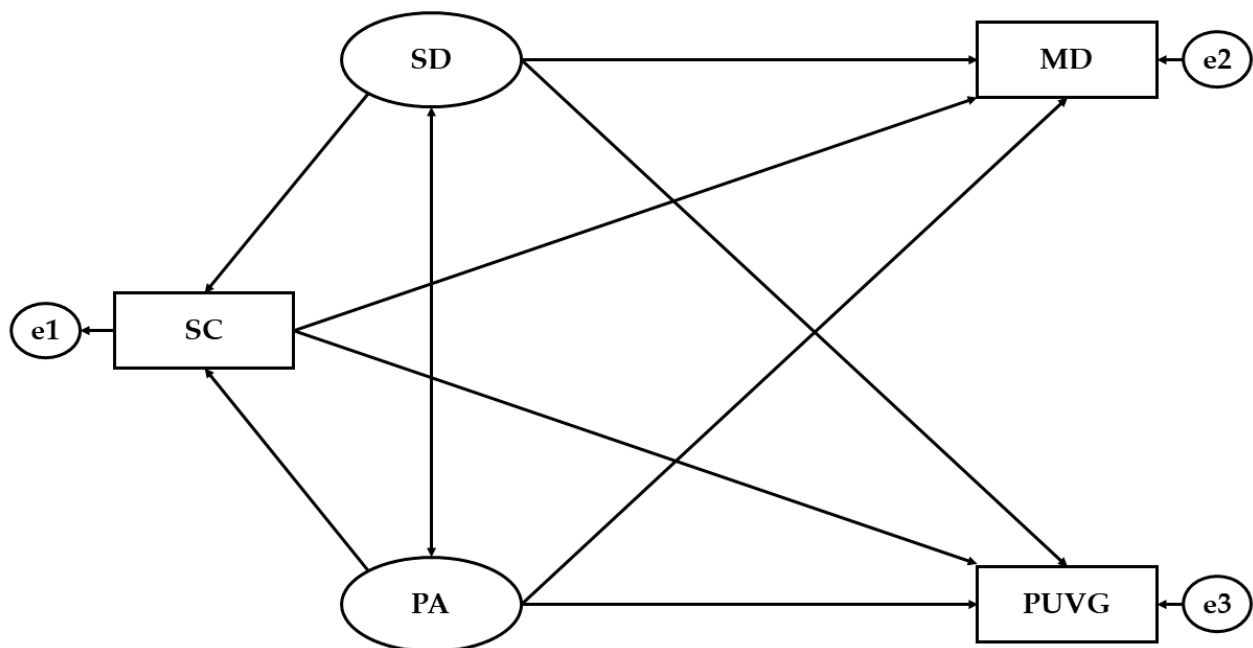
Figure 1. Theoretical structural equation model. Note: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG).

For the present SEM, self-concept (SC), Mediterranean diet (MD) and problematic use of videogames (PUVG) acted as endogenous variables (represented by a square). Sleep duration (hours per day) (SD) and physical activity (minutes per day) (PA) act as exogenous variables (represented by an ellipse). The exogenous variables SD and PA exert an effect on the endogenous variables SC, MD and PUVG. In addition, the MD and PUVG are affected by SC. Finally, there is a bidirectional effect between SD and PA.

The fit of the model was examined to verify the compatibility, and the empirical data were obtained. Reliability of fit was assessed using Marsh's goodness indices [29]. These parameters indicate that the non-significant values in the chi-square associated with p indicate a good fit of the model. Because this statistic is highly sensitive to sample effects, other fit indices should be used [30]. In this sense, and taking into account various parameters, the comparative fit index (CFI) will be acceptable with values greater than 0.90 and excellent with values greater than 0.95. For the normed fit index (NFI), values must be higher than 0.90. The Tucker–Lewis index (TLI) will be acceptable if it presents values higher than 0.90 and excellent with values higher than 0.95. Finally, the root mean square error of approximation (RMSEA) will be acceptable if it is less than 0.08 and excellent with values less than 0.05.

3. Results

Table 1 established the descriptive results of the study. Mean values were obtained for adherence to the Mediterranean diet of M = 8.20 ± 1.93, with 50.6% (*n* = 584) having a medium adherence, while 20.5% (*n* = 236) had a low adherence. In this sense, the problematic use of videogames showed a mean value of M = 1.31 ± 0.34, which means that 81.3% (938) had no problems, while 15.5% (202) presented potential problems. The students obtained a mean value of M = 81.84 ± 46.18 min of physical-sports activity per week and results of M = 10.16 ± 0.60 with respect to hours of sleep per day. Finally, self-concept showed values of M = 4.17 ± 0.32, with the highest values for family self-concept (M = 4.68 ± 0.31) and academic self-concept (M = 4.30 ± 0.49), and the lowest for social self-concept (M = 3.51 ± 0.67).

Table 1. Descriptive results of the study variables.

Variables	Categories			% (*n*)
	Low			20.5 (236)
Adherence to the Mediterranean diet	Medium			50.6 (584)
	Hight			28.9 (334)
	No problems			81.3 (938)
Problematic use of videogames	Potential problems			15.5 (202)
	Severe problems			1.2 (14)
	Minumum	Maximum	Mean	SD
Minutes of physical activity (weekly)	0	240	81.84	46.18
Hours of sleep	8.00	11.80	10.16	0.60
Adherence to the Mediterranean diet	5.00	12.00	8.20	1.93
Self-concept	3.20	4.80	4.17	0.32
Academic self-concept	2.76	5.00	4.30	0.49
Social self-concept	2.33	5.00	4.23	0.58
Emotional self-concept	1.33	5.00	3.51	0.67
Family self-concept	3.83	5.00	4.68	0.31
Physical self-concept	2.80	5.00	4.16	0.52
Problematic videogame use	1.00	3.06	1.31	0.34

The general model developed by evaluating the variables that were measured in the sample of primary-school students according to gender showed a good fit for all the indices. The chi-square analysis showed significant values (X^2 = 0.159; *p* < 0.001; df = 1; pl = 0.691), but these indicators cannot be interpreted in isolation because they are sensitive to sample size; therefore, other standardized indices must be taken into account. The NFI showed a value of 0.998, the CFI obtained a value of 0.995, the IFI presented a value of 0.998 and the TLI showed a value of 1.028, which shows an excellent fit of the model. In addition, the RMSEA obtained a value of 0.001, which reveals an excellent fit for this parameter.

Next, Figure 2 and Table 1 show the regression weights and the estimated values of the parameters of the theoretical model of structural equations, for which statistically significant relationships were obtained at the *p* < 0.05 level. Sleep duration was positively associated with self-concept (*p* < 0.01; r = 0.270) and negatively with problematic use of videogames (*p* < 0.001; r = −0.485). Thus, the practice of physical activity was directly related to self-concept (*p* < 0.001; r = 0.441) and indirectly with the problematic use of videogames (*p* < 0.01; r = −0.264). Furthermore, the practice of physical activity and the duration of sleep had a direct and bidirectional influence on each other (*p* < 0.001; r = 0.295). However, it should be noted that self-concept had a direct effect on adherence

to a Mediterranean diet ($p < 0.05$; r = 0.258) and an indirect effect on problematic use with videogames ($p < 0.001$; r = −0.394).
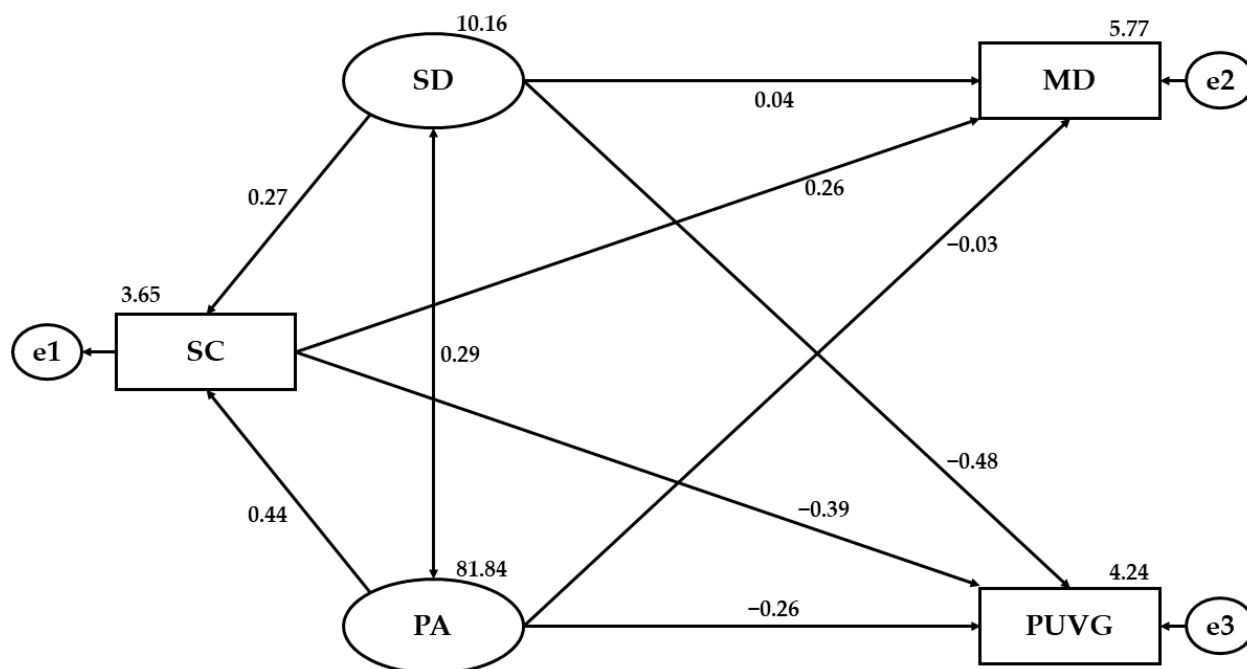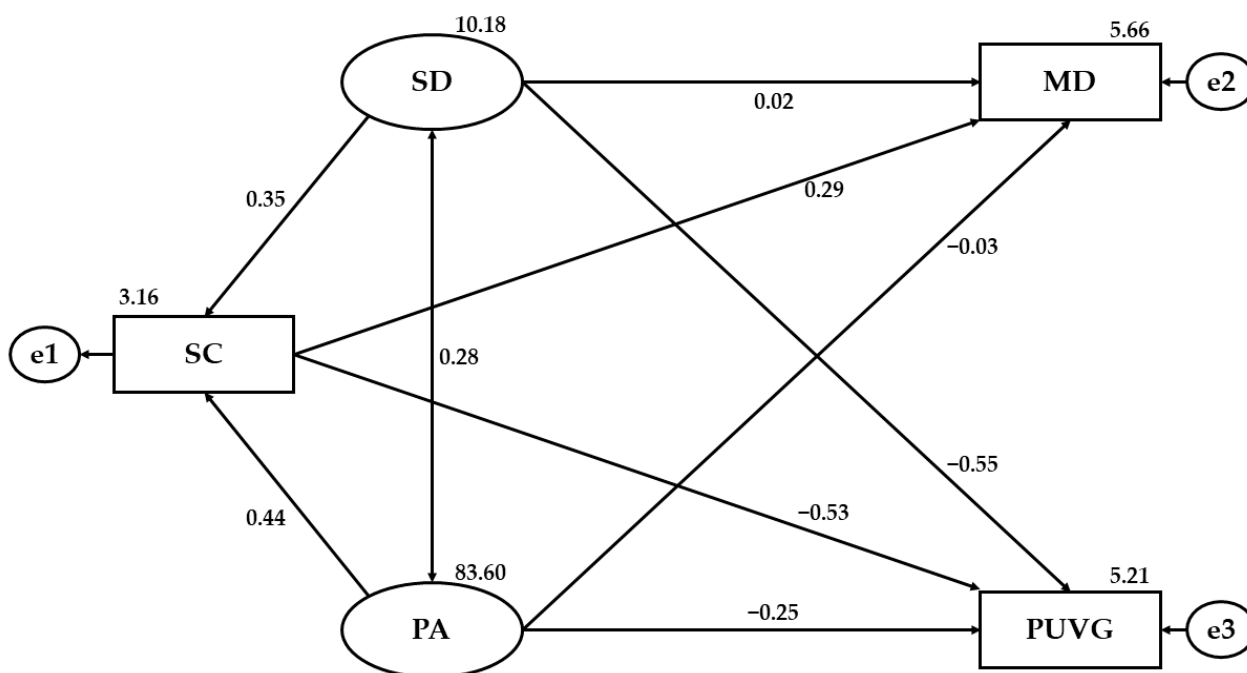

Figure 2. Structural equation for the theoretical model. Note: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG).

The model developed for the male gender showed a good fit for all the indices. The chi-square analysis showed significant values ($X^2 = 0.227$; $p < 0.001$; df = 1; pl = 0.634). Because these indicators are sensitive to sample size, other standardized indices were used. The NFI showed a value of 0.999, the CFI obtained a value of 0.998, the IFI presented a value of 0.998 and the TLI showed a value of 1.031, which shows an excellent fit of the model. In addition, the RMSEA obtained a value of 0.000, which reveals an excellent fit for this parameter.

Figure 3 and Table 2 show the regression weights obtained for the male gender. In boys, sleep duration was directly associated with self-concept ($p < 0.001$; r = 0.351) and indirectly with problematic use of videogames ($p < 0.001$; r = −0.549). Similarly, the practice of daily physical activity was positively related to self-concept ($p < 0.001$; r = 0.351) and negatively with problematic use of videogames ($p < 0.05$; r = −0.252). Thus, it was shown that in the male gender there was a positive and bidirectional association between the duration of sleep and the practice of physical activity ($p < 0.05$; r = 0.279). In addition, a direct effect of self-concept on adherence to the Mediterranean diet ($p < 0.05$; r = 0.286) and an indirect effect on problematic use with videogames ($p < 0.001$; r = −0.531) were highlighted.

The model developed for the female gender showed a good fit for all the indices, for which the chi-square analysis showed significant values ($X^2 = 0.039$; $p < 0.001$; df = 1; pl = 0.844). In relation to the standardized indices, the NFI showed a value of 0.998, the CFI obtained a value of 0.996, the IFI presented a value of 0.997 and the TLI showed a value of 1.153, which shows an excellent fit of the model. In addition, the RMSEA obtained a value of 0.001, which reveals an excellent fit for this parameter.

Figure 3. Structural equation for the males. Note: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG).

Table 2. Regression weights and standardized weights of the theoretical structural equation model.

| Relationships between Variables			R.W.				S.R.W.
			Estimate	E.E.	C.R.	*p*	EST
SC	←	SD	0.038	0.016	2.454	**	0.270
SC	←	PA	0.002	0.000	8.396	***	0.441
MD	←	SD	0.111	0.095	1.172	0.241	0.036
PUVG	←	SD	−0.164	0.015	−10.587	***	−0.485
MD	←	SC	0.340	0.178	1.912	*	0.258
PUVG	←	SC	−0.309	0.029	−10.655	***	−0.394
MD	←	PA	−0.001	0.001	−1.142	0.254	−0.034
PUVG	←	PA	0.000	0.000	2.316	**	−0.264
SD	↔	PA	2.639	0.821	3.214	***	0.295

Note 1: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG). Note 2: Regression Weights (R.W.); Standardized Regression Weights (S.R.W.); Error Estimation (E.E.); Critical Ratio (C.R.); Estimations (EST). Note 3: Statistically significant relationship between variables at the level 0.001 (***); Statistically significant relationship between variables at the level 0.01 (**); Statistically significant relationship between variables at the level 0.05 (*).

Figure 4 and Table 3 show the regression weights obtained for the female gender. In the case of girls, sleep duration was not statistically associated with self-concept ($p > 0.05$); however, it was significantly and indirectly associated with the problematic use of videogames ($p < 0.001$; r = −0.358). It was highlighted that the practice of daily physical activity was positively related to self-concept ($p < 0.001$; r = 0.433) and with the problematic use of videogames ($p < 0.01$; r = 0.325) (Table 4). Along these lines, self-concept exerted an inverse effect with the problematic use of videogames ($p < 0.001$; r = −0.386). Finally, it should be noted that in girls, the bidirectional association between the duration of sleep and the practice of physical activity was indirect ($p < 0.01$; r = −0.319) (Table 4).

By way of synthesizing comparative results, the structural equation models based on gender showed in both genders that the practice of physical activity was positively associated with self-concept and that sleep duration and self-concept were negatively associated with problematic use of videogames. In this sense, in boys there was a direct

correlation between self-concept with sleep duration and adherence to the Mediterranean diet, while girls did not generate these differences. However, the girls showed a positive association between the practice of physical activity and the problematic use of videogames. Finally, it was highlighted that the practice of physical activity and the duration of sleep were directly related in boys and indirectly in girls.
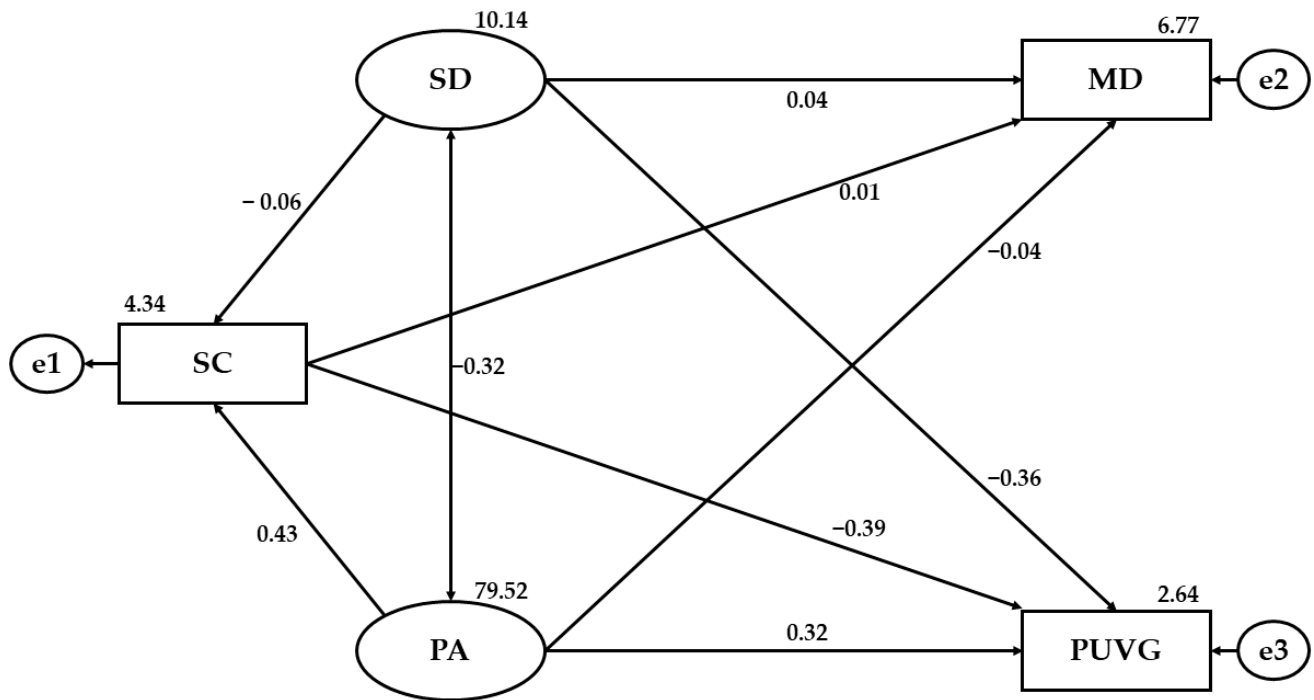
Figure 4. Structural equation for the females. Note: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG).

Table 3. Regression weights and standardized weights of the structural equation model for the males.

Relationships between Variables			R.W.				S.R.W.
			Estimate	E.E.	C.R.	*p*	EST
SC	←	SD	0.087	0.022	3.992	***	0.351
SC	←	PA	0.002	0.000	6.371	***	0.440
MD	←	SD	0.073	0.128	0.574	0.566	0.023
PUVG	←	SD	−0.228	0.022	−10.233	***	−0.549
MD	←	SC	0.478	0.226	2.114	*	0.286
PUVG	←	SC	−0.373	0.039	−9.459	***	−0.531
MD	←	PA	−0.001	0.002	−0.766	0.444	−0.031
PUVG	←	PA	0.000	0.000	0.722	*	−0.252
SD	↔	PA	2.162	1.073	2.015	*	0.279

Note 2: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity, (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG). Note 2: Regression Weights (R.W.); Standardized Regression Weights (S.R.W.); Error Estimation (E.E.); Critical Ratio (C.R.); Estimations (EST). Note 3: Statistically significant relationship between variables at the level 0.001 (***); Statistically significant relationship between variables at the level 0.01; Statistically significant relationship between variables at the level 0.05 (*).

Table 4. Regression weights and standardized weights of the structural equation model for the females.

Relationships between Variables			R.W.				S.R.W.
			Estimate	E.E.	C.R.	*p*	EST
SC	←	SD	−0.030	0.022	−1.360	0.174	−0.060
SC	←	PA	0.001	0.000	5.317	***	0.433
MD	←	SD	0.120	0.144	0.835	0.404	0.038
PUVG	←	SD	−0.070	0.020	−3.609	***	−0.358
MD	←	SC	0.055	0.295	0.186	0.853	0.009
PUVG	←	SC	−0.166	0.040	−4.151	***	−0.386
MD	←	PA	−0.002	0.002	−0.926	0.354	−0.043
PUVG	←	PA	0.001	0.000	2.778	**	0.325
SD	↔	PA	−3.362	1.271	−2.644	**	−0.319

Note 3: Sleep Duration (hours per day) (SD); Self-Concept (SC); Physical Activity (minutes per day) (PA); Mediterranean Diet (MD); Problematic Use of Videogames (PUVG). Note 2: Regression Weights (R.W.); Standardized Regression Weights (S.R.W.); Error Estimation (E.E.); Critical Ratio (C.R.); Estimations (EST). Note 3: Statistically significant relationship between variables at the level 0.001 (***); Statistically significant relationship between variables at the level 0.01 (**).

4. Discussion

In this research, an analysis of the relationship of engagement in physical activity and sleep duration with self-concept, Mediterranean diet and the problematic use of videogames was carried out in a sample of primary school students. The study includes an analysis of structural equations based on the sex of the participants. The route model developed acquires good fit indices, configuring a valid explanatory model that allows for the explaining of existing relationships between the different variables that have been studied, as in previous studies [14,31–35].

Among the main findings obtained in the present research, the first to highlight is that the duration of sleep is positively associated with self-concept and negatively with the problematic use of videogames. We did not find studies with which to directly compare these results, because the variable duration of sleep is not widely discussed in the literature [36]. However, there were few sleep problems among subjects with greater mental toughness, understood as a psychological construct composed of factors such as physical well-being, mental well-being, relationship with parents, school environment and social acceptance, which are factors related to the different domains of self-concept (physical, social, family and social) [37]. Similarly, the adequate sleep patterns in children and adolescents promote better physical and psychological well-being, with higher levels of self-esteem [38,39]. Sleep duration may be positively associated with self-concept because students who maintain a good quality and quantity of sleep hours obtain better academic performance [40], which constitutes a fundamental factor in the formation of good self-concept during childhood and youth [41,42].

Regarding the negative association found between the duration of sleep and the problematic use of videogames, the results obtained in the present investigation are consistent with those obtained by Brunetti et al. [43], Kenney [44], Salih et al. [45] and Turel et al. [46], whose results reflect sleep-disturbance problems in children and adolescents who show high use of videogames, as well as social networks [40,47]. These are habits that negatively affect the quantity and quality of sleep due to the ease with which the display devices can be used in the room itself [39].

Another finding of this study is that engagement in physical activity is directly related to self-concept and indirectly related to problematic videogame use in the general model. However, it should be noted that in girls, problematic videogame use was directly related to physical activity practice. Thus, regarding the relationship between the practice of physical activity and self-concept, the results obtained are in line with those found by Fernández-Bustos et al. [3], Fernández-Guerrero et al. [48] and Moral-Campillo et al. [49], in which the existence of a positive effect between engagement in physical activity and the

development of self-concept, both in children and adolescents, is established. However, there is no direct relationship between both variables [31]. In this sense, according to Zurita-Ortega et al. [35], the family exerts a greater influence on the development of self-concept during adolescence than the practice of physical activity. In this study, an association is found between the practice of physical activity and self-concept which may be due to the influence of factors such as body image, body mass index and level of physical condition [50] on the development of that variable in children.

Regarding the inverse relationship found between physical activity and problematic use of videogames, it has been contrasted in other investigations such as those by Ferrari et al. [51] and Forde [52] where the effects that a high use of videogames has on the creation of sedentary lifestyles are corroborated. This can affect physical appearance and training of an inadequate self-concept due to a lack of the habit of physical activity [31]. On the contrary, a direct and bidirectional influence between engagement in physical activity and duration of sleep is found when their relationship is analyzed, as occurs in other studies such as those by Bartel et al. [53] and Lemola et al. [38]. Their conclusions highlight the benefits of engagement in physical activity on the adoption of healthy sleep and rest habits, which are necessary to promote better physical health and mental well-being, and therefore, to achieve an optimal psychological profile.

Another result obtained in this research is that self-concept is directly related to adherence to a Mediterranean diet and inversely related to the problematic use of videogames. It should be pointed out that a direct association between self-concept and adherence to Mediterranean diet has also been found in previous studies such as that of Puertas-Molero et al. [11], where it is verified that the follow-up of the Mediterranean diet together with engagement in physical activity are conceived as factors of great relevance for the child's development of a positive vision of himself or herself. Self-vision or self-concept, in the case of children with a problematic use of videogames, will be negative, as demonstrated both in this research and in previous studies, for example, Castro-Sánchez et al. [31], Jackson et al. [54], and Sánchez-Zafra et al. [12]. Therefore, the reason why self-concept increases when there is adherence to the Mediterranean diet, and decreases when children show problematic use of videogames, may be because that psychological variable is closely linked to the adoption of habits or styles of active and healthy lifestyles, where engagement in physical activity, and the maintenance of a healthy diet and good social relations with peers and family play a transcendental role.

When the results of the structural model developed according to sex are analyzed, it appears, firstly, that the duration of sleep is directly associated with self-concept and indirectly with the problematic use of videogames in the case of boys, while in girls, no statistical association was found between sleep duration and self-concept, although a significant and indirect association was found with the problematic use of videogames. Despite not finding studies with which to directly compare these results, the truth is that they are similar to those obtained by Kenney [44], who find a greater sleep disturbance in subjects who show high use of videogames, being higher in boys than in girls. The reason why there is an indirect association between the duration of sleep and the problematic use of videogames in both sexes may be due to the fact that both the boys and the girls participating in the study have quite similar nocturnal habits of videogame use, providing for resulting from a similar number of hours of sleep at these ages. However, future research will be necessary to deepen the knowledge of the factors that determine the habit of using videogames and, above all, of social networks, in the moments before children and adolescents sleep at night.

Regarding the relationship between self-concept and engagement in daily physical activity, it is verified that both variables are positively related in both sexes, which concludes that physical activity can contribute to the formation of a positive self-concept and better psychological well-being by improving physical condition and satisfaction with body image, both in boys and girls [3]. Similarly, with regard to the relationship between self-concept and adherence to the Mediterranean diet, this relationship is positive in both

sexes, although it is higher in the case of boys. Despite the fact that these results are not comparable with those obtained in other studies, either because the population is different or because analyses of the relationship of variables based on sex are not included, they are nonetheless in line with the contributions of Puertas-Molero et al. [11] and Tapia-López [6], in whose research benefits of adherence to a Mediterranean diet for the development of self-concept in both sexes are found, although no statistical differences are found between boys and girls.

Another finding of the present study is the existence of differences regarding the bidirectional association between the duration of sleep and engagement in physical activity according to sex. A positive and direct relationship was found between both variables in the case of boys, while in girls it was surprisingly verified that this relationship is indirect. These results agree with the contributions of Lemola et al. [38], who find positive effects on physical health by subjects with optimal sleep patterns, as well as the contributions of Lin et al. [55], who state that subjects who do not get enough sleep or have inadequate sleeping habits are more likely to suffer from drowsiness and being overweight, and are therefore not likely to perform daily physical activities [56]. One of the possible reasons for obtaining an indirect relationship between sleep duration and physical activity in girls may be due to lower participation of girls in physical and sports activities.

Finally, we found an inverse relationship between self-concept and problematic use of videogames in both sexes. These results are in line with those obtained by Castro-Sánchez et al. [31], who found that subjects who do not show problems with the use of videogames generally have a better self-concept, although, in this study, we report greater problems with the use of videogames by male subjects. The reason why an inverse relationship is obtained in this study between self-concept and problematic use of videogames in both sexes may be due to a similar development of self-concept in both boys and girls, as well as habits of videogame usage. Use of electronic devices, according to Chacón-Cuberos et al. [57], should be limited so that both boys and girls can focus on academic activities, relationships with friends and physical activity, all essential aspects of the development of an optimal self-concept.

The present study has certain strengths, but also limitations that can be overcome in future research. Thus, in relation to strengths, it is necessary to highlight the deep and ambitious analysis carried out on the existing relationships between the multiple variables integrated in it through the analysis of structural equations based on sex, which has made possible the knowledge of interesting data on the effects of sleep patterns and engagement in physical activity on the development of self-concept, adherence to a Mediterranean diet and problematic use of videogames in children. All of these issues have been examined in previous research but without including the variable sleep duration, as well as the analysis based on sex.

Among the limitations of the present study is, on the one hand, the fact that the results must be considered with caution, since they cannot be extrapolated to populations other than children enrolled in the last year of primary education. It would be interesting to replicate the study in subjects belonging to different age groups or stages of life, in order to explore possible differences in the relationships between the different variables treated. Similarly, it would be necessary to extend the study to other regions of Spain to deepen the knowledge of the habits and lifestyles of the Spanish child and the youth population. Finally, although an indirect association has been found between the problematic use of videogames and duration of sleep, the use of videogames constitutes a limited factor when it comes to explaining the amount of sleep in children. Thus, future research should include an analysis of habits relating to the use of social networks during the moments before going to bed, as well as their influence on sleep quantity and quality, the difficulty of falling asleep and consider other aspects such as the commitment of families, academic performance, living environment and healthcare, among others.

In conclusion, the structural equation models based on gender show that engagement in physical activity is positively associated with self-concept in both genders. Similarly,

sleep duration and self-concept are negatively related to problematic use of videogames. In boys there is a direct relationship between self-concept, on the one hand, and sleep duration and adherence to a Mediterranean diet, on the other, while in girls these differences are not obtained. However, girls show a positive association between engagement in physical activity and the problematic use of videogames. Finally, we found that the practice of physical activity and the duration of sleep are directly related in boys and indirectly related in girls.

References

1. Coll, C.; Palacios, J.; Marchesi, A. *Desarrollo Psicológico y Educación*; Alianza Editorial: Madrid, Spain, 2004.
2. Giner, I.; Navas, L.; Holgado, F.P.; Soriano, J.A. Extracurricular physical activity, physical self-concept, goal orientations and academic performance. *Rev. Psicol. Deporte* **2019**, *28*, 107–116.
3. Fernández-Bustos, J.G.; Infantes-Paniagua, Á.; Cuevas, R.; Contreras, O.R. Effect of physical activity on self-concept: Theoretical model on the mediation of body image and physical self-concept in adolescents. *Front. Psychol.* **2019**, *10*, 1537. [CrossRef] [PubMed]
4. Palenzuela, N.; Duarte, G.; Gómez, J.; Rodríguez, J.Á.; Sánchez, M.B. Questionnaires Assessing Adolescents' Self-Concept, Self-Perception, Physical Activity and Lifestyle: A Systematic Review. *Children* **2022**, *9*, 91. [CrossRef]
5. Onetti, W.; Álvarez-Kurogi, L.; Castillo-Rodríguez, A. Adherence to the Mediterranean diet pattern and self-concept in adolescents. *Nutr. Hosp.* **2019**, *36*, 658–664. [CrossRef] [PubMed]
6. Tapia-López, A. Diferencias en los niveles de actividad física, grado de adherencia a la dieta mediterránea y autoconcepto físico en adolescentes en función del sexo. *Retos* **2019**, *36*, 185–192. [CrossRef]
7. Guillamón, A.; Canto, E.G.; López, P.J. Actividad física, condición física y autoconcepto en escolares de 8 a 12 años. *Retos* **2019**, *35*, 236–241.
8. Carcamo-Oyarzun, J.; Estevan, I.; Herrmann, C. Association between actual and perceived motor competence in school children. *Int. J. Environ. Res. Public Health* **2020**, *17*, 3408. [CrossRef]
9. Rojas-Jiménez, M.; Zurita-Ortega, F.; Castro-Sánchez, M. Asociación entre el autoconcepto y la práctica de actividad física en escolares de Granada. *J. Sport Health Res.* **2020**, *12*, 188–199.
10. Guillamón, A.; Carrillo, P.J.; García, E.; Perez, J.J.; Tarraga, L.; Tarraga, P.J. Dieta mediterránea, estado de peso y actividad física en escolares de la Región de Murcia. *Clín. Investig. Arterioscler.* **2019**, *31*, 1–7. [CrossRef]
11. Puertas-Molero, P.; San Román-Mata, S.; González-Valero, G.; Ubago-Jiménez, J.L. Hábitos y estilos de vida saludable en escolares de Educación Primaria. Importancia de la adherencia a la dieta mediterránea. *J. Sport Health Res.* **2020**, *12*, 295–302.
12. Sánchez-Zafra, M.; Zurita-Ortega, F.; Ramírez-Granizo, I.; Puertas-Molero, P.; González-Valero, G.; Ubago-Jiménez, J.L. Levels of self-concept and its relations with the use of video games in third grade primary school students. *J. Sport Health Res.* **2019**, *11*, 43–54.
13. Möller, C. Media Abstinence is the Onset of Media Literacy. *Prax. Kinderpsychol. Kinderpsychiatr.* **2022**, *71*, 160–175. [CrossRef] [PubMed]
14. González-Valero, G.; Ubago-Jiménez, J.L.; Zurita-Ortega, F.; Chacón-Cuberos, R.; Castro-Sánchez, M.; Puertas-Molero, P. Eating Habits and Lifestyles in Schoolchildren from Granada (Spain). A Pilot Study. *Educ. Sci.* **2018**, *8*, 216. [CrossRef]
15. Männikkö, N.; Ruotsalainen, H.; Miettunen, J.; Pontes, H.M.; Kääriäinen, M. Problematic gaming behaviour and health-related outcomes: A systematic review and meta-analysis. *J. Health Psychol.* **2020**, *25*, 67–81. [CrossRef] [PubMed]
16. Bernaldo-Quirós, M.; Sánchez-Iglesias, I.; González-Alvarez, M.; Labrador, F.J.; Estupiñá, F.J.; Fernández-Arias, I.; Labrador, M. Factors associated with the problematic use of video games in adolescents and young people. *Int. J. Ment. Health Addict.* **2021**, *1*, 1–14. [CrossRef]

17. Areshtanab, H.N.; Fathollahpour, F.; Bostanabad, M.A.; Ebrahimi, H.; Hosseinzadeh, M.; Fooladi, M.M. Internet gaming disorder and its relationship with behavioral disorder and mother's parenting styles in primary school students according to gender in iran. *BMC Psychol.* **2021**, *9*, 110. [CrossRef]

18. Keller, P.S.; Haak, E.A.; DeWall, C.N.; Renzetti, C. Poor sleep is associated with greater marital aggression: The role of self control. *Behav. Sleep Med.* **2019**, *17*, 174–180. [CrossRef]

19. Amigo, I.; Busto, R.; Herrero, J.; Fernández, C. Actividad física, ocio sedentario, falta de sueño y sobrepeso infantil. *Psicothema* **2008**, *20*, 516–520. Available online: https://reunido.uniovi.es/index.php/PST/article/view/8690 (accessed on 12 November 2021).

20. Reverter-Masià, J.; Hernández-González, V.; Jové-Deltell, M.C.; De Vega Cassasas, M. Actividad física en adolescentes.¿ Existe evidencia científica de cómo afecta el ejercicio físico al sueño en la población adolescente? *J. Negat. No Posit. Results* **2017**, *2*, 298–303.

21. Fochesatto, C.F.; Gaya, A.; Brand, C.; Mota, J.; Bandeira, D.R.; Lemes, V.B.; Gaya, A.R. Sleep and childhood mental health: Role of physical activity and cardiorespiratory fitness. *Rev. Bras. Med. Esporte* **2020**, *26*, 48–52. [CrossRef]

22. Miró, E.; Lozano, M.D.; Casal, G.B. Sueño y calidad de vida. *Rev. Colomb. Psicol.* **2005**, *14*, 11–27.

23. García, F.; Musitu, G. *AF5: Autoconcepto Forma 5*; TEA Ediciones: Madrid, Spain, 1999.

24. Shavelson, R.J.; Hubner, J.J.; Stanton, G.C. Self-concept: Validation of construct interpretations. *Rev. Educ. Res.* **1976**, *46*, 407–441. [CrossRef]

25. García, J.F.; Musitu, G.; Riquelme, E.; Riquelme, P. A confirmatory factor analysis of the "Autoconcepto Forma 5" questionnaire in young adults from Spain and Chile. *Span. J. Psychol.* **2011**, *14*, 648–658. [CrossRef] [PubMed]

26. Serrá-Majem, L.; Ribas, L.; Ngo, J.; Ortega, R.M.; García, A.; Pérez-Rodrigo, C.; Aranceta, J. Food, youth and the Mediterranean diet in Spain. Development of KIDMED, Mediterranean Diet Quality Index in children and adolescents. *Public Health Nutr.* **2004**, *7*, 931–935. [CrossRef] [PubMed]

27. Chamarro, A.; Carbonell, X.; Menresa, J.M.; Muñoz-Miralles, R.; Ortega-González, R.; Lopez-Morron, M.R.; Batalla-Martinez, C.; Toran-Monserrat, P. The Questionnaire of Experiences Associated with Video games (CERV): An instrument to detect the problematic use of video games in Spanish adolescents. *Adicciones* **2014**, *26*, 303–311. [CrossRef]

28. Beranuy, M.; Chamarro, A.; Graner, C.; Carbonell, X. Validación de dos escalas breves para evaluar la adicción a Internet y el abuso de móvil. *Psicothema* **2009**, *21*, 480–485.

29. Marsh, H.W. *Handbook of Sport Psychology*, 3rd ed.; Tenenbaum, G., Eklund, R.C., Eds.; John Wiley & Sons: Hoboken, NJ, USA, 2007.

30. Byrne, B.M. *Structural Equation Modelling with AMOS: Basic Concepts, Applications, and Programming*; Routledge: London, UK, 2013.

31. Castro-Sánchez, M.; Rojas-Jiménez, M.; Zurita-Ortega, F.; Chacón-Cuberos, R. Multidimensional Self-Concept and Its Association with Problematic Use of Video Games in Spanish College Students. *Educ. Sci.* **2019**, *9*, 206. [CrossRef]

32. Ramirez-Granizo, I.A.; Sánchez-Zafra, M.; Zurita-Ortega, F.; Puertas-Molero, P.; González-Valero, G.; Ubago-Jiménez, J.L. Multidimensional self-concept depending on levels of resilience and the motivational climate directed towards sport in schoolchildren. *Int. J. Environ. Res. Public Health* **2020**, *17*, 534. [CrossRef] [PubMed]

33. Simms, K.; Bock, S.; Hackett, L. Do the duration and frequency of physical education predict academic achievement, self-concept, social skills, food consumption, and body mass index? *Health Educ. J.* **2014**, *73*, 166–178. [CrossRef]

34. Yang, S.C.; Huang, K.L. Using structural equation modeling to validate online game players' motivations relative to self-concept and life adaptation. *J. Educ. Comput. Res.* **2011**, *49*, 527–542. [CrossRef]

35. Zurita-Ortega, F.; Castro-Sánchez, M.; Álvaro-González, J.I.; Rodríguez-Fernández, S.; Pérez-Cortés, A.J. Autoconcepto, Actividad física y Familia: Análisis de un modelo de ecuaciones estructurales. *Rev. Psicol. Deporte* **2016**, *25*, 97–104.

36. Kleszczewska, D.; Szkutnik, A.M.; Siedlecka, J.; Mazur, J. Physical Activity, Sedentary Behaviours and Duration of Sleep as Factors Affecting the Well-Being of Young People against the Background of Environmental Moderators. *Int. J. Environ. Res. Public Health* **2019**, *16*, 915. [CrossRef] [PubMed]

37. Brand, S.; Kalak, N.; Gerber, M.; Clough, P.J.; Lemola, S.; Pühse, U.; Holsboer-Trachsler, E. During early and mid-adolescence, greater mental toughness is related to increased sleep quality and quality of life. *J. Health Psychol.* **2016**, *21*, 905–915. [CrossRef] [PubMed]

38. Lemola, S.; Räikkönen, K.; Scheier, M.F.; Matthews, K.A.; Pesonen, A.-K.; Heinonen, K.; Lahti, J.; Komsi, N.; Paavonen, J.E.; Kajantie, E. Sleep quantity, quality and optimism in children. *J. Sleep Res.* **2011**, *20*, 12–20. [CrossRef] [PubMed]

39. Saini, E.K.; Gillis, B.T.; Elmore-Staton, L.; Buckhalt, J.A.; El-Sheikh, M. Longitudinal relations between sleep and cognitive functioning in children: Self-esteem as a moderator. *J. Sleep Res.* **2021**, *30*, e13209. [CrossRef]

40. Vernon, L.; Barber, B.L.; Modecki, H.L. Adolescent Problematic Social Networking and School Experiences: The Mediating Effects of Sleep Disruptions and Sleep Quality. *Cyberpsychol. Behav. Soc. Netw.* **2015**, *18*, 386–392. [CrossRef]

41. Marsh, H.W.; Pekrun, R.; Parker, P.D.; Murayama, K.; Guo, J.; Dicke, T.; Arens, A.K. The murky distinction between selfconcept and self-efficacy: Beware of lurking jingle jangle fallacies. *J. Educ. Psychol.* **2019**, *111*, 331–353. [CrossRef]

42. Méndez-Giménez, A.; Fernández-Río, J.; Cecchini-Estrada, J.A. Papel importante del alumnado, necesidades psicológicas básicas, regulaciones motivacionales y autoconcepto físico en Educación Física. *Cuad. Psicol. Deporte* **2012**, *13*, 71–82. [CrossRef]

43. Brunetti, V.C.; O'Loughlin, E.K.; O'Loughlin, J.; Constantin, E.; Pigeon, E. Screen and nonscreen sedentary behavior and sleep in adolescents. *Sleep Health* **2016**, *2*, 335–340. [CrossRef]

44. Kenney, E.L.; Gortmaker, S.L. United States Adolescents' Television, Computer, Videogame, Smartphone, and Tablet Use: Associations with Sugary Drinks, Sleep, Physical Activity, and Obesity. *J. Pediatr.* **2017**, *182*, 144–149. [CrossRef]

45. Salih, E.M.; Alghamdi, A.H.; Alzahrani, A.Y.; Alghamdi, H.A.; Alghamdi, F.A.; Alzubaidy, A.S. Prevalence and Negative impact of Videogames among children and adolescents in Albaha city, KSA. *Med. Sci.* **2020**, *24*, 4001–4009.

46. Turel, O.; Romashkin, A.; Morrison, K.M. Health Outcomes of Information System Use Lifestyles among Adolescents: Videogame Addiction, Sleep Curtailment and Cardio-Metabolic Deficiencies. *PLoS ONE* **2016**, *11*, e0154764. [CrossRef]

47. Woods, H.C.; Scott, H. #Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *J. Adolesc.* **2016**, *51*, 41–49. [CrossRef]

48. Fernández-Guerrero, M.; Feu-Molina, S.; Suárez-Ramírez, M. Physical self-concept in terms of sociodemographic variables and their relationship with physical activity. *Cult. Cienc. Deporte* **2020**, *15*, 189–199.

49. Moral-Campillo, L.; Reigal-Garrido, R.E.; Hernández-Mendo, A. Physical activity, cognitive and psychosocial functioning in a preadolescent sample. *Rev. Psicol. Deporte* **2020**, *29*, 123–131.

50. Sánchez-Miguel, P.A.; León-Guereño, P.; Tapia-Serrano, M.A.; Hortigüela-Alcalá, D.; López-Gajardo, M.A.; Vaquero-Solís, M. The Mediating Role of the Self-Concept between the Relationship of the Body Satisfaction and the Intention to Be Physically Active in Primary School Students. *Front. Public Heath* **2020**, *8*, 113. [CrossRef]

51. Ferrari, G.L.; Araújo, T.L.; Oliveira, L.C.; Matsudo, V.; Fisberg, M. Association between electronic equipment in the bedroom and sedentary lifestyle, physical activity, and body mass index of children. *J. Pediatr.* **2015**, *91*, 574–582. [CrossRef]

52. Forde, C.; Hussey, J. How Children Use Active Videogames and the Association Between Screen Time and Physical Activity. *Games Health J.* **2015**, *4*, 312–317. [CrossRef]

53. Bartel, K.A.; Gradisar, M.; Williamson, P. Protective and risk factors for adolescent sleep: A meta-analytic review. *Sleep Med. Rev.* **2015**, *21*, 72–85. [CrossRef]

54. Jackson, L.A.; Von Eye, A.; Fitzgerald, H.E.; Zhao, Y.; Witt, E.A. Self-concept, self-esteem, gender, race and information technology use. *Comput. Hum. Behav.* **2010**, *26*, 323–328. [CrossRef]

55. Lin, L.N.; Chang, L.-Y.; Hurng, B.-S.; Wu, C.-C.; Yen, L.-L.; Chang, H.-Y. Sex differences in sleep patterns and changes in 7th to 12th graders: A longitudinal follow-up study in Taiwan. *Sleep* **2018**, *41*, zsx211. [CrossRef] [PubMed]

56. McKnight-Eily, L.R.; Eaton, D.K.; Lowry, R.; Croft, J.B.; Presley-Cantrell, L.; Perry, G.S. Relationships between hours of sleep and health-risk behaviors in US adolescent students. *Prev. Med.* **2011**, *53*, 271–273. [CrossRef] [PubMed]

57. Chacón-Cuberos, R.; Zurita-Ortega, F.; Castro-Sánchez, M.; Espejo-Garcés, T.; Martínez-Martínez, A.; Ruiz-Rico Ruiz, G. Relación entre autoconcepto, consumo de sustancias y uso problemático de videojuegos en universitarios: Un modelo de ecuaciones estructurales. *Adicciones* **2018**, *30*, 179–188. [CrossRef] [PubMed]