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Original Article

Relationship between perceived family support, physical activity level, nutritional habits, and physical and emotional well-being in Spanish secondary school students.

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Abstract:
The positive impact of physical activity and family support on the physical and mental well-being of children and adolescents is well established. This study aims to explore the relationship between physical activity levels, body composition, symptoms of depression, anxiety, and stress, nutritional habits, mindfulness, family relationships, and the integration of cross-curricular content associated with physical education that can influence the improvement of these variables in Spanish secondary school students. A sample of 54 secondary school students in the third and fourth years (34 males and 20 females, mean age = 14.98 ± 0.62 years) participated in a 10-session intervention over five months. Participants were divided into two groups: a control group (CG; n=30) and an Experimental Group (EG; n=24). The study assessed body composition, sociodemographic characteristics, perceived family support (APGAR), adherence to the Mediterranean diet (KIDMED), levels of physical activity (IPAQ and APALQ), mindfulness (MAAS), mindful eating (MEQ) and levels of depression, stress, and anxiety (DASS-21). The results did not reveal significant effects of the 10-session intervention, based on cross-curricular competencies within a physical education class, on emotional health, eating habits, or physical activity levels among the adolescents studied. However, correlational analyses indicated that perceived family support was positively correlated with student mindfulness levels ($r=0.462$; $p<0.01$), suggesting a greater connection to reality and lower levels of depression, stress, and anxiety ($r=-0.573$; $p<0.01$). Additionally, family socioeconomic status was significantly associated with perceived family support ($r=0.277$; $p<0.05$). Physical activity habits were linked to healthier eating habits ($r=0.404$; $p \leq 0.01$), which in turn were related to better body composition ($r=-0.277$; $p \geq 0.05$). These findings suggest that future intervention studies aimed at improving psychoemotional health, physical activity levels, and body composition in adolescents should incorporate a focus on the family unit.
Key Words: **Emotional well-being, mental health, adolescent depression, physical activity, family support, body composition.**

Introduction

One of the greatest challenges facing educators today is achieving the set of goals or achievements established for student evaluation. The achievement of these goals depends largely on the student's motivation, which is influenced by various individual, social, and environmental variables (Bandura, 1993).

Physical activity is well known for its significant role in promoting both physical and mental health. This has long been emphasised within physical education curricula (Hallal et al., 2016). Various organizations and professional associations related to physical activity and health, such as the National Association for Society of Health and Physical Educators (SHAPE, 2020), the World Health Organization (WHO, 2020), the Spanish Official College of Graduates in Physical Education and Sports Sciences (COLEF, 2024), and the National Association for Sports and Physical Education (NASPE, Tucker, 2008), highlight the positive impact of physical activity on the physical and mental well-being of children and adolescents. These organisations recommend daily doses of moderate physical activity (MPA) or vigorous physical activity (VPA) ranging from 60 to 120 minutes per day.

Systematic reviews have examined international guidelines for physical activity among children and youth (Parrish et al., 2020), reflecting adaptations according to societal and contextual needs, with recommended durations ranging from 60 to 90 minutes of MPA or VPA per day. Furthermore, physical activity not only improves physical and cardiorespiratory fitness, but also contributes to cognitive development and improvements in mental health (Landry & Driscoll, 2012).

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Physical activity levels are typically assessed using the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003), which quantifies weekly activity minutes at various intensities, and the Physical Activity Level Questionnaire (APALQ; Ledent, Cloes & Piéron, 1997), which evaluates participation and adherence to physical activity. In youth, physical activity is often encouraged by families (Suárez & Vélez, 2018). However, in the Spanish educational system, physical education teachers play a crucial role in promoting physical activity and health among adolescents (Ortega, 2009).

One of the most debated topics today is the relationship between physical activity levels and psychoemotional aspects such as stress, depression, and anxiety. These emotional variables are commonly assessed using the Depression, Anxiety, and Stress Scale 21 (DASS-21; Vados, Solanas & Andrés, 2005), whose Spanish version has been validated in clinical studies with adolescents (Román, Santibáñez & Vinet, 2016; Merino & Privado, 2024).

An increasing prevalence of depressive symptoms among young people has been observed throughout Europe, with an estimated 6.54% of the population affected, reaching 11.41% among individuals aged 15 to 29 (Arias et al., 2023). Depression is the leading cause of disease and disability among adolescents aged 10 to 19 years (Dick & Ferguson, 2016). It is characterised by mood changes, sadness, and behavioural alterations linked to activity levels and thought patterns, with multiple manifestations (Gómez, 2005). Longitudinal studies have shown a significant association between depressive symptoms and suicidal tendencies, which have increased over the past two decades (Twenge et al., 2019). These findings highlight the importance of addressing emotional well-being in educational contexts.

Family support plays a crucial role in youth performance and development, especially during early childhood (Cardona et al., 2015). Emotional intelligence and related competencies are primarily learnt within the family unit, with peer and teacher relationships that reinforce this learning process (Cervantes & González, 2017). Dysfunctional family environments can contribute to behavioural and developmental problems that can persist into adulthood (Feldman, 2017). Consequently, the perception of family and social environments is often assessed, as families are considered primary support systems that provide values and emotional regulation tools (Ceberio, 2006).

In Spain, the APGAR test (Adaptation, Participation, Personal Resource Gradient, Affection, and Resources) is commonly used to evaluate family functionality from the youth's perspective (Arias & Herrera, 1996). Family dysfunction and disruptive behaviours are related to health problems, such as childhood obesity and long-term depression (Suárez & Alcalá, 2014). Therefore, parental participation in the educational process is crucial to promote youth well-being. Therefore, emphasis should be placed on the need for family involvement in education, engaging parents in the teaching-learning process of their children.

An individual's ability to maintain focus and awareness is essential for achieving goals and objectives. In Spain, mindfulness is commonly measured using the Mindfulness Attention Awareness Scale (MAAS), which has been validated for the Spanish population (Soler et al., 2012).

Although no definitive relationship has been established between physical activity levels and psychological traits such as anxiety, stress, or depression, positive correlations have been found between physical activity and cognitive performance on academic tasks (Biddle & Asare, 2011; Biddle et al., 2019).

Recent studies have evaluated the effects of physical activity on resilience, revealing that extracurricular physical activity in students not only improved academic performance but also enhanced their resilience and social skills (Daud & Carruthers, 2008; Barquero, 2015), with communication, support, and parental follow-up being essential for the development of these capacities. In this regard, Werner (1989) conducted a longitudinal study with a sample of more than 500 children living in environments of violence, extreme poverty, and exposure to diseases, and it was found that success in adapting to these circumstances was based on the development of resilience, with at least one person or group providing these children with support, recognition, value, and affection. Other studies observed that individuals with high self-esteem and social skills also exhibited better resilience (Fergus & Zimmerman, 2005; Zolkoski & Bullock, 2012).

Recent studies have examined the effects of physical activity on resilience, demonstrating that extracurricular physical activity not only improves academic performance but also improves resilience and social skills (Daud & Carruthers, 2008; Barquero, 2015). Communication, support, and parental involvement are critical for developing these capacities. Werner (1989) conducted a longitudinal study involving more than 500 children living in challenging environments (eg, violence, poverty), showing that resilience was fostered by supportive relationships that provided recognition, value, and affection. Other studies have found that individuals with high self-esteem and social skills exhibit greater resilience (Fergus & Zimmerman, 2005; Zolkoski & Bullock, 2012).

The aim of this study is to examine the relationship between physical activity levels, body composition, depressive symptoms, anxiety and stress, nutritional habits, mindfulness, and family relationships in Spanish secondary school students. Furthermore, the study investigates whether an intervention that incorporates cross-curricular content within physical education can positively impact psychological traits such as stress, anxiety, and depression in students.

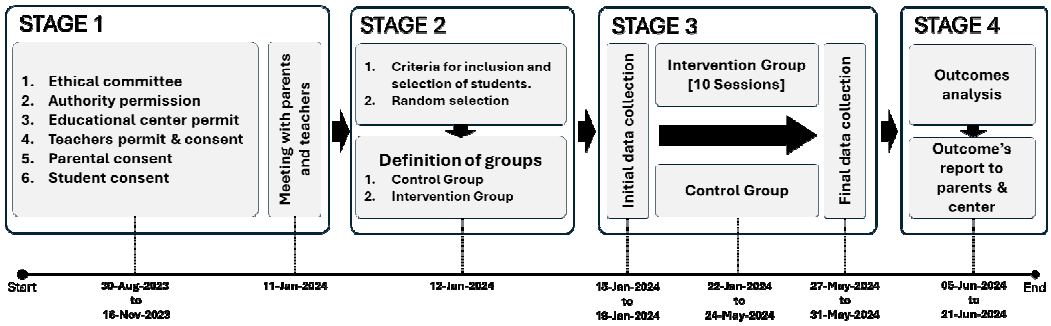
Material & methods

Study Design and Participant Allocation: Of the 378 students in the third and fourth year of secondary education at the school, 60 students agreed to participate in the study. These students were randomly assigned to two groups: an intervention group (IG; n = 30) and a control group (CG; n = 30). The final sample consisted of 54 students aged between 14 and 15 years (M=14.98 ± 0.62 years), including 34 males (63%) and 20 females (37%). The participants in this study were students in the 3rd and 4th year of secondary education at IES Palas Atenea in the city of Torrejón de Ardoz (Madrid). After obtaining authorisation from the school administration, all students were informed and they were enrolled in the study after signing an informed consent form from their parents/legal guardians as well as by the students themselves.

The study timeline is summarised in Figure 1. The study began with a meeting with parents, during which the objectives of the study and the methodology to be used were explained.

Figure 1

Chronology of the project.



An initial data collection was conducted between January 15 and 19, 2024, during which all the variables included in the study were evaluated. Subsequently, a 10-session intervention was carried out, covering key topics from cross-curricular areas (philosophy and sociology, relaxation techniques, nutrition, the environment, and new technologies), which were distributed between January and May 2024. The inclusion criteria for the study were enrolment in the 3rd or 4th year of secondary education, no clinical physical or psychological health disorders, no use of medications that alters psychophysical conditions, and attendance at more than 95% of the school's educational sessions, as well as attending at least 80% of the project sessions. It should be noted that 20% of the students in the intervention group (6 students) decided to leave the study or did not attend the required number of sessions and therefore were excluded from the study (intervention group: n = 24).

Test protocols and instruments

The variables evaluated in the students included: anthropometry, sociodemographic data, family functionality, adherence to the Mediterranean diet, physical activity time, physical activity habits, level of mindful attention, mindful eating, and levels of stress, depression, and anxiety.

Anthropometry: The ISAK protocol was used (Esparza & Vaquero, 2023). Body weight was measured with an XMTZC-02HM scale, with a precision of ± 0.1 kg (Xiaomi, Beijing); height was measured using a portable SECA 213 stadiometer with a precision of ± 0.1 cm (SECA, Hamburg); diameters (wrist and femur) were measured with a caliper with a precision of ± 0.1 cm (Holtain, Crosswell); skinfolds (triceps, mid-thigh, and calf) were measured using a skinfold caliper with a precision of ± 0.2 mm (Holtain, Crosswell); and perimeters (relaxed arm, waist, hip, thigh, and calf) were measured using a tape measure with a precision of ± 0.1 cm (CESCORF, Porto Alegre). Additionally, measurements of body mass and height, as well as sex and ethnicity, were recorded.

Sociodemographic data: Information was collected on homeownership, parents, marital status, parents, educational level, number of siblings and birth order, sleep hours during the week and on weekends, ownership of vehicles, computer equipment at home, internet access, vacations taken in the last 12 months, and whether the student owned a smartphone. These data were used to calculate a score ranging from 0 to 12 points.

Subjective perception of family support questionnaire: Family functionality, as perceived by students, was assessed using the APGAR questionnaire (Campo & Caballero, 2021), which measures family adaptation, participation, resource gradient, affectivity, and problem-solving capacity. This questionnaire was validated for Spanish adolescents aged 13 to 17, yielding a Cronbach's α = 0.82. Each of the nine items used a Likert scale from 0 to 4 points and the total score was calculated. The interpretation of the scores establishes normal family functionality (17-20 points), mild deficiencies (16-13 points), moderate deficiencies (12-10 points), or severe deficiencies (≤9). This categorisation allows for a nuanced understanding of the students' perceptions of their family environments.

Adherence to the Mediterranean diet questionnaire: Adherence to the Mediterranean diet was evaluated with the KIDMED questionnaire (Serra et al., 2004), which assesses the quality of students' diets and has a Cronbach's α = 0.79 (Carrillo & Ramírez, 2020). The questionnaire uses a dichotomous response (yes/no) to

assess the quality of the diet, with final scores categorising it as "Very poor quality" (≤3), "Need to improve eating habits" (4-7), or "Optimal" (≥8).

Weekly physical activity and adherence to physical activity questionnaires: Weekly physical activity time was evaluated using IPAQ (Craig et al., 2003), which calculates the total number of minutes of vigorous, moderate and light physical activity per week, with a recommendation from WHO (WHO, 2021) of 60 minutes daily, totalling 420 minutes per week for youth aged 5 to 17 years. The APALQ questionnaire (Jurado, Llorente & Gil, 2019), adapted for the Spanish population, was also administered, which assesses the physical activity levels in young people aged 9 to 18 years. It consists of five items rated on a Likert scale of 1 to 5 for type, frequency, duration, and intensity of activity. Scores categorize the subject as sedentary (5-10 points), moderately active (11-16 points), or very active (≥17 points).

Mindful attention questionnaire: The Mindfulness Attention Awareness Scale (MAAS) (Calvete, Sampedro & Orue, 2014) adapted for Spanish-speaking populations was also applied, which assesses the individual's ability to pay attention and be aware in the present moment, with a Cronbach's $\alpha = 0.88$ (Barajas & Garra, 2014). The questionnaire consists of 15 questions using a Likert scale from 1 to 6. The responses are summed, and the result is averaged. Higher values indicate a higher level of mindfulness.

Mindful eating questionnaire: The Mindful Eating Questionnaire (MEQ) (Framson et al., 2009) assesses an individual's willingness to pay attention to what they eat and the emotional signals that affect appetite and the physiological need to eat. This questionnaire consists of 28 questions using a Likert scale of 1 to 4, evaluating traits of disinhibition, awareness, external cues, emotional response, and distraction. The global internal consistency of this tool is high with a Cronbach's $\alpha = 0.86$ (Hart et al., 2018).

Inventory of depression, stress, and anxiety: Finally, the students completed the Depression, Anxiety, and Stress Inventory (DASS-21), which has high validation values for its different scales of depression (Cronbach's $\alpha = .84$), anxiety (Cronbach's $\alpha = 0.7$), and stress (Cronbach's $\alpha = 0.83$) (Vados, Solanas & Andrés, 2005). It is a 21-item Likert questionnaire with a range of 0 to 3, and critical reference values for moderate symptoms of depression (≥14 points), anxiety (≥10 points), and stress (≥19 points) were used (Lovibond, 1995).

Data Analysis

The normality of the results was evaluated using the Kolmogorov-Smirnov normality test (n>50) and Levene's homoscedasticity test for both pre- and post-intervention evaluations. Only 16 of the 40 variables considered were deemed parametric. To analyse the hypotheses between the control group (CG) and the experimental group (EG), Kolmogorov-Smirnov tests were used for parametric variables, and Kruskal-Wallis tests were used for nonparametric variables. t-Student tests and Levene's test were performed to determine the existence of significant means and variances ($p<0.05$), as well as effect size estimators using Cohen's d (Cohen, 2013) for both inter- and intra-subject comparisons. Subsequently, regression and correlation analyses were performed for the dependent variables in relation to the independent variable (DASS-21). Finally, data were analyzed to identify potential collinearity and multicollinearity factors (11 dimensions) using ANCOVA (covariance analysis) and ANOVA (Analysis of Variance). Results were analysed using the SPSS 27 statistical analysis software (2020), with a statistical significance level of $\alpha = 0.05$ applied throughout.

Results

Table 1 shows the results of the variables studied by gender and course of the participants. The results based on gender did not show significant differences in most of the variables studied ($p>0.05$), with effect size estimators (Cohen's d) ranging from null (<0.20) to very small (0.21<X>0.49). The results were also compared based on the academic courses, but no significant patterns were identified.

Table 1

General results by gender and grade.

	Gender					Grade (*secondary education*)				
Variable	**Male**	**Female**	$t_{(52)}$	***p***	***d***	**3rd**	**4th**	$t_{(52)}$	***p***	***d***
Age	14.92 ± 0.65	15.09 ± 0.57	-0.914	0.365	-0.257	14.77 ± 0.5	15.66 ± 0.47	-5.651	**<0.001***	**-1.799***
% MM	23.98 ± 3.88	20.96 ± 2.73	3.055	**0.004***	**0.861***	22.54 ± 3.7	23.88 ± 3.93	-1.117	0.269	-0.356
% FM	18.48 ± 6.55	23.74 ± 7.12	-2.753	**0.008***	**-0.776***	20.42 ± 6.74	20.46 ± 8.70	-0.017	0.987	-0.005
Family	9.47 ± 1.28	9.50 ± 1.15	-0.84	0.933	-0.24	9.41 ± 1.28	9.69 ± 1.03	-0.709	0.481	-0.226
DASS-21	18.68 ± 10.29	19.40 ± 11.74	-0.237	0.814	-0.67	19.56 ± 10.17	17.00 ± 12.65	0.745	0.459	0.237
APGAR	14.47 ± 3.52	15.50 ± 4.41	-0.944	0.350	-0.266	14.65 ± 3.80	15.46 ± 4.15	-0.649	0.519	-0.206
IPAQ	660.1 ± 340.3	606.8 ± 297.2	0.582	0.563	0.164	640.2 ± 328.7	640.8 ± 318.0	-0.006	0.996	-0.002
APALQ	14.05 ± 3.08	13.70 ± 2.60	0.437	0.664	0.123	13.70 ± 2.89	14.61 ± 2.9	-0.986	0.951	-0.314
MAAS	4.16 ± 0.91	4.28 ± 0.77	-0.499	0.620	-0.14	4.10 ± 0.86	4.52 ± 0.78	-1.588	0.118	-0.505
KIDMED	7.29 ± 2.16	6.85 ± 2.11	0.734	0.466	0.207	6.95 ± 2.17	7.69 ± 1.97	-1.091	0.280	-0.347
NCONSC	10.57 ± 1.83	10.89 ± 2.10	-0.596	0.554	-0.168	10.85 ± 2.03	10.15 ± 1.46	1.159	0.252	0.369

The only significant differences were found for muscle mass values (%MM), which were higher in males (23.98 ± 3.88) than in females (20.96 ± 2.73) ($p<0.01$) with a very large effect size (d=-0.861), and for fat mass (%FM), which was higher in females (23.74 ± 7.12) than in males (18.48 ± 6.55) ($p<0.01$) with a very large effect size (d=0.776). There were no significant differences between the courses, except for age (age 3rd year=14.77 ± 0.5 years; age 4th year=15.66 ± 0.47 years) ($p<0.001$) with a very large effect size (d=-1.799).

Tables 2 and 3 compare the results between the intervention and control groups before and after the intervention. Student's t test assuming equal variances (F=12.612; $p<0.001$) showed no significant differences for any of the variables considered in the study. The findings showed no significant differences for any of the variables considered in the study between the two groups, both pre- and post-intervention.

Table 2

The general results of the intervention based on the group (previous intervention).

Previous intervention

Variable	Control (*n*=30)	Experimental (*n*=24)	*t (gl52)*	*p*	*d*
Age	14,91 ± 0,56	15,08 ± 0,70	-0,912	0,366	-0,250
% MM	22,97 ± 3,51	22,73 ± 4,17	0,236	0,815	0,065
% FM	20,70 ± 6,94	20,10 ± 7,59	0,300	0,766	0,082
F.Punt.	9,57 ± 1,20	9,38 ± 1,28	0,568	0,573	0,156
DASS-21	20,40 ± 11,80	17,13 ± 9,19	1,147	0,257	0,305
APGAR	15,07 ± 3,49	14,58 ± 4,35	0,453	0,653	0,124
IPAQ	629,33 ± 339,94	654,08 ± 307,61	-0,277	0,783	-0,076
APALQ	13,87 ± 3,28	14,00 ± 2,40	-0,167	0,868	-0,046
MAAS	4,22 ± 0,96	4,18 ± 0,73	0,155	0,878	0,042
KIDMED	7,12 ± 2,14	7,37 ± 2,33	-1,543	0,129	-0,423
NCONSC	10,42 ± 1,61	11,03 ± 2,24	-1,167	0,249	-0,320

Table 3

The general results of the intervention based on the group (post intervention).

Post intervention

Variable	Control (*n*=30)	Experimental (*n*=24)	*t (gl52)*	*p*	*d*
Age	15,30 ± 0,56	15,46 ± 0,70	-0,923	0,360	-0,253
% MM	24,26 ± 4,40	23,42 ± 4,53	0,687	0,495	0,188
% FM	21,82 ± 7,92	21,37 ± 7,88	0,210	0,835	0,057
F.Punt.	9,57 ± 1,20	9,38 ± 1,28	0,568	0,573	0,156
DASS-21	20,57 ± 11,55	20,46 ± 9,50	0,037	0,971	0,010
APGAR	14,67 ± 3,74	13,83 ± 4,49	0,744	0,460	0,204
IPAQ	829,67 ± 522,59	762,00 ± 362,77	0,539	0,593	0,147
APALQ	15,47 ± 3,08	15,04 ± 3,46	0,477	0,635	-0,056
MAAS	4,25 ± 1,07	4,01 ± 0,89	0,860	0,394	0,236
KIDMED	7,12 ± 2,14	7,37 ± 2,33	-0,129	0,898	-0,035
NCONSC	10,73 ± 1,69	11,63 ± 1,97	-1,799	0,078	-0,493

However, the general sample of the study (Table 4), including the members of the control and experimental groups, showed a significant variation in the following variables: age (Age_{Pre} = 14.99 ± 0.63 vs. Age_{Post} = 15.37 ± 0.63; $p<0.001$; d=-76.3), %MM ($\%MM_{Pre}$ = 22.86 ± 3.78 vs. $\%MM_{Post}$ = 23.88 ± 4.44; $p<0.001$; d=-0.486), %FM ($\%FM_{Pre}$ = 20.43 ± 7.17 vs. $\%FM_{Post}$ = 21.61 ± 7.83; $p<0.001$; d=-0.488), and APALQ ($APALQ_{Pre}$ = 13.93 ± 2.89 vs. $APALQ_{Post}$ = 15.27 ± 3.22; $p<0.01$; d=-0.437).

Table 4

General results before and after the intervention.

Pre-Post

Variable	Pre (*n*=54)	Post (*n*=54)	$t_{(52)}$	*p*	*d*
Age	14.99 ± 0.63	15.37 ± 0.63	-560.84	**<0.001***	**-76.3**
% MM	22.86 ± 3.78	23.88 ± 4.44	-3.571	**<0.001***	**-0.486**

% FM	20.43 ± 7.17	21.61 ± 7.83	-3.586	**<0.001***	**-0.488**
Family	9.48 ± 1.22	9.48 ± 1.22	-	0	0
DASS-21	18.94 ± 10.74	20.51 ± 10.59	-0.237	0.814	-0.198
APGAR	14.85 ± 3.87	14.29 ± 4.07	1.684	0.980	0.229
IPAQ	660.1 ± 340.3	606.6 ± 297.2	0.582	0.563	-0.325
APALQ	13.93 ± 2.89	15.27 ± 3.22	-3.214	**0.002***	**-0.437**
MAAS	4.20 ± 0.99	4.15 ± 0.99	0.654	0.516	0.089
KIDMED	7.12 ± 2.14	7.37 ± 2.33	-1.329	0.189	-0.181
NCONSC	10.69 ± 1.92	11.13 ± 1.86	-2.144	0.37	-0.292

Table 5 shows the correlations between the different variables of the study, and the relationships between the variables with significant correlations are graphically represented in Figure 2.

Table 5

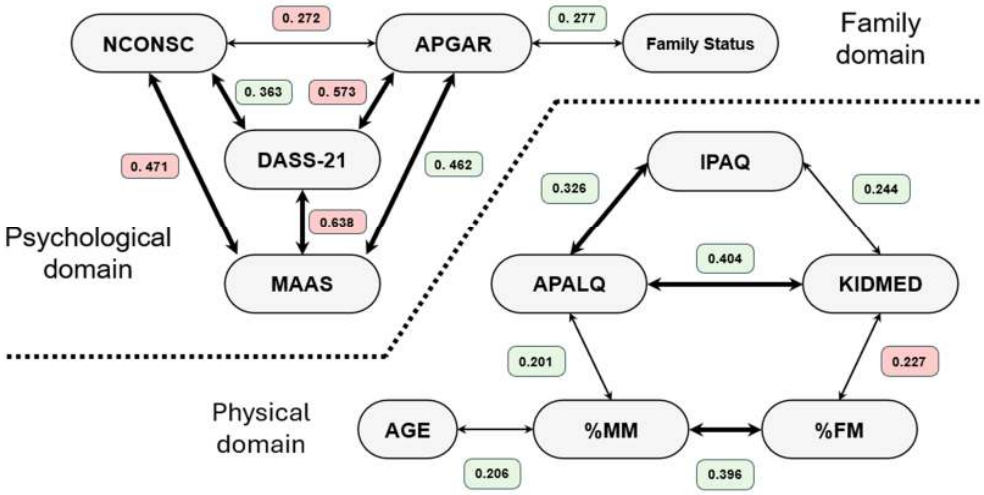
Correlation between the variables studied.

Correlations

	DASS-21	Age	% MM	% F				ALQ	MAAS	KIDMED	NCONSC
DASS-21	1	(0.243)	(0.147)	(0.685)	(0.558)	(**0.000**)	(0.412)	(0.487)	(**0.000**)	(0.464)	(**0.000**)
Age	0,113	1	(**0.033**)	(0.519)	(0.856)	(0.528)	(0.253)	(0.952)	(0.749)	(0.466)	(0.071)
% MM	-0,140	**0,206***	1	(**0.000**)	(0.282)	(0.044)	(0.891)	(**0.037**)	(0.599)	(0.856)	(0.954)
% FM	-0,039	0,063	**0,396****	1	(0.082)	(0.049)	(0.088)	(0.224)	(0.272)	(**0.018**)	(0.707)
F.Punt.	-0,057	-0,018	0,104	0,168	1	(**0.004**)	(0.769)	(0.174)	(0.352)	(0.646)	(0.210)
APGAR	**-0,573****	-0,061	0,195	0,190	**0,277***	1	(0.073)	(0.169)	(**0.000**)	(0.539)	(**0.004**)
IPAQ	-0,080	-0,111	-0,013	-0,165	0,029	0,173	1	(**0.001**)	(0.759)	(**0.011**)	(0.437)
APALQ	-0,068	0,006	**0,201***	-0,118	0,132	0,133	**0,326****	1	(0.931)	(**0.000**)	(0.297)
MAAS	**-0,638****	0,031	-0,051	0,107	0,090	**0,462****	0,030	-0,008	1	(0.629)	(**0.000**)
KIDMED	-0,071	-0,071	0,018	-0,227	-0,045	0,060	0,244	**0,404****	-0,047	1	(0.350)
NCONSC	**0,363****	-0,175	0,006	-0,037	-0,122	**-0,272***	0,076	0,101	**-0,471****	0,091	1

The variables with moderate correlations were: DASS-21 vs MAAS (r=-0.638; p<0.01), DASS-21 vs APGAR (r=-0.573; p<0.01), MAAS vs NCONSC (r=-0.471; p<0.01), APGAR vs MAAS (r=0.462; p<0.01), APALQ vs KIDMED (r=0.404; p<0.01), %MM vs %FM (r=0.396; p<0.01), DASS-21 vs NCONSC (r=0.363; p<0.01), IPAQ vs APALQ (r=0.326; p<0.01); the variables with weak correlations and significance were: Family vs APGAR (r=0.277; p<0.05), APGAR vs NCONSC (r=-0.272; p<0.05), IPAQ vs KIDMED (r=0.244; p<0.05), %FM vs KIDMED (r=-0.227; p<0.05), Age vs %MM (r=0.206; p<0.05) and %MM vs APALQ (r=0.201; p<0.05). These correlations provide valuable information on the interconnectedness of psychological, dietary, and physical activity variables among adolescents.

Figure 2 *Relationship between study variables.*



Note: In green, direct relationship. In red, inverse relationship. Significance: thick line (p<0.01), thin line (p<0.05).

The correlation coefficient analysis determined that the APGAR and MAAS parameters had the highest significance for the dependent variable DASS-21 ($p<0.001$). The fit of the model explained 52.0% of the variance (adjusted $R^2= 0.52$; $p<0.05$). The bilateral Pearson's correlation power analysis test for the set of variables studied provided a statistical significance of 0.946 ($n=108$; $p=0.05$). These findings underscore the importance of family support and mindfulness in influencing adolescent mental health.

Dicussion

Following a descriptive analysis of variables examined by grade and gender, this discussion addresses the impact of a 10-session intervention focused on transversal competencies within physical education classes. Although the effects were not highly significant, the correlational analysis explored the relationship between the perceived family support and their levels of mindful attention, depression, stress and anxiety.

The results revealed no significant gender differences for most variables, except for %MM (3% higher in boys) and %FM (5% higher in girls), which is consistent with the existing literature that attributes these differences to age-related morphological and physiological factors (Ezaguirre, 2004). Regarding differences by academic year, only age exhibited significant variation, while other variables remained consistent, indicating data homogeneity. This homogeneity supports the integration of the entire sample to assess the intervention's effects and analyse the correlations among the variables studied.

Considering the differences based on the academic year, logically, only significant differences were found for age; however, no significant differences were observed for any other variables, indicating data homogeneity and allowing the integration of the entire sample to establish the effects of the intervention and the correlations between the various variables studied.

The results show that after the intervention period, only significant variations were recorded for age, %MM (1.02% higher) %FM (1.18% higher), and APALQ (8.67% higher); however, the intervention carried out between the groups, which included ten sessions on transversal competencies such as social skills, emotional control, healthy eating habits and training to prevent the abuse of new technologies, did not have a significant impact on any of the variables related to these contents. Perhaps, the duration of the intervention was not large enough (0.61% of the class load during the 5-month intervention) to have an observable effect on these variables.

It is quite interesting to analyse the results of the correlational study of the variables. We observe that the variable reporting the family support perceived by the student (APGAR) significantly correlated with the level of mindful attention (MAAS) of the students ($r = 0.462$; $p \leq 0.01$), suggesting that a lower perception of family support by the youth is related to a greater loss of mindful attention and a greater disconnection from reality and the present moment. Many authors point out that young people are overwhelmed with information, tend to social isolation, and have excessive use of new technologies (Espada & de Andrés, 2004; Han, 2012; Martínez & Blanc, 2015), so the lack of family support could be fostering these habits in youth. Moyeda, Velasco, and Ojeda (2013) have linked the problems young people perceive in relation to their families with distancing and detachment from their parental figures.

All these phenomena of disconnection from reality and parental figures seem to be inversely correlated with the recorded high levels of depression, stress and anxiety recorded ($r = -0.573$; $p \leq 0.01$); the lower the family attention, the greater the disconnection from reality and the higher the levels of depression, stress, and anxiety in the youth. This is, from our perspective, one of the main findings of the study, and suggests that interventions with young people should involve families and focus on strengthening emotional bonds between the young people and their family core.

Family attention values were also inversely correlated with the degree of mindful eating ($r = -0.272$; $p \leq 0.05$). Other previous studies have related increased family attention to a lower propensity for abnormal behaviours or eating disorders in youth (Losada & Vidau, 2017; Plúa & Díaz, 2021; Redonda, 2023). This would reflect the importance of family education to achieve better nutrition quality and adherence to healthy behaviours and routines in youth, beyond educational institutions.

Finally, although to a lesser degree, the socioeconomic level of the families was correlated ($r = 0.277$; $p \leq 0.05$) with the subjective perception of family attention by the youth. Youths from higher socioeconomic levels reported more attention from their families, something already reported by Ezpeleta et al. (2000), who found a higher number of disruptive behaviours in youth and adolescents from families with lower socioeconomic levels.

In the physical domain, which is typically considered in physical education classes, the physical activity habits of the youth (APALQ) were significantly correlated with better eating habits (KIDMED) ($r = 0.404$; $p \leq 0.01$), and, in turn, better eating habits were correlated with a lower percentage of body fat (%FM) ($r = -0.277$; $p \geq 0.05$) and with a greater amount of time spent in moderate to vigorous physical activity (IPAQ) ($r = 0.326$; $p \leq 0.01$); furthermore, an increase in muscle mass (%MM) was significantly correlated with an increase in body fat (%FM) ($r = 0.396$; $p \leq 0.01$), as well as with the physical activity habits of youth (APALQ) ($r = 0.201$; $p \leq 0.05$). These results are consistent with the findings of other studies that included the family context (Fuentes et al., 2020; Ávila et al., 2016) and have associated the habits and levels of physical activity of youth with a quality diet and proper body composition in Spanish youth.

It is well known that physical education plays a fundamental role in education beyond the classroom, involving both parents and children, strengthening family bonds, and improving interpersonal relationships both academically, within the family, and socially (Alonso & Bujosa, 2018). Physical activity has also been linked to the development of cognitive abilities related to logic, spatial memory, and problem-solving, among others (Vaquerizo, 2021). Our results suggest that it would be interesting to study in the future the impact of physical education and the development of transversal competencies within secondary school classes on improving psychological factors such as resilience and stress tolerance and the improvement of depression and anxiety levels. Our results suggest that this intervention should be extended to the family sphere due to the high relationship between these variables and the level of family attention perceived by the youth.

Conclusions

The effect of a ten-session intervention based on transversal competencies within a physical education class has not had a significant impact on emotional health, eating habits, or physical activity levels in a population of young secondary school students from the Community of Madrid. However, the correlational study shows that the students' perceived family support is directly related to their level of mindful attention, a greater connection to reality, and lower levels of depression, stress, and anxiety. The socioeconomic level of the family appears to be significantly related to the family attention perceived by the student, and their physical activity habits are related to eating habits, which are directly associated with optimal body composition.

All these results suggest that work on the family unit should be included in future intervention studies to improve the psycho-emotional health aspects, physical activity levels, and body composition of youth.

Conflicts of interest: We declare not having any conflict of interest with any of the aspects or results reported in the manuscript.

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