ANALYSIS OF PARENTAL EDUCATIONAL STYLES AND PERCEIVED STRESS ON THE LEVEL OF PHYSICAL ACTIVITY AND ADHERENCE TO THE MEDITERRANEAN DIET IN ADOLESCENTS. AN EXPLANATORY MODEL

ANÁLISIS DE LOS ESTILOS EDUCATIVOS DE LOS PADRES Y EL ESTRÉS PERCIBIDO EN EL NIVEL DE ACTIVIDAD FÍSICA Y EL CUMPLIMIENTO DE LA DIETA MEDITERRÁNEA EN LOS ADOLESCENTES. UN MODELO EXPLICATIVO

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Abstract

Family environment plays a fundamental role in the development of healthy habits in adolescents. Parenting styles and parental stress have been identified as key factor influencing physical activity and dietary behaviors during adolescence. This study aims to examine the causal relationship between parenting styles, perceived parental stress, adolescents' physical activity levels and Mediterranean Diet adherence. A cross-sectional design was applied with a sample of 647 adolescents (14.86 ± 1.60) and their parents (39.92 ± 9.02). Parents completed the Perceived Stress Scale and Parenting Styles Scale questionnaires. Adolescents completed the KIDMED questionnaire and the PAQ-C. Data were analyzed using IBM SPSS Statistics and IBM SPSS Amos 23.0. The model showed a good fit (X2 = 21.262, df = 1, pl = 0.003, IFI = 0.982, CFI = 0.982; NFI = 0.982; TLI = 0.924; RMSEA = 0.077). Both parenting styles were positively associated with perceived stress. The affective-communication style positively influenced Mediterranean diet adherence ($\beta = 0.162$; $p < .05$), while criticism-rejection style had a negative effect ($\beta = -0.316$; $p < .05$). As a conclusion, pareting styles and parental stress significantly impact adolescents' healthy habits. Promoting empathic and communicative parenting may foster better physical and dietary behaviors in adolescents

Keywords: Children, family environment, health behaviors, mediterranean diet, physical activity.

Resumen

El entorno familiar desempeña un papel fundamental en el desarrollo de hábitos saludables en los adolescentes. Se ha determinado que los estilos de crianza y el estrés parental son factores clave que influyen en la actividad física y los hábitos alimentarios durante la adolescencia. El objetivo de este estudio es examinar la relación causal entre los estilos de crianza, el estrés parental percibido, los niveles de actividad física de los adolescentes y el cumplimiento de la dieta mediterránea. Se aplicó un diseño transversal con una muestra de 647 adolescentes (14,86 ± 1,60) y sus padres (39,92 ± 9,02). Los padres completaron los cuestionarios de la Escala de Estrés Percibido y la Escala de Estilos de Crianza. Los adolescentes completaron el cuestionario KIDMED y el PAQ-C. Los datos se analizaron utilizando IBM SPSS Statistics e IBM SPSS Amos 23.0. El modelo mostró un buen ajuste (X2 = 21.262; df = 1; p =.003; IFI = 0.982; CFI = 0.982; NFI = 0.982; TLI = 0.924; RMSEA = 0.077). Ambos estilos de crianza se asociaron positivamente con el estrés percibido. El estilo afectivo-comunicativo influyó positivamente en la adherencia a la dieta mediterránea ($\beta = 0.162$; $p < .05$), mientras que el estilo crítico-rechazador tuvo un efecto negativo ($\beta = -0{,}316$; $p < .05$). En conclusión, los estilos de crianza y el estrés parental influyen significativamente en los hábitos saludables de los adolescentes. Fomentar una crianza empática y comunicativa puede promover mejores comportamientos físicos y alimentarios en los adolescentes

Palabras clave: Actividad física, dieta mediterránea, entorno familiar, hábitos de salud, niños.

Introduction

During human development, the family is supposed to be the main context of social and emotional development (Morris et al., 2007; Skinner et al., 2005). In this theory, behavioral models, belief systems, and coping strategies are acquired that mark the evolution of psychoaffective behavior (Skinner et al., 2005) and emotional development (Morris et al., 2007). Parenting educational styles acquire great relevance in integral development, as they configure an emotional framework in which self-esteem, self-concept, and affective regulation are forged (Chen et al., 2024; Zimmer-Gembeck et al., 2022). Within this framework, the affective-communication and criticism-rejection styles are considered valid styles that differ in the quality of the affective bond and emotional communication (Zimmer-Gembeck et al., 2022).

The affective-communication style is characterized by a high degree of positive affectivity, empathy, and open dialogue between parents and children (Chen et al., 2024; Zimmer-Gembeck et al., 2022). This is associated with sensitive and emotional parenting practices (Chen et al., 2024; Zimmer-Gembeck et al., 2022). The scientific literature has shown that attachment theory (Bowlby, 1979) promotes a secure attachment that favors the development of self-esteem, social skills, and emotional self-regulation (Skinner et al., 2005). In addition, the affective-communicative style promotes positive family climates, favoring the internalization of norms and values along with the peaceful resolution of conflicts (Morris et al., 2007; Skinner et al., 2005).

In contrast, the critical-rejection parenting style is characterized by a negative interaction marked by constant disapproval, personal judgments, lack of emotional validation, and explicit or implicit rejection of the child (Thoilliez & Wortmann, 2024). This parenting style tends to generate a hostile environment that can affect the child's perception of themselves and others (Thoilliez & Wortmann, 2024). From the coercive socialization approach (Thoilliez & Wortmann, 2024), it has been found that this parenting style is linked to an increased risk of emotional and behavioral problems and difficulties in emotional self-regulation and self-esteem (Thoilliez & Wortmann, 2024).

The parenting process involves a complex interaction between the child's characteristics and the sociocultural context (Inda-Caro et al., 2023). One of the most influential factors on this dynamic is the level of parental stress (Im et al., 2019). From a biopsychosocial approach, stress in parents can have a direct impact on their parenting practices (Inda-Caro et al., 2023). Research indicates that high levels of parental stress are associated with a higher likelihood of adopting negative or dysfunctional parenting styles (Barreto et al., 2024). When parents face excessive demands without adequate support networks or ineffective emotional strategies, they tend to respond more reactively (Barreto et al., 2024; Inda-Caro et al., 2023). This translates into communication focused on criticism, disapproval, or punishment. The critical-rejection parenting style is not only a consequence of stress, but also a factor that perpetuates it (Barreto et al., 2024; Inda-Caro et al., 2023). Negative interaction with children generates more conflicts and behavioral problems, which generates greater emotional exhaustion on the part of the caregiver (Barreto et al., 2024; Inda-Caro et al., 2023). On the contrary, the affective-communicative style functions as a stress-buffering element in parenting (Barreto et al., 2024; Inda-Caro et al., 2023). Empathic practices based on mutual understanding and emotional expression favor more cooperative and satisfactory relationships with children (Barreto et al., 2024; Inda-Caro et al., 2023).

Likewise, the influence of the family environment on young people's healthy lifestyle habits is vital for acquiring an active and healthy lifestyle (Vorlíček et al., 2025). Factors such as parenting style and caregiver stress play a fundamental role in the consolidation of health-related behaviors (Santos et al., 2023). The communicative affective style has been linked to a higher probability that children adopt and maintain healthy lifestyles (Santos et al., 2023). This is because children feel safer, more motivated, and more accompanied (Santos et al., 2023). In addition, as there is greater family communication, it is more likely that educational processes related to healthy diet and dietary patterns will be carried out (Melguizo-Ibáñez et al., 2021). On the contrary, the criticism-rejection style can cause young people to experience greater demotivation or rebellion in the face of parental recommendations, presenting greater sedentary behavior (Santos et al., 2023). Likewise, in critical family contexts, a higher consumption of ultra-processed foods is observed along with unstructured eating patterns (Melguizo-Ibáñez et al., 2021).

Based on this, the study proposes the following objectives:

(a) To develop and adjust a theoretical model of structural equation that analyzes the causal relationships of parental educational styles and parental stress on the level of physical activity and the level of adherence to the Mediterranean diet.

(b) To analyze the causal relationships of parental parenting styles and parental stress on the level of physical activity and the level of adherence to the Mediterranean diet of young people.

Material and Methods

Design and Participants

The sample is made up of primary school students and the respective legal guardians of the students. Looking at young people, the sample was made up of 647 students (14.86 ± 1.60). Regarding the distribution according to sex, 322 are boys and 325 are girls. With regard to families, the sample was made up of 647 legal guardians (39.92 ± 9.02) In terms of distribution according to sex, 353 are fathers and 294 are mothers. The socio-comic level of the young people's families was high. To guarantee the representativeness of the sample, a sampling error analysis was applied. In this case, for a confidence level of 95%, an error of 3.80% was obtained.

Instruments and Variables

Questionnaire prepared by the ad hoc authors: This instrument has been developed in order to collect sociodemographic variables. This has been common for families and children. The variables of sex (male/female) and age of the participants were collected.

Perceived stress scale (Cohen et al., 1983): For this research, the version adapted to Spanish was used (Remor, 2006). This questionnaire is composed of a total of 14 items with a five-point Likert scale response format. The instrument obtained a high degree of reliability, with a score α = 0.879 and ω = 0.909. This questionnaire was answered by the students' families.

Scale of parental educational styles: The version used for the present study was the one developed by Fuentes-Rebollo et al (1999). This questionnaire allows the evaluation of the parenting educational styles perceived by students through two dimensions. The first is the affect-communication scale (items 2, 4, 6, 8, 9, 11, 14, 18, 19 and 20) and the critical-rejection scale (items 3, 5, 7, 10, 12, 15 and 17). Likewise, items 1, 13 and 16 are related to the latter scale, but have a negative formulation. The values of Cronbach's Alpha and McDonald's Omega for this study were as follows: criticism-rejection (α = 0.905; ω = 0.922) and affect-communication (α = 0.896; ω = 0.909). This questionnaire was answered by the students' families.

KIDMED Questionnaire (Serrá-Majem et al., 2004): This instrument was applied to collect data related to adherence to the Mediterranean diet. It consisted of 16 questions that were answered positively or negatively. In particular, questions 6, 12, 14 and 16 were worded in the negative. If they answered positively, it was interpreted as -1 point. Reliability tests showed a value of α = 0.787 and ω=0.743. This instrument was answered by the students.

PAQ-C Questionnaire: This questionnaire was used to collect data related to the practice of physical activity. Specifically, the Spanish version Manchola-González et al. (2017) was used for this study. It consisted of 10 questions that evaluated the type and frequency of physical activity performed in the last seven days. Reliability tests showed a value of α = 0.719 and ω = 0.722. This instrument was answered by the students.

Procedure

The authors met to conduct a literature search for instruments. This was carried out in order to know the different instruments intended for the collection of the variables studied. The instruments that presented the best characteristics and greater internal consistency were selected.

Since the present study was carried out in a small population, an information letter was initially sent to the educational institutions informing them of the purpose and objectives of the study. Likewise, once permission was given by the center, the research team invited the legal guardians of the young people to a meeting. This was carried out in order to inform the parents of this research. Afterwards, a week of reflection was given for parents to decide whether or not their children participated in the study. After this, the legal guardians sent the informed consent to participate in the study. They were guaranteed that the data would be processed anonymously and for scientific purposes.

A Google Forms quiz was created using the quizzes described above. The families who agreed to participate signed both their informed consent and that of the minors. In this case, the people who agreed to participate were summoned by the research team and the teaching team of the center. Families filled out the evaluation instrument during school recesses. Likewise, the minors filled out the questionnaire during the physical education sessions. The instrument had a completion time of 10 minutes. During data collection, the research team was present to answer any questions that arose. Likewise, the data was collected between January and April 2025. Finally, the present study was approved and supervised by an ethics committee (CE032409).

Data Analysis

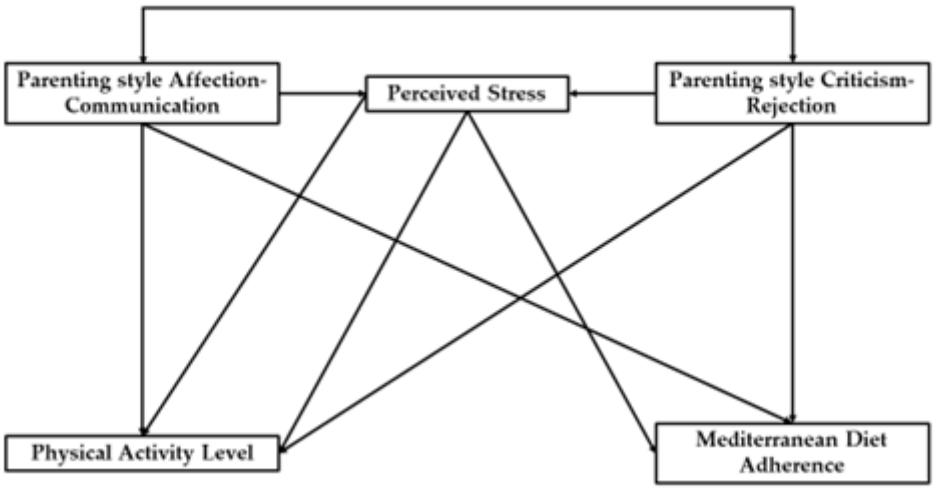
For the descriptive study, the IBM SPSS Statics 25.0 program (IBM Corp., Armonk, NY, USA) has been used. The study of the normality of the results was carried out through the values of asymmetry and kurtosis of each item. The values of asymmetry and kurtosis must conform to the conventional criteria of normality. The asymmetry value should range between −1.5 and 1.5. Kurtosis values should be between −3 and 3 (Kline, 2005; Marôco, 2021). Likewise, the reliability of the instruments used has been evaluated through the Cronbach's Alpha and McDonald's Omega tests, establishing the reliability index at 95%.

To elaborate the model of multigroup structural equations, the IBM SPSS Amos 23.0 software (IBM Corp., Armonk, NY, USA) has been used. Initially, the theoretical model was developed (Figure 1). To adjust the model, the values of the Increased Adjustment Index (IFI), Comparative Adjustment Index (CFI) together with the Normalized Adjustment Index (NFI) have been consulted. The values of these indices must be higher than 0.90 to show a good fit (Maydeu-Olivares, 2017). The Mean Root of the Square Approximation Error (RMSEA) has also been consulted. The values of this index must be less than 0.08 (Kyriazos, 2018).

Figure 1 presents the theoretical model. This is made up of five variables. Stress, level of physical activity and adherence to the Mediterranean diet act as endogenous variables. These receive the causal relationship of other variables. Likewise, educational parenting styles play an exogenous role. These variables exert a causal relationship on other variables. A causal explanation has been carried out for endogenous variables. This has been carried out based on the associations observed between the indicators and the degree of reliability of the measurement. All these variables are continuous and have been calculated through the average value of the items of each dimension of the instrument. Likewise, the arrows symbolize the direction of the causal relationship and are interpreted from the standardized regression weights. A significance level of 0.05 was established using Pearson's Chi-square test.

Figure 1

Theoretical Model Developed



After proposing and developing the theoretical model of the research, the fit of this model is then evaluated. The adjustment indices that were evaluated were as follows: X2 = 21.262, df = 1, *pl* = 0.003, IFI = 0.982, CFI = 0.982; NFI = 0.982; TLI = 0.924; RMSEA = 0.077. The values obtained present a good fit of the theoretical model. Due to the good fit of the

different indices consulted (Maydeu-Olivares, 2017; Kyriazos, 2018), this has been used as a model on which to develop multigroup analysis.

Results

Table 1

Asymmetry, Kurtosis and Descriptive Analysis of the Variables

	M ± SD	Skewness	Kurtosis
Physical Activity Level	1.53 ± 0.72	1.24	0.95
Affection-Communication	4.34 ± 0.58	0.95	1.36
Criticism-Rejection	1.73 ± 0.54	1.43	1.34
Perceived Stress	2.21 ± 0.28	0.240	0.66
Mediterranean Diet Adherence	0.44 ± 0.13	−0.73	1.43

Table 2

Direction of Standardized Regression Weights

	Regression Weights				Standardized Regression Weights
	Estimation	Estimation Error	Radio Critic	*p*	*β*
Stress # Parenting Style Affection-Communication	0.254	0.036	7.116	< .05	0.519
Stress # Parenting Style Criticism-Rejection	0.236	0.038	6.217	< .05	0.454
Physical Activity Level # Stress	0.623	0.099	6.279	< .05	0.243
Mediterranean Diet Adhrence #Stress	0.060	0.017	3.540	< .05	0.127
Physical Activity Level # Parenting Style Affection-Communication	0.177	0.094	1.891	.059	0.141
Physical Activity Level # Parenting Style Criticism-Rejection	−0.065	0.099	−0.656	.512	−0.049
Mediterranean Diet Adherence # Parenting Style Affection-Communication	0.37	0.016	2.344	< .05	0.162
Mediterranean Diet Adherence # Parenting Style Criticism-Rejection	−0.077	0.017	−4,627	< .05	−0.316
Parenting Style Affection-Communication # # Parenting Style Criticism-Rejection	−0.271	0.016	−16,514	< .05	−0.855

Table 1 presents the values of asymmetry and kurtosis for each of the variables. In this case, a normal distribution is observed for all variables since the asymmetry values are between −1.5 and 1.5. In addition, kurtosis values range from −3 to 3 (Kline, 2005; Marôco, 2021).

Table 2 presents the standardized regression weights. A significant positive causal relationship was observed between the affect-communication parenting style on stress ($\beta = 0.519$; $p < .05$). A significant positive causal relationship of the critical-rejection parenting style is also observed over stress ($\beta = 0.454$; $p < .05$). Continuing with parenting styles, a positive causal relationship between the affect-communication style on adherence to the Mediterranean diet was observed ($\beta = 0.162$; $p < 0.05$). On the contrary, a negative causal relationship of the critical-rejection parenting style is shown on adherence to the Mediterranean diet ($\beta = -0.316$; $p < .05$). Continuing with stress, it is observed that this variable exerts a positive causal relationship on the level of physical activity ($\beta = 0.243$; $p < .05$) and adherence to the Mediterranean diet ($\beta = 0.127$; $p < .05$).

Discussion

Once the findings of the research have been presented, we then move on to their contextualization. It is observed that both parental educational styles exert a positive causal relationship on the level of stress perceived by the parents. Parenting style is a set of parenteral behaviors, practices, and attitudes that significantly influence the emotional development of young people (Morris et al., 2007; Skinner et al., 2005). Traditionally, it has been considered that the affect-communication style promotes emotional well-being, exercising a protective role against stress (Ruiz-Hernández et al., 2018). Recent research has indicated that excessive emotional involvement or overprotection can lead to higher levels of anxiety and stress (Bruysters & Pilkington, 2023; Li et al., 2025; Yaffe, 2021). This causes a dysfunctional state that can coexist with affective practices, but this causes the deterioration of people's ability to self-regulate and therefore a lower tolerance to stress (Bruysters & Pilkington, 2023; Li et al., 2025; Yaffe, 2021).

Likewise, the parenting style based on criticism and rejection has shown a direct and significant association with higher levels of stress. This is often characterized by hostility and emotional disapproval, which weakens the attachment bond and emotional regulation of young people (Li et al., 2025). The parental acceptance-rejection theory states that rejection is a robust predictor of psychological distress, including high levels of perceived stress (Khaleque et al., 2019). Research has shown that critical and punitive styles are associated with increased activation of the hypothalamic-pituitary-adrenal axis, increased cortisol secretion, and physiological responses to stress (Bruysters and Pilkington, 2023; Li et al., 2025).

Likewise, a positive causal relationship between the affect-communication style and adherence to the Mediterranean diet is observed. Despite this, a negative causal relationship of the critical-rejection parenting style is shown on adherence to the Mediterranean diet. Adherence to healthy eating patterns does not depend only on individual factors but also on influences from the family environment (Melguizo-Ibáñez et al., 2023). The parenting-affection-communication style is characterized by showing a high degree of communication between parents and children (Grey et al., 2022). This style has been shown to be a protective factor in promoting healthy eating habits (Grey et al., 2022). This is because it fosters a family environment where children feel safe to make decisions, receive guidance, and share health-related experiences (Grey et al., 2022). Adolescents with parents who use a democratic or affective parenting style have been found to be more likely to adhere to healthy-eating models (Leuba et al., 2022). This is because parents promote food autonomy without resorting to coercive control, which favors the internalization of healthy behaviors (Leuba et al., 2022). The critical-rejection parenting style is characterized by constant disapproval and lack of emotional support (Thoilliez & Wortmann, 2024). Various studies have shown that the lack of emotional support and the presence of critical and punitive practices are associated with a higher consumption of ultra-processed foods, lower consumption of fruits and vegetables, and low adherence to the Mediterranean diet (Melguizo-Ibáñez et al., 2022). In addition, this parenting style can generate a dysfunctional emotional relationship with food, causing children to turn to unhealthy foods as a form of emotional compensation (Leuba et al., 2022).

It has also been found that perceived stress on the part of parents exerts a positive causal relationship on the level of physical activity and adherence to the Mediterranean diet. Stress derived from parenting style can have varied effects on children's healthy behaviors depending on the context, the perception of stress, and the strategies used to combat it (Chen et al., 2024). The scientific literature suggests that perceived stress due to dysfunctional family dynamics may lead adolescents to channel discomfort through compensatory behaviors such as physical exercise (Santos et al., 2023; Vorlíček et al., 2025). This practice acts as a form of escape or emotional regulation (Santos et al., 2023; Vorlíček et al., 2025). In contexts where family emotional support is not available, physical activity can become a source of autonomous psychological well-being (Santos et al., 2023; Vorlíček et al., 2025).

Although stress has traditionally been associated with an unbalanced diet, certain young people respond to parental stress by adopting healthy eating patterns (Bautista et al., 2023). In these cases, adherence to the Mediterranean diet presents a form of self-control and care to improve physical and emotional well-being (Melguizo-Ibáñez et al., 2022). Recent research has concluded that adults and young people who experience parental stress have adequate internal resources to adopt healthier eating patterns as emotional self-regulation mechanisms (Haines et al., 2019).

Despite having responded to the research objectives, this study is not without limitations. The first of these relates to the type of sampling. Convenience sampling has been used. This has limited the population under study. For future studies, it would be advisable to use random sampling. Continuing with the instruments, although they have been validated and adapted to the population under study, they present an intrinsic error in the data collection process. Likewise, these have been answered through a self-report. It would be advisable to use more objective instruments, such as accelerometers. Finally, it should be noted that the design of the study is supposed to be a limitation in itself. As it is a cross-sectional study, it is only possible to establish cause-effect relationships at the point in time at which the data have been collected. For future studies it would be advisable to apply a longitudinal design.

Conclusions

The conclusions obtained highlight that parenting styles significantly influence parental stress and children's healthy habits. Both the affective-communication style and the criticism-rejection style are positively related to stress. In addition, the affective-communicative style shows a positive relationship with adherence to the Mediterranean diet. On the contrary, the criticism-rejection style shows a negative causal relationship on adherence to the Mediterranean diet. Likewise, parental stress shows a positive boost in healthy behaviors of children. A positive causal relationship was observed on physical activity and adherence to the Mediterranean diet.

As a general conclusion, the need to promote parenting styles based on empathic communication and accompaniment to favor the adoption of healthy behaviors in minors is highlighted. The importance of parenting styles and parental stress as interrelated variables that directly influence the physical and emotional health of young people is underlined. Future studies should explore these relationships from a longitudinal approach.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the relevant Ethics Committee (registration code CE032409, in May 2024). Informed consent was obtained from all participants and the legal guardians of minors prior to data collection. The anonymity and confidentiality of all the data collected was guaranteed, being used exclusively for scientific purposes.

Conflict of Interest

The authors declare that there is no conflict of interest in relation to this study.

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Author's Contribution

Conceptualization F.J.A.-M.; Methodology E.M.-I.; E.M.-I. software; Validation F.J.A.-M., M.P.V.C. & M.A.O.-F.; Formal Analysis E.M.-I.; Investigation M.P.V.C.; Resources F.J.A.-M. & M.A.O.-F.; Data Curation F.J.A.-M.; Writing – Original Draft F.J.A.-M. & M.P.V.C.; Writing – Review & Editing F.J.A.-M.; Visualization E.M.-I.; F.J.A.-M. Supervision; Project Administration M.P.V.C.; Funding Acquisition & M.P.V.C. All authors have read and agree with the published version of the manuscript.

Data Availability Statement

Data available on request from the corresponding author mdpvilchez@ucam.edu.

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