Received: August 26, 2026
Accepted: November 3, 2026
Published November 27, 2026

Acad Med J 2026;6(3):88-98
UDC: 159.922.7:316.356.2
Original article

PHYSICAL ACTIVITY AS A MODERATOR OF THE RELATIONSHIP BETWEEN PARTNER CONFLICT AND A CHILD'S PSYCHO-EMOTIONAL DEVELOPMENT

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Abstract

Aim of the study: The aim of this study was to analyze the impact of physical health and its role in mitigating the link between partner conflict and psycho-emotional difficulties in children and adolescents.

Materials and methods: A quantitative cross-sectional survey design was used to examine whether physical activity moderates the relationship between partner conflict and children's psycho-emotional development.

Results: The study included parents of children aged 6-18 years. Participants were recruited through schools via random choose. The final sample consisted of 106 parents. Seven parents had a low final score, 20 had a moderate final score, and 79 parents had a high final score.

Conclusion: Conflict between partners represents a significant risk factor for a child's psycho-emotional development, as it can undermine emotional security and increase the risk of anxiety, depressive symptoms, and difficulties with emotional regulation. However, the presence of protective factors can mitigate this impact to some extent. Through its positive impact on psychological well-being, self-confidence, and stress-coping abilities, physical activity acts as a potential moderator of the relationship between partner conflict and a child's psycho-emotional development.

Keywords: physical activity, partner conflict, psycho-emotional development, psychological resilience, child, protective factors

Introduction

The family environment represents one of the most important contexts influencing children's psychological and emotional development. During childhood, children acquire essential skills related to emotional regulation, social interaction, coping with stress, and the formation of self-concept through daily interactions with parents and other family members. Although direct parent-child interactions play a central role in development, increasing evidence indicates that the quality of the relationship between parents, particularly the presence of partner conflict, has a substantial influence on children's psycho-emotional adjustment [1].

Partner conflict refers to disagreements, hostility, ineffective communication, emotional withdrawal, and difficulties in resolving differences between parents. While conflict is a natural component of intimate relationships, the frequency, intensity, and manner in which conflicts are expressed may determine whether they have harmful or adaptive consequences

for children. Exposure to destructive interparental conflict has been associated with increased risks of emotional difficulties, anxiety, depressive symptoms, behavioral problems, impaired emotional regulation, and reduced social competence in children [1].

Several theoretical perspectives explain how partner conflict affects child development. According to Family Systems Theory, the family operates as an interconnected emotional system in which difficulties within one relationship influence other family members (Bowen, 1978). From this perspective, conflict between parents can alter the emotional climate of the household and affect children's sense of security and well-being. Similarly, Emotional Security Theory proposes that children are highly sensitive to the quality of interactions between their parents and that repeated exposure to hostile or unresolved conflict may threaten their emotional security (Davies and Cummings, 1994) [2].

However, not all children exposed to family stress develop psychological difficulties, suggesting the presence of protective factors that may reduce the negative effects of partner conflict. One potentially important protective factor is physical activity. Physical activity has increasingly been recognized as an important contributor to children's psychological health due to its association with improved mood, reduced stress, enhanced self-esteem, and better emotional regulation [3].

Regular physical activity may influence children's ability to cope with stressful family experiences through several mechanisms. Participation in physical activity can promote physiological stress regulation, increase opportunities for positive peer interactions, strengthen self-confidence, and provide children with adaptive coping strategies. Furthermore, physical activity may serve as a buffer against environmental stressors by reducing emotional vulnerability and promoting psychological resilience [3].

The stress-buffering hypothesis suggests that protective resources can reduce the negative impact of stressful experiences on psychological outcomes. Within this framework, physical activity may moderate the relationship between partner conflict and children's psycho-emotional development by weakening the association between exposure to family conflict and adverse emotional outcomes. Children who engage in regular physical activity may demonstrate greater resilience and improved emotional adjustment despite experiencing family-related stress [4].

Previous research has demonstrated that higher levels of physical activity are associated with better mental health outcomes in children and adolescents, including lower levels of anxiety and depression and improved emotional functioning. At the same time, studies examining the interaction between family conflict and physical activity remain limited. Understanding whether physical activity can protect children from the negative consequences of partner conflict may provide valuable information for prevention programs and family interventions.

Therefore, the aim of the present study was to examine whether physical activity moderates the relationship between partner conflict and children's psycho-emotional development. It was hypothesized that higher levels of partner conflict would be associated with poorer psycho-emotional outcomes in children, while higher levels of physical activity would reduce the negative impact of partner conflict and contribute to better emotional adjustment.

Materials and methods

A quantitative cross-sectional survey design was used to examine whether physical activity moderates the relationship between partner conflict and children's psycho-emotional development. This design allows assessment of associations between variables at a specific point in time and enables investigation of potential moderating effects.

The study included parents of children aged 6-18 years. The final sample consisted of 50 parents.

Participants were selected using a random sampling technique. Eligible participants were recruited from schools in Skopje, N. Macedonia. Potential participants were approached and provided with information about the purpose and procedures of the study. Those who met the inclusion criteria and agreed to participate were invited to complete the questionnaire.

Participants provided information regarding family relationship characteristics, their child's physical activity level, and their child's psycho-emotional development.

Ethical considerations

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee at the Clinical Hospital Acibadem Sistina. Written informed consent was obtained from all participants before data collection commenced. Confidentiality and anonymity were maintained throughout the study,

Inclusion criteria

Participants were included if they: were parents or legal caregivers of a child within the selected age range, had sufficient knowledge of the child's daily activities and emotional functioning and voluntarily agreed to participate in the study.

Exclusion criteria

Participants were excluded if questionnaires were incomplete or if informed consent was not provided.

Physical activity assessment - Physical activity questionnaire for children – PAQ-c

Children's physical activity was assessed using the Physical Activity Questionnaire (PAQ). The PAQ measures children's participation in physical activities during different contexts, including school, leisure time, and recreational activities. The score from PAQ-C is interpreted as a continuous measure of physical activity, where 1 represents low activity and 5 represents high activity (1–2 = low, 2–3 = moderate, 3–5= high). The questionnaire provides an overall estimate of habitual physical activity levels, with higher scores indicating greater engagement in physical activity.

All data were statistically evaluated using: Shapiro-Wilk test, Pearson's correlation coefficient, Regression analysis, ANOVA (Analysis of Variance) test and Multiple regression analysis.

Data were collected through questionnaires administered in paper or electronic format. Participants were chosen randomly. Participants received information about the study objectives, confidentiality procedures, and voluntary participation. After providing informed consent, parents completed all questionnaires.

The average completion time was approximately 10-15 min. All collected data were anonymized and used exclusively for research purposes. Data were analyzed using JASP-Statistics [JASP Team (2026), version 0.98.0)].

Descriptive statistics were calculated to summarize participant characteristics and study variables. Reliability analyses were performed using Cronbach's alpha coefficients.

Pearson correlation analysis was conducted to examine relationships between partner conflict, physical activity, and psycho-emotional development.

To examine whether physical activity moderated the relationship between partner conflict and psycho-emotional development, a moderation analysis using hierarchical regression was performed. Partner conflict and physical activity were entered as predictor

variables, while their interaction term (Partner Conflict×Physical Activity) was included to determine whether physical activity significantly changed the strength of the association between partner conflict and child outcomes.

Statistical significance was established at $p < 0.05$.

Results

The key point of the PAQ-C is that the questionnaire produces a final score ranging from 1 to 5, with higher scores indicating higher levels of physical activity. Nine items of PAQ-C contribute to the overall score.

The study included 106 parents of children aged 6-18 years. Participants were recruited through schools via random sampling method.

Participants provided information regarding family relationship characteristics, their child's physical activity level, and their child's psycho-emotional development.

From the 106 surveyed parents:

7(7,42%) parents had a low final score;

20(21,2%) had a moderate final score;

79(83,4%) parents included in the study had a high final score.

Table 1. Descriptive statistics showing standard deviation and mean

	Physical activity	Emotional regulation	Partner dyad	Co-parenting scale
Valid	106	106	106	106
Mean (arithmetic)	38.65	47.71	105.94	72.62
SD	11.03	15.82	31.13	19.96
Skewness	-1.10	-0.16	-0.52	-0.42
Std. Error of Skewness	0.23	0.23	0.23	0.23
Kurtosis	0.15	-1.50	-0.70	-0.91
Std. Error of Kurtosis	0.47	0.47	0.47	0.47
Minimum	12.00	21.00	35.00	24.00
Maximum	50.00	72.00	150.00	100.00

Table 2. Shapiro-Wilk test for normality showed $p < .01$, indicating that all four variables deviated significantly from normality, and that residuals were normally distributed

	Physical activity	Emotional regulation	Partner dyad	Parental cooperation
Valid	106	106	106	106
Shapiro-Wilk	0.85	0.91	0.94	0.93
P-value of Shapiro-Wilk	< .01	< .01	< .01	< .01

Table 3. Pearson correlation coefficient (PCC)

Variable		Physical activity	Emotional regulation	Partner dyad	Parental cooperation
1. PHYSICAL ACTIVITY	Pearson's r	—			
	p-value	—			
2. EMOTIONAL REGULATION	Pearson's r	0.46***	—		
	p-value	< .01	—		
3. PARTNER DYAD	Pearson's r	0.59***	0.51***	—	
	p-value	< .01	< .01	—	
4. PARENTAL COOPERATION	Pearson's r	0.45***	0.52***	0.72***	—
	p-value	< .01	< .01	< .01	—

* p < .05, ** p < .01, *** p < .001

Pearson correlation coefficient presented in table 3 is showing that all associations were statistically significant ($p<.01$) and $p<.05$, with the former indicating stronger statistical significance), and the correlation was positive.

The strongest association was found between the partner dyad and parental cooperation ($r=0.72$), while the weakest association was between physical activity and parental cooperation ($r=0.45$).

Table 4. Multiple regression analysis - Emotional regulation

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	df1	df2	p
M_0	0.00	0.00	0.00	15.82	0.00	0	105	
M_1	0.59	0.35	0.33	12.95	0.35	3	102	<.01

M_1 includes physical activity, partner dyad, and parental cooperation. R=0.59 (correlation between actual and predicted values)

Table 5. *ANOVA* tests the effect of one categorical independent variable on one quantitative dependent variable

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	9173.33	3	3057.78	18.23	< .01
	Residual	17112.60	102	167.77		
	Total	26285.93	105			

M_1 includes physical activity, partner dyad, parental colaboration

Table 6. *Coefficients* used to identify which variables are significant predictors of emotional regulation

							Collinearity Statistics	
Model		**Unstandardized B**	**Standard error**	**Standardized β**	**t**	**p**	**Tolerance**	**VIF**
M_0	(Intercept)	47.71	1.54		31.04	< .01		
M_1	(Intercept)	8.61	5.47		1.57	.12		
	Physical activity	0.34	0.14	0.24	2.40	.02	0.65	1.53
	Partner dyad	0.07	0.06	0.15	1.15	.25	0.40	2.52
	Parental collaboration	0.25	0.09	0.31	2.74	< .01	0.48	2.06

Physical activity was a significant positive predictor ($\beta=0.24$) of emotional regulation. If physical activity increases by 1 point, emotional regulation increases by an average of 0.34 points (the unstandardized B coefficient provides this figure).

The partner dyad was NOT a statistically significant predictor of emotional regulation, although the two variables were correlated ($p=0.25$). Parental cooperation was the strongest predictor ($\beta=0.31$; presented in the "Standardized β" data). If parental cooperation increased by 1 point, emotional regulation increased by an average of 0.25 points (unstandardized B).

The Cronbach's alpha coefficient was 0.95 for physical activity, 0.94 for emotional regulation, 0.97 for partner dyad, and 0.96 for parental cooperation.

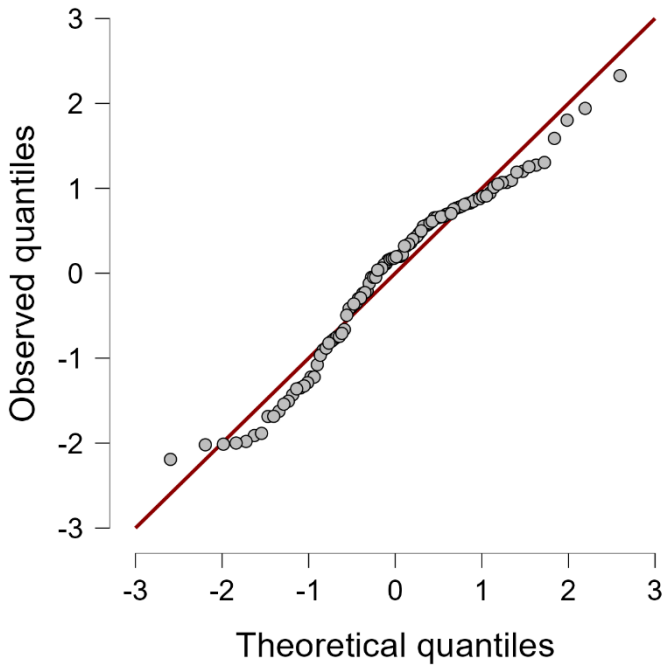

Fig. 1. Q-Q Plot Standardized Residuals - Regression residuals. They are relatively normally distributed; there are slight deviations at the tails, but no extreme outliers.

Descriptive statistical analysis was conducted to examine the distribution and central tendencies of the four study variables: physical activity, emotional regulation, partner dyad, and parental cooperation. A total of 106 valid observations were included in the analysis.

As presented in Table 1, the highest mean score was observed for the partner dyad variable (M = 105.94, SD = 31.13), followed by emotional regulation (M = 47.71, SD = 15.82), parental cooperation (M = 72.62, SD = 19.96), and physical activity (M = 38.65, SD = 11.03).

The standard deviations indicate variability in participants' scores across all four variables, with the greatest absolute variability observed for the partner dyad measure. The minimum and maximum values demonstrate that participants' scores covered a relatively broad range across the examined constructs.

Physical activity was positively correlated with emotional regulation (r = 0.46, p \< .01), partner dyad (r = 0.59, p \< .01), and parental cooperation (r = 0.45, p \< .01). These findings suggest that greater physical activity was associated with better emotional regulation and more positive partner and parental cooperation outcomes.

Emotional regulation was also positively associated with partner dyad (r = 0.51, p \< .01) and parental cooperation (r = 0.52, p \< .01). This suggests that better emotional regulation was associated with more positive relationship functioning and parental cooperation.

The strongest correlation was identified between partner dyad and parental cooperation (r = 0.72, p \< .01), indicating a strong positive association between these two variables. In contrast, the weakest correlation was observed between physical activity and parental cooperation (r = 0.45, p \< .01), although this relationship remained statistically significant.

Overall, the correlation findings demonstrate meaningful interrelationships among the examined variables, suggesting that physical activity, emotional regulation, and the quality of partner relationships are interconnected with parental cooperation.

As presented in Table 4, the regression model demonstrated a multiple correlation coefficient of R = 0.59, indicating a moderate association between the observed and predicted values of emotional regulation. The coefficient of determination ($R^2 = 0.35$) indicated that the three independent variables jointly explained 35% of the variance in emotional regulation. The

adjusted R^2 was 0.33, suggesting that the model explained approximately 33% of the variance after adjustment for the number of predictors and sample size.

The overall regression model was statistically significant, as demonstrated by the ANOVA results in Table 5 ($F(3, 102) = 18.23$, $p \< .01$). This indicates that physical activity, partner dyad, and parental cooperation, when considered jointly, significantly predicted emotional regulation.

These findings suggest that the selected behavioral and relational variables collectively contribute to explaining individual differences in emotional regulation.

Physical activity emerged as a statistically significant positive predictor of emotional regulation ($B = 0.34$, $\beta = 0.24$, $t = 2.40$, $p = .02$). This finding indicates that, holding the other variables constant, a one-unit increase in physical activity was associated with a 0.34-unit increase in emotional regulation scores.

Parental cooperation was also identified as a statistically significant positive predictor ($B = 0.25$, $\beta = 0.31$, $t = 2.74$, $p \< .01$). Among the three independent variables, parental cooperation demonstrated the highest standardized regression coefficient, suggesting that it made the strongest unique contribution to explaining emotional regulation in the model.

In contrast, partner dyad did not emerge as a statistically significant independent predictor of emotional regulation ($B = 0.07$, $\beta = 0.15$, $t = 1.15$, $p = .25$). Although the correlation analysis demonstrated a significant positive association between partner dyad and emotional regulation, this relationship was no longer statistically significant when physical activity and parental cooperation were simultaneously included in the regression model. Regarding multicollinearity, tolerance values ranged from 0.40 to 0.65, while variance inflation factor (VIF) values ranged from 1.53 to 2.52. These values do not indicate problematic multicollinearity among the independent variables.

Taken together, the regression findings suggest that physical activity and parental cooperation are significant positive predictors of emotional regulation, whereas partner dyad does not independently predict emotional regulation when the other variables are controlled.

The findings demonstrate significant associations between physical activity, emotional regulation, partner relationships, and parental cooperation. The correlation analysis revealed that all four variables were positively interconnected, with the strongest association observed between partner dyad and parental cooperation.

The regression analysis further demonstrated that physical activity and parental cooperation were significant independent predictors of emotional regulation. Notably, parental cooperation showed the strongest standardized predictive contribution, highlighting the potential importance of the family and co-parenting environment in understanding emotional regulation.

These findings may also be interpreted within the framework of Family Systems Theory, proposed by Bowen (1978), which conceptualizes the family as an interconnected emotional system in which the functioning of individual members is influenced by the relationships and interactions within the family unit. From this perspective, the observed association between partner dyad and parental cooperation suggests that the quality of the partner relationship may be closely connected to the functioning of the parental subsystem.

Furthermore, the positive association between physical activity and emotional regulation suggests that behavioral factors may also be relevant to emotional functioning. The findings therefore highlight the importance of considering both individual behavioral characteristics and interpersonal family relationships when examining emotional regulation.

The results indicate that emotional regulation is significantly associated with both individual behavioral factors and family relational functioning. Although partner dyad demonstrated a strong positive correlation with parental cooperation and a moderate positive correlation with emotional regulation, it did not independently predict emotional regulation in

the multiple regression model. In contrast, physical activity and parental cooperation emerged as significant positive predictors, with parental cooperation demonstrating the greatest relative contribution. These findings emphasize the relevance of considering both individual and family-level factors when investigating emotional regulation.

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Discussion

The purpose of this study was to examine whether physical activity moderates the relationship between partner conflict and children's psycho-emotional development. The findings contribute to a better understanding of how family stressors and protective lifestyle factors interact to influence children's psychological adjustment.

The results indicate that partner conflict is an important factor associated with children's psycho-emotional development. Higher levels of conflict between parents were associated with less favorable emotional outcomes, supporting previous research demonstrating that exposure to destructive interparental conflict increases children's vulnerability to emotional distress and behavioral difficulties. These findings are consistent with Emotional Security Theory, which suggests that children interpret parental conflict as a threat to their emotional safety, potentially resulting in anxiety, emotional dysregulation, and difficulties in adaptation (Davies and Cummings, 1994) [2].

The findings also support Family Systems Theory, which emphasizes that family relationships are interconnected and that difficulties within the partner relationship can influence children's functioning [11] When parents experience persistent conflict, the emotional atmosphere of the family may become less predictable and supportive, affecting children's ability to develop healthy emotional regulation and coping strategies.

Importantly, the present study highlights the potential protective role of physical activity. Physical activity may function as a moderator by reducing the negative influence of partner conflict on children's psycho-emotional development. Children who participate regularly in physical activities may experience improved mood, reduced physiological stress responses, stronger self-esteem, and greater emotional resilience. These findings are consistent with research demonstrating that physical activity is associated with improved mental health outcomes in children and adolescents [10]. Exercise contributes to psychological well-being through biological mechanisms, including regulation of stress hormones and neurotransmitters, as well as through psychosocial mechanisms such as social support, achievement experiences, and increased self-confidence.

The moderating role of physical activity suggests that children's developmental outcomes are influenced not only by exposure to family stress but also by access to protective experiences. Physical activity may provide children with opportunities for positive emotional experiences outside the family conflict context and strengthen their ability to cope with stressful situations.

From a practical perspective, these findings suggest that interventions targeting families experiencing relationship difficulties should consider promoting children's engagement in regular physical activity. Although physical activity cannot eliminate the effects of parental

conflict, it may represent an accessible protective factor that supports children's emotional health and resilience.

A recent meta-analysis by Fu Q. *et al*., reported associations between physical activity participation and improved mental health outcomes in children and adolescents, including emotional well-being and reduced psychological difficulties[5].

Mills e*t al., demonstrated* that destructive interparental conflict was associated with reduced emotional security and poorer psychological adjustment among children and adolescents [6].

Poitras *et al*.,[7] conducted a systematic review and identified favorable relationships between PA (physical activity) and a wide range of indicators encompassing physical, psychological/social, and cognitive health in children and youth. Overall, there was strong, consistent evidence that total PA was favorably associated with adiposity, cardiometabolic biomarkers, physical fitness, and bone health, with some support for favorable relationships between total PA and quality of life/well-being, motor skill development, and psychological distress. In general, higher intensity PA (i.e., MVPA and VPA) had more consistent and robust relationships with health indicators than lower intensity PA (i.e., LPA and MPA), and all patterns of activity (sporadic, bouts, continuous).

A longitudinal and cross-sectional study by Rodriges *et al*.,[8] found significant associations between physical activity and lower levels of psychological ill-being (i.e. depression, stress, negative affect, and total psychological distress) and greater psychological well-being (i.e. self-image, satisfaction with life and happiness, and psychological well-being). Furthermore, significant associations were found between greater amounts of sedentary behavior and both increased psychological ill-being (i.e. depression) and lower psychological well-being (i.e. satisfaction with life and happiness) in children and adolescents. Evidence on preschoolers was nearly non-existent.

Future studies should also investigate other potential protective factors, including social support, parenting quality, coping strategies, and children's temperament. Understanding the interaction between family stress and protective resources may contribute to more effective prevention and intervention strategies.

Overall, the findings suggest that physical activity may serve as an important protective factor that reduces the negative consequences of partner conflict on children's psycho-emotional development. Promoting healthy lifestyles alongside improving family relationships may represent a comprehensive approach to supporting children's psychological well-being.

Physical activity (PA) is associated with symptoms of depression and anxiety in children and adolescents. Using accelerometers to measure PA can provide more accurate and detailed data to investigate this relationship. However, no study has systematically reviewed and pooled the effects of accelerometer-measured PA on mental health.

A meta-analysis by Wang L. *et al*.,[9] examined the association between accelerometer-measured PA and symptoms of depression and anxiety in children and adolescents and determined whether the strength of this relationship varied by accelerometry methodology. Overall, these findings suggest that greater engagement in physical activity, particularly MVPA, is associated with fewer depressive and anxiety symptoms in children and adolescents. However, the observed associations were generally small, and the variability related to accelerometer epoch length highlights the importance of methodological considerations when assessing PA and its relationship with mental health. These findings support the potential relevance of promoting physical activity as part of strategies aimed at improving mental health in young populations, although causal relationships cannot be established from the observed associations. Sensitivity and publication bias analyses supported the overall robustness and reliability of the associations between PA and depression or anxiety [9].

Conclusion

This study examined physical activity as a moderator of the relationship between partner conflict and children's psycho-emotional development. The analyzed results emphasize that the quality of the family environment represents an important factor influencing children's emotional and psychological adjustment, while also demonstrating the potential protective role of physical activity.

Partner conflict appears to be associated with increased risks for difficulties in children's psycho-emotional development, particularly when conflict is frequent, intense, and unresolved. Exposure to ongoing parental disagreement may negatively influence children's emotional security, stress regulation, and behavioral adjustment. These findings reinforce the importance of considering the family system as a central context for child development.

At the same time, physical activity represents a valuable protective factor that may reduce the negative impact of family stress. Regular participation in physical activity may contribute to children's emotional resilience by improving mood, strengthening self-esteem, promoting social connections, and supporting adaptive coping mechanisms. Therefore, physical activity may serve as a buffer that helps children maintain healthier psychological functioning despite exposure to partner conflict.

The results have important practical implications for psychologists, educators, healthcare professionals, and family counselors. Interventions aimed at improving children's mental health should not only address family conflict but should also encourage healthy behaviors, including regular physical activity, as part of a broader resilience-building approach. Future research should use longitudinal designs and multiple assessment methods to further clarify the mechanisms through which physical activity influences the relationship between family stress and child development. Identifying additional protective factors will contribute to more effective strategies for supporting children living in challenging family environments. In conclusion, physical activity may play an important moderating role in protecting children's psycho-emotional development from the negative effects of partner conflict. Supporting both healthy family relationships and active lifestyles may provide children with stronger foundations for emotional well-being, resilience, and successful psychological development.

Conflict of interest statement. None declared.

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