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Association of parent-child discrepancies in educational aspirations with physical fitness, quality of life and school adaptation among adolescents: a multiple mediation model

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Abstract

Background The global public health issue of diminishing physical fitness among adolescents has gained increasing attention. The impact of parents' negative emotions or pressure regarding adolescents' educational aspirations may have a passive impact on the quality of life and adaptation of adolescents in and out of school, and ultimately harm their physical health. This study aims to explore whether parent-child discrepancies in educational aspirations influence physical fitness in adolescents through school adaptation and quality of life.

Methods Participants consisted of 9,768 students, males 4,753(48.7%), females 5,015(51.3%), aged 11–19 years, males 14.3 ± 1.92 , females 14.4 ± 1.93 . The educational aspirations were gauged using a six-point scale for expectation scores. Physical fitness assessments were based on criteria from the National Student Physical Fitness and Health Survey. School adaptation was evaluated using the School Social Behaviors Scale-2. Quality of life for adolescents was measured using Chinese version of the Quality of Life Scale for Children and Adolescents. To analyze the multiple mediating effects, structural equation models were used, and 95% confidence intervals were determined through bootstrap methods.

Results The results illustrated that school adaptation and quality of life played a significant mediating role in the effect of parent-child discrepancies in educational aspirations and physical fitness. There were three intermediary paths were confirmed: (1) discrepancies in educational aspirations → school adaptation → physical fitness ($\beta = -0.088$ SE = 0.021; $p < 0.01$; 95% CI: -0.135, -0.05); (2) discrepancies in educational aspirations → quality of life → physical fitness ($\beta = -0.025$; SE = 0.011; $p = 0.010$; 95% CI: -0.050, -0.006); (3) discrepancies in educational aspirations → school adaptation → quality of life → physical fitness ($\beta = -0.032$; SE = 0.014; $p = 0.011$; 95% CI: -0.061, -0.007).

Conclusion This study suggests that parents should reduce negative emotions and pressure regarding adolescents' academic aspirations may help their children get better physical fitness.

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Keywords Physical fitness, Educational aspirations, Adolescents, Multiple mediation model

Background

The current decline in physical fitness (PF) among adolescents has emerged as a global public health concern. Levels of physical fitness during childhood and adolescence can affect their adult health [1] and serves as a predictive indicator for morbidity and mortality rates [2]. Poor PF in adolescents is associated with an increased risk of type 2 diabetes and obesity [3], and metabolic disorders [4]. It also contributes to a higher incidence of symptoms related to depression and anxiety [5, 6], which may persist into adulthood [7]. Although there has been an overall improvement in the PF levels of adolescents, the developmental trend remains less optimistic [8]. According to the results of the eighth National Students' Physical Health Survey released by China's Ministry of Education in 2021, only 17.7% of students, aged 13–22, attained a “good” or “excellent” level [9], only 33% of students met the national standards, which could yield critical impact on adolescents' academic performance [10], physical and mental health [5, 11, 12].

Educational aspirations are defined as the level of education a person wants to attain [13]. Parental educational aspirations serve as both a source of academic support and a potential stressor for adolescents. Whether parental educational aspirations act as a motivating or a pressure factor depends on the discrepancies between adolescents' own aspirations and those of their parents [14]. According to the Identity Control Theory [15], persistent and unresolved differences between environmental inputs and personal identity criteria can cause psychological distress in individuals. Parental educational expectations can be considered environmental inputs, while self-educational expectations can be seen as identity criteria. Regardless of whether the input is more positive or negative than the identity criteria, such differences can result in distress, and the greater the difference, the greater the distress [16]. Psychological distress caused by larger parent-child discrepancies in educational aspirations (PCDEA) may impact school adaptation (SA) and quality of life (QoL) of adolescents [17]. At the same time, increased perceived stress in adolescents is accompanied by declining PF, such as aerobic fitness [18]. Notably, perceived educational aspiration discrepancies among adolescents can have a more direct adverse impact on them than actual discrepancies. Therefore, this study primarily discusses adolescent perceived educational aspiration discrepancies.

School adaptation refers to the ability to adapt to the requirements and characteristics of the school environment, experiencing comfort, engagement, and acceptance, which is the integration of cognition, attitudes,

and behaviors [19]. The understanding of adolescents' school adaptation status typically involves examining two aspects: social competence and antisocial behavior [20, 21]. The bioecological model emphasizes the ongoing interaction between developing individuals and their surrounding environments [22], and adapting to school is foundational for their healthy growth [23]. Some studies found that currently, approximately 70% of Chinese adolescents experience varying degrees of study-weariness, highlighting the prevalent issue of poor SA among adolescents. Positive parent-child interactions and academic support can significantly predict SA [24]. Low self-esteem, poor communication, and insecure attachment [25] caused by PCDEA are associated with adolescents' SA [24]. Poor SA, reflected by poor social competence [26] and antisocial behaviors [27], is correlated with adolescent obesity, which is an important indicator of adolescents' PF. However, the relationship with overall PF levels remains to be explored. Meanwhile, poor SA can directly decrease adolescents' sense of belonging [28], induce daytime sleepiness [29], reduce opportunities for social interactions, and diminish enthusiasm for participating in physical activities [30], this may be an important reason for affecting the QoL of adolescents.

QoL is defined as people's perceptions of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectation, standards, and concerns [31], which is a commonly used positive indicator applicable to all stages of human life [32]. Research on adolescents suggests that QoL involves initiating and maintaining a positive life healthy cycle of well-being, which heavily relies on stable family relationships and effective family functioning [33]. Previous studies showed that the impairment of family relationship and function caused by elevated PCDEA can negatively impact adolescents' life satisfaction. The adverse effects on the functioning and mental health are also contributing factors to the reduction in the QoL among adolescents. Many studies have confirmed significant associations between QoL and adolescents' muscular strength [34], cardiorespiratory endurance [35] and other factors related to PF [36], particularly highlighting strong associations between various dimensions of health-related QoL and PF [37].

Current research mainly focused on parental expectations or adolescents' self-expectation, adolescents' academic performance, academic outcomes [14], health risk behaviors [38], and mental health [39]. There was still little known to the association of PCDEA, PF, QoL and SA. The research hypothesized that PCDEA directly impacts PF of adolescents and indirectly affects the PF of

adolescents through the mediating pathways of SA and QoL respectively. Moreover, PCDEA also impacts PF of adolescents through the chain mediation pathway of SA and QoL. Meanwhile, gender [40, 41], only-child status [42, 43], past experience as a student leader, and family economic status [44, 45] have been exposed to influence the relationship between variables, so they will be included as covariates in the model of this study. The purpose of this study is to examine whether PCDEA and PF associated with SA and QoL through the mediating pathways and construct a multiple mediating model. In addition, previous studies have shown intense interest in the gender differences concerning adolescent PF [46], SA [47], and QoL [48]. We will also conduct a simple gender difference analysis of the main variables and basic personal information in the descriptive statistics section to better understand the sample characteristics. Through a deep understanding of the relationships between multiple pathways, this research will provide insights and targeted recommendations for promoting adolescent health.

Methods

Participants and procedure

Data for this study were derived from the Database of Youth Health (DYH) in National Population Health Data Center, a longitudinal Database of Chinese adolescents' health. DYH is the publicly shared dataset on the health and health-related behaviors of Chinese adolescents, comprising comprehensive data from several years of middle school and high school cohorts [49, 50]. Utilizing the population proportionate sampling (PPS) method, schools were randomly selected to be based on geographical, demographic, and socio-economic level in Shandong Province, China. A total of 9,768 adolescents (14.4 ± 1.93 years) were selected in the 2020–2021 semester from 62 middle schools and 32 high schools from 9 districts, including 4,753 males (14.3 ± 1.92 years) and 5,015 females (14.4 ± 1.93 years).

Measures

Parent-child discrepancies in educational aspirations

PCDEA among adolescents were measured by asking them about their own educational aspirations and the educational aspirations they perceived from their parents [16, 51]. PCDEA were categorized into six levels (1=junior high school or below; 6=doctoral degree). The absolute difference between these two values was calculated as the PCDEA score, $0 \leq \text{PCDEA} \leq 5$.

Physical fitness

The National Student Physical Fitness and Health 2014 (NSPFH 2014) was used to evaluate [52]. (a) body mass index (BMI, unit: kg/m^2); (b) vital capacity (unit: ml); (c) 50-m sprint (unit: minutes' seconds"); (d) sit and reach

(unit: cm); (e) standing long jump (unit: cm); (f) pull-ups (unit: times; tested only for males); (g) bent-leg sit-ups (unit: times/minute; tested only for females); (h) 1000-m / 800-m running (unit: minutes' seconds").

School adaptation

SA was measured using the School Social Behavior Scale-2 (SSBS-2), which was originally developed by Merrell [20, 21]. SSBS-2 was employed to screen and evaluate social competence and antisocial behavior in school students. In social competence subscale, peer relation (PR) dimension was used to assess the significant social skills and characteristics related to the establishment of positive relationships with classmates. Self-management (SM) dimension measured behaviors such as self-control, cooperation, adherence to school rules and expectations. Academic behavior (AB) dimension was used to measure adolescents' academic performance and engagement in learning tasks. In antisocial behavior subscale. Hostile-irritable (HI) dimension encompassed behaviors characterized by self-centeredness, irritability and annoyance leading to rejection by classmates. Antisocial-aggressive (AA) dimension measured openly violating school rules, threatening or hurting others, which may evolve into conduct disorders and delinquent behaviors. Defiant-disruptive (DD) dimension reflected impulsive behaviors during school activities, or having excessive and inappropriate demands on others. SSBS-2 was testified by the Cronbach's $\alpha=0.897$, KMO=0.821, $\chi^2=62326.379$, demonstrating good reliability and validity.

Quality of life

QoL is a self-report questionnaire called Quality of Life Scale for Children and Adolescents (QLSCA), which designed by Kowalski et al. [53, 54] to assess QoL in children and adolescents. The 49-item Chinese version QLSCA has been proven to be suitable for Chinese adolescents [55]. QLSCA including social psychology function, physio-mental health, living environment and satisfaction of living quality. Social psychology function involved teacher-student relationships, peer relationships, parent-child relationships, learning abilities and attitudes, and self-concept. Physio-mental health encompassed physical sensations, negative emotions, and attitudes toward schoolwork. Living environment included the convenience of daily life, opportunities for activities, and physical activity. Satisfaction of living quality assessed self-satisfaction and other aspects of living quality. QoL was tested by the Cronbach's $\alpha=0.903$, KMO=0.904, Bartlett test $\chi^2=58189.095$, demonstrating good reliability and validity.

Statistical analyses

All data were presented as mean \pm standard deviation (SD) or relevant statistical measures, and statistical significance was set at $p < 0.05$. Structural equation model (SEM) was employed to explore the direct and indirect relationships among PCDEA, PF, SA, and QoL. The model was adjusted for gender, only-child status, past experience as a student leader, and family economic status. To validate the model's applicability, SEM and

bootstrapping methods were utilized to test the significance of the mediating effects. When the sample size was 2000, and the 95% confidence interval does not include 0, it indicates that there was a mediating effect. STATA 17.0, SPSS 26.0 and AMOS 24.0 were used for data processing and analysis.

Table 1 Demographic characteristics

	All (n = 9768)	Male (n = 4753)	Female (n = 5015)	
Categorical Variables				χ^2
Educational level^b				9.35***
Middle school	6120 (62.65)	3051 (64.19)	3069 (61.20)	
High school	3648 (37.35)	1702 (35.81)	1946 (38.80)	
Only child or not^b				131.76***
Only child	2775 (28.41)	1606 (33.79)	1169 (23.31)	
Non-only child	6993(71.59)	3147(66.21)	3846(76.69)	
Father educational level^b				37.45***
Uneducated	135(1.38)	79(1.66)	56(1.12)	
Primary school	817(8.37)	416(8.75)	401(8.00)	
Middle school	3975(40.69)	1881(39.57)	2094(41.75)	
High school	1065(10.90)	515(10.84)	550(10.97)	
Technical secondary school	480(4.92)	227(4.78)	253(5.04)	
Junior college	1468(15.03)	736(15.49)	732(14.60)	
Bachelor's degree	856(8.76)	415(8.73)	441(8.79)	
Master's degree	787(8.06)	361(7.59)	426(8.49)	
Doctoral degree	185(1.89)	123(2.59)	62(1.24)	
Mother educational level^b				44.02***
Uneducated	312(3.19)	178(3.75)	134(2.67)	
Primary school	1473(15.08)	760(15.99)	713(14.22)	
Middle school	3707(37.95)	1752(36.68)	1955(38.98)	
High school	978(10.01)	474(9.97)	504(10.05)	
Technical secondary school	397(4.06)	186(3.91)	211(4.21)	
Junior college	1239(12.69)	587(12.35)	652(13.00)	
Bachelor's degree	795(8.14)	392(8.25)	403(8.03)	
Master's degree	693(7.10)	309(6.50)	384(7.66)	
Doctoral degree	174(1.78)	115(2.42)	59(1.18)	
Family economic status^b				22.32***
Very poor	225 (2.30)	135 (2.84)	90 (1.79)	
Poor	1113 (11.39)	558 (11.74)	555 (11.07)	
Medium	7667 (78.49)	3655 (76.90)	4012 (80.00)	
Rich	624 (6.39)	336 (7.07)	288 (5.74)	
Very rich	139 (1.42)	69 (1.45)	70 (1.40)	
Continuous Variables				t
Age (years)^a	14.37 \pm 1.93	14.34 \pm 1.92	14.40 \pm 1.93	-1.40
PCDEA^a	0.47 \pm 0.79	0.49 \pm 0.85	0.45 \pm 0.73	2.59***
SA^a	242.12 \pm 30.81	238.15 \pm 33.16	245.89 \pm 27.88	-12.51***
QoL^a	131.57 \pm 19.15	131.79 \pm 19.44	131.36 \pm 18.88	1.11*
PF^a	73.36 \pm 9.53	70.50 \pm 9.74	76.06 \pm 8.48	-30.14***

Note: PCDEA, parent-child discrepancies in educational aspirations; SA, school adaptation; QoL, quality of life; PF, physical fitness; ^a Mean \pm Standard deviation; ^b Number (Percentage)

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 2 Path parameters of PCDEA, SA, QoL and PF

Route	β	S.E.	<i>p</i>
PCDEA → PF	0.001	0.117	0.938
PCDEA → SA	-0.111	0.128	0.001
PCDEA → QoL	-0.058	0.025	0.001
SA → QoL	0.666	0.002	0.001
SA → PF	0.066	0.014	0.001
QoL → PF	0.036	0.059	0.014

Notes: PCDEA: parent-child discrepancies in educational aspirations; PF: physical fitness; SA: school adaptation; QoL: quality of life

Results

Participants characteristics

This study analyzed a sample of 9,768 participants (Table 1) and founded that the age of participants ranged from 11 to 19 years, with an average age of 14.37 years. Among them, there were 4753 males (48.66%) and 5015 females (51.34%). A total of 6120 participants were in middle schools (62.65%), and 3648 were in high schools (37.35%). Significant gender differences ($p < 0.05$) were observed in the current educational stage, only-child status, father and mother educational level, family economic status, PCDEA, SA, QoL, and PF. However, there were no significant gender differences in age. More than half of the parents had an education level at or below junior high school. Males were more likely to be only children than girls, and had significantly higher scores in PCDEA and QoL. Females had a higher proportion of families with a socio-economic status at a moderate level or above, and had significantly higher scores in SA and PF.

Preliminary analysis

Table 2 presents that PCDEA were significantly negatively correlated with SA ($\beta = -0.111$, $p < 0.001$) and QoL ($\beta = -0.058$, $p < 0.001$). SA was significantly positively correlated with QoL ($\beta = 0.666$, $p < 0.001$) and PF ($\beta = 0.066$, $p < 0.001$). QoL was significantly positively correlated with PF ($\beta = 0.036$, $p = 0.014$). These relationships indicated that adolescents with larger PCDEA were more likely to experience poor SA and QoL, poor SA and QoL were associated with worse PF. Additionally, poor SA was linked to lower QoL, exacerbating the adverse impact on the PF of adolescents.

Mediation analysis

Table 3 presents the chain mediating effects of SA and QoL on the relationship between PCDEA and PF. The result showed that there was no direct effect of PCDEA on PF. However, each indirect path's confidence interval excluded zero, explaining the multiple mediating role of SA and QoL in the relationship between PCDEA and PF. PCDEA had an indirect effect on PF through SA, with a mediation effect of -0.088. There was also an indirect effect of PCDEA on PF through QoL, with a mediation effect of -0.025. Furthermore, PCDEA exerted a chained indirect effect on PF through both SA and QoL, with a mediation effect of -0.032. The total effect was -0.145, with the sole mediation effect of SA accounting for 60.69%, the sole mediation effect of QoL accounting for 17.24%, and the continuous path through SA and QoL accounting for 22.07%.

Using PCDEA as the independent variable, PF as the dependent variable, and SA and QoL as mediator variables, the path results are illustrated in Fig. 1. As a result, the structural model was verified as a good fit, and all the indices fulfilled the criteria: NFI=0.927, GFI=0.915, CFI=0.928, RMSEA=0.064, SRMR=0.057.

Discussion

This study revealed that there was no direct effect of PCDEA on the PF of adolescents. However, PCDEA had indirect impacts on PF of adolescents through SA and QoL. Specifically, higher PCDEA directly negatively influenced both SA and QoL, and indirectly decreased PF of adolescents through the pathways of both SA and QoL. Additionally, poor SA negatively affected QoL for adolescents, thereby adversely impacting PF. This suggested that reducing PCDEA is a beneficial approach to improving SA, QoL, and PF among adolescents.

PCDEA in this study indirectly influenced PF of adolescents through SA, which suggests that discrepancies in educational aspirations between adolescents and their parents may lead to lesser SA, subsequently affecting PF. The intergenerational stake hypothesis states that parents and children always view the same interactions and behaviors from different perspectives [17]. Regardless of the sources of effective parenting or family processes, parent-child discrepancies can predict adolescents' self-control abilities [56], which is a crucial factor

Table 3 Multiple mediating effects of SA and QoL on PCDEA and PF

Effect Type	Route	S.E.	β	95%CI		<i>p</i>
				Lower	Upper	
Direct effect	PCDEA → PF	0.010	0.001	-0.018	0.019	0.936
Indirect effect	PCDEA → SA → PF	0.021	-0.088	-0.135	-0.050	0.001
	PCDEA → QoL → PF	0.011	-0.025	-0.050	-0.006	0.010
	PCDEA → SA → QoL → PF	0.014	-0.032	-0.061	-0.007	0.011

Notes: PCDEA: parent-child discrepancies in educational aspirations; PF: physical fitness; SA: school adaptation; QoL: quality of life

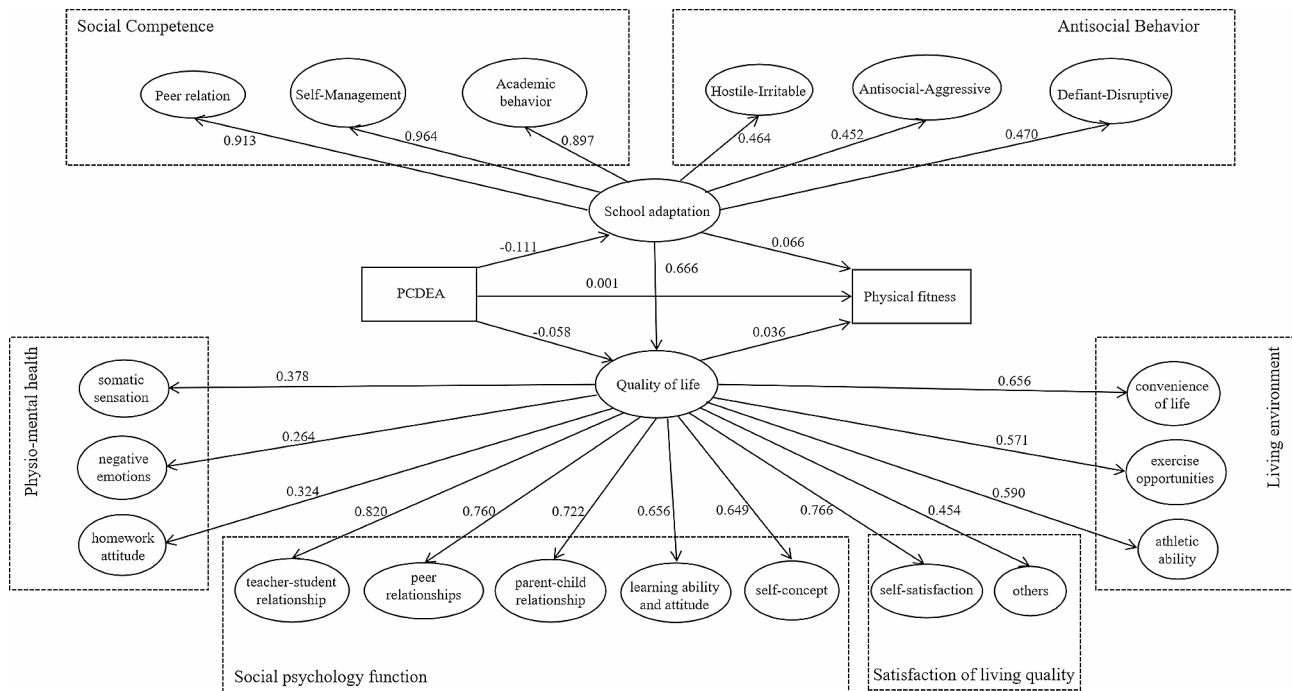


Fig. 1 Multiple mediating effects model for parent-child discrepancies in educational aspirations prediction of adolescents' physical fitness

influencing their social competence in the school environment. Additionally, these discrepancies often mean poor parent-child relationships, ineffective parental discipline, and coercive communication, which contribute to antisocial behaviors, a significant manifestation of school maladaptation in adolescents. The mechanism can be explained by Patterson's Coercion Theory [57], which elucidated how parents unintentionally reinforce oppositional and aggressive behaviors in children through strict and inconsistent parenting, leading to the persistence of negative behaviors in children. The coercive cycle may stabilize and become a consistent pattern of interaction, extending into environments beyond the family, such as the school environment [58]. This may be an important reason for the PCDEA affecting adolescents' SA. That is, adolescents learn how to handle conflicts with others at school by participating in social interactions within the family and observing the dialogue between their parents [59]. This can lead to adolescents triggering or intensifying conflicts in the school environment, making it challenging for them to adapt well to school, and it is difficult to establish and properly handle good relationships with school friends. School maladaptation can reinforce unhealthy behavior choices in adolescents, potentially leading to physical injuries such as trauma, fractures, internal injuries through involvement in intense physical conflicts and violent behaviors [60], as well as other behaviors that lead to high levels of chronic stress may increase susceptibility to related diseases [61].

PCDEA indirectly impacted PF of adolescents through their QoL in this study, which indicates that differences in educational aspirations between adolescents and their parents may lead to a decline in their QoL, subsequently affecting their PF. Adolescence is considered a crucial period for identity formation, as mentioned earlier in the Identity Control Theory [15], persistent and unresolved discrepancies between environmental inputs and personal identity standards lead to psychological distress. Regardless of whether the inputs are more positive or negative than the identity standards, such discrepancies cause suffering, with greater discrepancies resulting in more significant distress. Concerning educational identity, adolescents' educational aspirations can be considered ideal self-identity standards, while parents' aspirations for adolescents' education serve as environmental inputs. As adolescents' QoL relies on stable family relationships, the distress caused by PCDEA becomes a crucial factor influencing their QoL. From a socio-psychological adaptation and physio-mental health perspective, the tension and disharmony in the family atmosphere caused by such discrepancies may have a lasting and intense negative impact on the adolescents' QoL. Studies indicated that discrepancies in aspirations between parents and children reflect both the autonomy support granted by parents and the autonomous development of adolescents [62]. Parental psychological control influences adolescent autonomy, leading them to question their abilities, ultimately resulting in reduced self-efficacy [63]. If parental expectations are excessively high

or low, it implies a reduction in the autonomy granted to adolescents in their development, leading to confusion in self-perception and damage to self-esteem. This not only impairs the socio-psychological adaptation of adolescents but also becomes a crucial factor affecting their QoL. Research indicates that the QoL in adolescents is associated with PF [64]. In the study by Leibinger and colleagues [35], higher levels of health-related QoL were correlated with better cardiorespiratory health scores. Specifically, higher scores in domains such as physical and mental health, autonomy, and parental and school environments were associated with longer running distances. Additionally, higher level of PE, social support, peers, and school environment were linked to better sit-up performance. Moreover, poor QoL is associated with sleep issues [65], such as insomnia or irregular sleep patterns, which are crucial factors impacting adolescent growth, immune function, and cardiovascular health. Although current research on the directional relationship between QoL and PF is rare, we can reasonably infer based on existing studies that, adolescents with higher QoL tend to have more time, opportunities, and interest in participating in physical activities. They also have more scientifically informed means to monitor and maintain their health effectively. This may be an important reason for the influence of QoL on PF in the mediation path of this study.

PCDEA impacted adolescents' PF through a chain mediating pathway involving SA and QoL. Adolescents spend a significant portion of their time at school, school is the most important place for their social interaction, and adapting to school is foundational for the health development of adolescents [23]. School maladaptation directly diminishes adolescents' sense of belonging [28], reduces opportunities for social interaction, thereby impairing their QoL. The psychosocial development theory [66] emphasizes individuals' experiences of identity exploration and crises at different stages. If adolescents encounter negative events in school, it may constitute a negative crisis in their psychosocial development stage. This crisis could impact their cognitive understanding of self and society, leading to persistent negative effects on individual psychosocial development, and even impeding adolescents' enthusiasm for participating in other activities in their daily lives. For example, a negative experience in physical education class might serve as a hindrance to their active engagement in extracurricular sports activities. Consequently, school maladaptation can trigger negative emotions in adolescents, potentially reducing their satisfaction with the QoL.

Strengths and limitations

The advantages of this study are as follows: First of all, the utilization of a large sample obtained through sampling

from 94 schools across nine districts in Shandong Province, enhancing the generalizability of the findings. Secondly, the results elucidate multiple indirect pathways through which PCDEA impact PF. This provides practical guidance for developing interventions and improving the PF of adolescents. Limitations of this study: Firstly, this study used a cross-sectional design and could not determine causality; Secondly, data collection for PCDEA, SA, and QoL relied on self-reports from participants, introducing the potential for subjectivity and recall bias.

Conclusion

The results of this study indicate that PCDEA did not have a direct effect on PF. However, they were found to influence adolescents' PF through SA and QoL. Parents should aim to reduce the gap in academic aspirations with their children, thereby improving their SA and QoL, ultimately enhancing PF of adolescents. However, the more longitudinal studies are needed to confirm these findings and exploring the bidirectional relationship.

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Author contributions

All authors contributed to the study conception and design. HZ, CGG, BW and RZ performed material preparation and data collection. HZ, LYZ, YKY and YG cleaned and analyzed the data. HZ wrote the first draft of the manuscript. BW, CGG, XSD, RZ revised the manuscript. All authors reviewed and approved the final version of the manuscript.

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Data availability

The data that support the findings of this study will be available in the Database of Youth Health (DYH) in National Population Health Data Center. <https://www.ncmi.cn/phda/dataDetails.do?id=CSTR:17970.11.A0031.202107.209.V1.0>.

Declarations

Ethics approval and consent to participate

This study involves human participants and was approved by Ethics Committee of Shandong University (20180517). The protocol has been performed with the ethical standards as laid down in the 1989 Declaration of Helsinki and its later amendments or comparable ethical standards. Written informed consent to participate in this study was provided by the participants and their parents and/or legal guardians.

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

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