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The impact of parental educational expectations on subjective well-being among adolescents: The serial mediating role of selfefficacy and learning engagement



Xuehui Yin¹, Suning Jia², Yanhong Shao^{3*} and Lili Zhang^{4*}

Abstract

Background Research has shown that parental educational expectations, self-efficacy, and learning engagement play a crucial role in influencing students' subjective well-being. However, the specific mechanisms through which parental educational expectations impact adolescents' subjective well-being via self-efficacy and learning engagement are not well understood.

Methods This study investigates the influence of parental educational expectations on adolescents' subjective wellbeing, with self-efficacy and learning engagement as mediating variables. In April 2024, a sample of 1170 adolescents was selected from four middle schools in Shandong Province, with a mean age of 13.91 years (SD=0.777). Data analysis was conducted using structural equation modeling (SEM) in AMOS 24.0 and SPSS 24.0.

Results The study revealed the following key findings: (1) Parental educational expectations were significantly and positively correlated with adolescents' subjective well-being; (2) Self-efficacy mediated the relationship between parental educational expectations and adolescents' subjective well-being; (3) Learning engagement also mediated the relationship between parental educational expectations and adolescents' subjective well-being; (4) Self-efficacy and learning engagement jointly operated as serial mediators between parental educational expectations and adolescents' subjective well-being; (4) Self-efficacy adolescents' subjective well-being; (1) Self-efficacy and learning engagement jointly operated as serial mediators between parental educational expectations and adolescents' subjective well-being.

Conclusion These findings provide valuable insights into the factors that influence adolescents' subjective wellbeing and identify potential pathways for enhancement. They carry significant theoretical and practical implications for understanding and improving the well-being of adolescents.

Keywords Parental educational expectations, Self-efficacy, Learning engagement, Subjective well-being, Adolescents

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Introduction

Subjective well-being is a pivotal metric for assessing the quality of life and psychological health of individuals, reflecting their personal evaluation of life quality in accordance with their own criteria [1]. This construct encompasses two key dimensions: the cognitive aspect, which pertains to life satisfaction or contentment, and the affective aspect, which relates to the emotional spectrum of positive versus negative feelings [2]. Adolescence marks a pivotal phase in the psychological maturation and the cultivation of well-being. Subjective well-being during this period is not only instrumental in fostering the healthy psychological development of adolescents but also plays a crucial role in bolstering their academic and social competencies [3]. Consequently, identifying the determinants of subjective well-being in adolescence and elucidating their underlying mechanisms is of paramount importance for fostering positive youth development.

An increasing number of studies have delved into universal factors that affect individual subjective well-being as well as unique factors within diverse cultural and social contexts [4-5]. Parental educational expectations are recognized as a significant external factor influencing adolescents' subjective well-being [6]. These expectations refer to the academic achievements that parents or primary caregivers anticipate their children can achieve, often focusing on the level of education they expect their offspring to attain [7]. High parental expectations for academic success may inspire adolescents to study with greater confidence and effort, leading to better academic performance and, consequently, an enhancement in their subjective well-being. Self-efficacy is an internal individual factor that impacts adolescents' well-being [8]. It pertains to an individual's judgment of their capabilities to organize and execute actions necessary to accomplish specific goals [9]. Self-efficacy enables students to be more confident and persistent in the learning process, stimulating their enthusiasm for active participation and in-depth exploration, which contributes to enhancing their subjective well-being. Another internal factor affecting adolescents' subjective well-being is learning engagement [10]. This refers to the emotional and cognitive state of enthusiasm and deep involvement that an individual exhibits during the learning process, encompassing three key elements: vigor, concentration, and dedication [11]. Evidence suggests a positive correlation between adolescents' engagement levels and their subjective well-being [12]. Typically, adolescents who are fully engaged in their studies are more likely to experience positive emotions, such as joy, passion, and a sense of accomplishment, during academic activities, which collectively contribute to improving their subjective well-being.

Although the direct relationship between parental educational expectations and adolescents' subjective wellbeing has been supported by some research [6, 7], the specific mechanisms underlying this relationship remain unclear. This study not only focuses on the direct relationship but also further explores the mediating roles of self-efficacy and learning engagement in this relationship. By doing so, it aims to reveal the pathways through which parental educational expectations influence adolescents' subjective well-being, thereby providing more targeted evidence for educational interventions and policy-making. The rationale for selecting self-efficacy and learning engagement as mediating variables is rooted in Social Learning Theory and Self-Determination Theory. Social Learning Theory emphasizes the significant impact of parental behaviors and expectations on adolescent psychological development [8]. Meanwhile, Self-Determination Theory posits that fulfilling an individual's needs for autonomy, competence, and relatedness is crucial for enhancing subjective well-being [9]. Existing research has demonstrated that self-efficacy and learning engagement are not only highly correlated with subjective well-being but also play a pivotal role in adolescent psychological development [10-11]. Therefore, this study aims to further elucidate the specific pathways through which parental educational expectations influence subjective well-being by analyzing these two mediating variables. To this end, the study poses four questions: What is the relationship between parental educational expectations and adolescents' subjective well-being? Does self-efficacy mediate the relationship between parental educational expectations and adolescents' subjective well-being? Does learning engagement mediate the relationship between parental educational expectations and adolescents' subjective well-being? Do self-efficacy and learning engagement jointly operate as serial mediators between parental educational expectations and adolescents' subjective well-being? The study extends the current knowledge base regarding the determinants of adolescents' subjective well-being and offers actionable insights to nurture their positive growth. Integrating these findings into educational strategies and policy frameworks can cultivate a more conducive environment, one that is instrumental in advancing the mental health and overall happiness of young people.

Literature review and research hypotheses Parental educational expectations and subjective wellbeing

Although studies have shown a positive correlation between parental educational expectations and adolescents' subjective well-being [6, 12, 13], the underlying mechanisms remain underexplored, particularly the psychological pathways and cultural influences. Most research has focused on Western contexts, leaving gaps in understanding non-Western settings. This study examines how parental educational expectations in China influence subjective well-being through selfefficacy and learning engagement, offering theoretical insights and practical implications for family and school interventions.

According to the Expectancy-Value Theory, an individual's motivational behavior is influenced by the probability of success and the subjective value of success [14]. Parental educational expectations can enhance children's expectations and value perceptions of educational achievements, thereby stimulating learning motivation and enhancing well-being. Moreover, parental expectations and support provide necessary resources and encouragement, helping children overcome academic challenges and experience a greater sense of achievement and satisfaction, which are important components of subjective well-being [15]. Empirical research supports this theoretical perspective. For instance, a longitudinal study by Lu et al. [6] using nationally panel survey data of 28,499 Chinese middle school students showed that parental educational expectations have a significant positive impact on adolescents' subjective well-being, especially among students experiencing higher academic pressure. This indicates that while excessively high expectations may bring pressure, moderate expectations can promote the psychological well-being of adolescents. Similarly, in a longitudinal study by Jung et al. [16], it was found that parents' higher educational expectations for adolescents were positively related to their children's life satisfaction over two decades. Furthermore, parental educational expectations are positively related to children's achievement motivation, self-expectations, and academic achievements, which are considered bridges connecting parental expectations with children's subjective well-being [17-18]. Based on the above analysis, this study proposes the following hypothesis.

H1 There is a positive and significant relationship between parental educational expectations and adolescents' subjective well-being.

The mediating role of self-efficacy

Self-efficacy is positively influenced by parental educational expectations [19]. Social Learning Theory emphasizes the importance of observational learning and imitation [20]. Parents, as role models, can inspire their children to pursue higher educational goals through their behaviors and expectations, thereby enhancing their children's self-efficacy [8]. Empirical research also indicates a significant positive correlation between parental educational expectations and self-efficacy. For instance, a cross-sectional survey conducted by Chen et al. [21] on 2529 secondary students in Hong Kong revealed a strong correlation between perceived parental short-term expectations and self-efficacy. In a similar vein, a study by Ndukwu & Ndukwu [22] involving 2,334 primary five pupils demonstrated that parental expectations have a significant impact on students' self-efficacy. Furthermore, a longitudinal investigation by Cross et al. [23] on 148 Latino parent-adolescent pairs disclosed a positive link between parental educational expectations and the academic self-efficacy of adolescents.

Self-efficacy is closely related to subjective well-being [24]. Self-efficacy theory suggests that an individual's assessment of their capabilities to perform specific tasks directly affects their motivational behavior and emotional state. Individuals with high self-efficacy are more likely to engage in positive self-regulation, exhibit stronger resilience and optimism when facing challenges, and thus experience higher subjective well-being [25]. Relevant empirical research also indicates that self-efficacy positively influences students' subjective well-being. For instance, A study by Cattelino et al. [10] surveyed 485 Italian high school and university students using an online questionnaire and identified self-efficacy as a significant predictor of subjective well-being (SWB). This aligns with the findings of Céspedes et al. [26], who conducted a survey among 406 middle school students and found a strong correlation between general self-efficacy and subjective well-being.

In this study, self-efficacy is treated as a mediating variable, not a moderating one, in the relationship between parental educational expectations and adolescents' subjective well-being. Grounded in the Social Cognitive Theory, self-efficacy serves as a key mechanism through which parental educational expectations, as an environmental factor, influence subjective well-being by shaping internal psychological processes [8, 23]. While self-efficacy can act as a moderator in some contexts, this study positions it as a mediator to better align with the theoretical framework and research goals. Prior studies also support its mediating role between family education variables and adolescent psychological outcomes [27]. Based on the Social Cognitive Theory, parental educational expectations can enhance adolescents' subjective wellbeing by strengthening their self-efficacy [8]. Therefore, the following hypothesis is proposed:

H2 Self-efficacy mediates the relationship between parental educational expectations and middle school students' subjective well-being.

The mediating role of learning engagement

Parental educational expectations significantly influence learning engagement [28]. Self-Determination Theory emphasizes the importance of satisfying three basic psychological needs-autonomy, competence, and relatedness—for motivation and behavior [29]. When parents hold positive expectations for their children's education, their children's sense of autonomy is enhanced, and they feel a strong interest and intrinsic motivation to learn, thereby increasing their learning engagement [30]. Existing research has confirmed that parental expectations affect children's tendencies towards learning engagement. For instance, Luo found that parental educational expectations have a significant positive predictive effect on the academic engagement of left-behind students [31]. In a cross-sectional survey of 572 junior high school students, Huang revealed a significant positive correlation between parental educational expectations and students' learning engagement [27]. Pinquart and Ebeling, through a meta-analysis, found that parental educational expectations significantly predict children and adolescents' academic achievement, indicating that parental expectations foster student learning engagement [15].

Learning engagement positively affects subjective wellbeing [32]. According to Self-Determination Theory, when students are fully engaged in learning, they not only gain a deeper sense of satisfaction but also enhance their feelings of competence, relatedness, and autonomy through the process, thereby significantly strengthening their subjective well-being. Empirical research has also substantiated this theoretical perspective. For example, Wong et al., in a meta-analysis of 137 studies involving 158,510 participants, indicated that student engagement was most closely related to students' subjective well-being [11]. Datu and King, in a longitudinal study, found that students' subjective well-being and academic engagement influence each other [33]. Li et al., in a survey of 791 non-disadvantaged older adults, demonstrated that learning engagement had a significant effect on enhancing the subjective well-being of disadvantaged older adults, with all dimensions of learning engagement having a significant positive relationship with subjective well-being [32]. Self-efficacy is an important factor that positively affects learning engagement. For instance, Shao and Kang conducted a cross-sectional study involving 250 middle school students, revealing that selfefficacy has a positive impact on their level of learning engagement [34]. In a similar vein, Wang et al. surveyed 474 college students and discovered that self-efficacy in online learning settings significantly predicts adolescents' engagement in their studies [35].

Drawing on the theoretical frameworks mentioned earlier, we advance the following research hypotheses:

H3 Learning engagement mediates the relationship between parental educational expectations and adolescents' subjective well-being.

H4 Self-efficacy and learning engagement jointly play a serial mediating role between parental educational expectations and adolescents' subjective well-being.

In summary, this study considers three factors closely related to adolescents' subjective well-being—parental educational expectations, self-efficacy, and learning engagement—and focuses on adolescents to further explore the internal mechanisms of the relationship between parental educational expectations and adolescents' subjective well-being, proposing a hypothetical model (Fig. 1).

Method

Participants and procedure

This study was conducted across four middle schools in Weifang City, Shandong Province, including Qingzhou No. 1 Middle School, Weifang Experimental Middle School, Shouguang Middle School, and Gaomi No. 2 Middle School. These institutions were selected to ensure a balanced representation of both urban and rural educational settings. Ethical approval for the study was granted by the Ethics Committee of Weifang Engineering Vocational College on March 15, 2024 (Approval No.: 2024026). The research design and implementation



Fig. 1 The hypothetical model

were rigorously aligned with the ethical standards set forth in the Declaration of Helsinki and the national ethical guidelines for research involving minors in China. Informed consent procedures were meticulously followed prior to data collection. Parents were provided with comprehensive documentation detailing the study's objectives, potential risks, and the measures in place to safeguard participant confidentiality. Written consent was obtained from parents, while students provided verbal assent to confirm their willingness to participate. Data collection was carried out between April 3 and April 30, 2024. A 15-minute pre-survey orientation session was conducted to familiarize participants with the survey procedures and address any questions. The survey itself was administered within a 20-minute timeframe at each school. Participation was entirely voluntary, and strict measures were implemented to ensure the anonymity and confidentiality of all participants throughout the study.

A total of 1400 questionnaires were distributed, and 1385 were returned. Following the handling of missing data, a total of 1,170 valid questionnaires were retained, with an average participant age of 13.91 years (SD = 0.777) and an effective response rate of 83.57%. Specifically, questionnaires exhibiting a high proportion of missing data (i.e., more than 20% of items unanswered) or those with entirely uniform responses were excluded from the analysis. For cases involving minimal missing data (i.e., less than 5% of items unanswered), the mean imputation method was applied to replace missing values. This approach is widely recognized in psychological and educational research for its effectiveness in addressing smallscale data gaps while preserving the overall integrity of the dataset [36-37]. The final dataset underwent rigorous scrutiny to ensure its completeness and reliability for subsequent analysis. The demographic characteristics of the respondents are as follows: There were 608 males (52%) and 562 females (48%). The sample was primarily composed of students from Grade 7, with 407 participants (34.8%), Grade 8, with 457 participants (39.1%), and Grade 9, with 305 participants (26.2%). In terms of residence, 615 respondents (52.6%) lived in urban areas, while 555 (47.4%) lived in rural areas. Regarding the education level of the fathers, 368 (31.5%) had a junior high school education or below, 318 (27.2%) had a senior high school or vocational education, 231 (19.7%) had an associate degree, and 253 (21.6%) had a bachelor's degree or higher. For the mothers' education levels, 400 (34.2%) had a junior high school education or below, 310 (26.5%) had a senior high school or vocational education, 259 (22.1%) had an associate degree, and 201 (17.2%) had a bachelor's degree or higher.

Materials

Parental educational expectations scale

The Parental Educational Expectations Questionnaire developed by Hong and Ho [38] was used in this study. The questionnaire uses a single-item response format, where students self-report their parents' expectations for their future educational attainment with the question, "What level of education do your parents expect you to achieve in the future?" The educational levels and corresponding values are as follows: 1 = Primary school, 2 = Junior high school, 3 = High school or technical secondary school, 4 = Junior college, 5 = Undergraduate degree or higher. This measurement method has been recognized in numerous studies in China [39].

General self-efficacy scale

The General Self-Efficacy Scale (GSES), revised by Wang et al. [40] from the original version by Schwarzer and Jerusalem [41], was used to measure students' self-efficacy. The scale consists of 10 items (e.g., "I am confident that I can effectively handle any unexpected events.") on a single dimension. The scale uses a 4-point Likert scoring system, ranging from 1 (not at all true) to 4 (exactly true), with higher scores indicating higher self-efficacy. In this study, the scale's Cronbach's α coefficient was 0.925. Confirmatory factor analysis results showed factor loadings ranging from 0.634 to 0.802, with good model fit: $\chi 2/df = 1.325$ ($\chi 2 = 46.383$, df = 35), IFI = 0.998, CFI = 0.998, TLI = 0.998, GFI = 0.993, AGFI = 0.954, and RMSEA = 0.017.

Learning engagement scale

The Learning Engagement Scale by Salmela and Upadaya [42] was used to measure students' learning engagement. The scale includes three subscales: vigor, dedication, and absorption, with a total of 9 items (e.g., "I am full of enthusiasm for learning."). The questionnaire uses a 7-point scoring system, with 0 indicating "very rarely" and 6 indicating "very often", with higher scores indicating higher levels of academic engagement. The scale's reliability and validity have been validated in Chinese samples [43].

In this study, we employed item parceling to treat the learning engagement scale as a single-factor construct. Item parceling is commonly used in structural equation modeling (SEM) to reduce model complexity and enhance the stability of parameter estimates, particularly for scales with high internal consistency and strong inter-factor correlations [36]. The Cronbach's α coefficient for this scale was 0.929, indicating excellent internal consistency.

To validate the appropriateness of treating learning engagement as a unidimensional construct, we conducted a confirmatory factor analysis (CFA). The

Items	M±SD	IQR	kurtosis	skewness	C۷
Parental educational expectations	4.896±0.423	0	27.94	-4.629	8.642%
Self-efficacy	2.660 ± 0.510	0.6	0.87	-0.298	19.180%
Learning engagement	4.866 ± 1.258	1.667	0.584	-0.81	25.860%
Subjective well-being	4.581 ± 1.268	1.6	-0.024	-0.253	27.687%

results supported the single-factor model, with all factor loadings ranging between 0.651 and 0.866. The model fit indices were favorable: $\chi^2/df = 1.678$ ($\chi^2 = 45.31$, df = 27), IFI = 0.997, CFI = 0.997, TLI = 0.997, GFI = 0.997, AGFI = 0.998, and RMSEA = 0.024. These findings suggest that the learning engagement scale can be appropriately treated as a unidimensional construct.

Furthermore, the original developers of the scale [42] noted that the three dimensions—vigor, dedication, and absorption—are highly correlated and can be combined into a single construct when the research focus is on overall learning engagement. Previous studies have adopted similar approaches [44], further supporting our methodological treatment.

Subjective well-being scale

The Satisfaction with Life Scale (SWLS) developed by Diener et al. [1] was used to measure students' subjective well-being. The scale consists of 5 items, such as "I am satisfied with my life." The scale uses a 7-point scoring system (1=strongly agree, 7=strongly disagree), with higher scores indicating greater life satisfaction. The scale has been widely used in studies with Chinese student populations [44]. In this study, the scale's Cronbach's α coefficient was 0.857. Confirmatory factor analysis results showed factor loadings ranging from 0.543 to 0.869, with good model fit: $\chi 2/df = 1.418$ ($\chi 2 = 7.088$, df = 5), IFI = 0.999, CFI = 0.999, TLI = 0.999, GFI = 0.998, AGFI = 1.000, and RMSEA = 0.019.

Data analysis

Data were managed using statistical software SPSS 24.0 and Amos 24.0. Initially, Harman's single-factor test was conducted to assess common method bias; subsequently, descriptive statistical analysis, analysis of variance, and correlation analysis were performed on the collected data; finally, a latent variable structural equation model was established and the Bootstrap method was used to test for mediation effects.

Results

Common method bias test

The sample data of this study were primarily collected using self-report scales, which may be subject to common method bias. Therefore, Harman's single-factor test was employed to assess common method bias. The results indicated that there were 5 factors with eigenvalues
 Table 2
 The mean value, standard deviation and relevant

 statistical results of each variable

	1	2	3	4
1 Parental educational expectations	1			
2 Self-efficacy	0.143**	1		
3 Learning engagement	0.135**	0.428**	1	
4 Subjective well-being	0.165**	0.340**	0.488**	1
N . * 0.05** 0.04*** 0.004				

Note: p < 0.05, p < 0.01, p < 0.001, same below

greater than 1, and the variance explained by the largest factor was 38.302%, which is below the critical value of 40%. Thus, there is no significant common method bias in the data of this study [45].

Normality distribution test

This study examined the normality assumption of key variables (parental educational expectations, self-efficacy, learning engagement, and subjective well-being) by analyzing kurtosis, skewness, and the coefficient of variation (CV). As is shown in Table 1, parental educational expectations (mean \pm SD = 4.896 \pm 0.423, kurtosis = 27.94, skewness = -4.629) slightly deviated from normality but remained within an acceptable range. Self-efficacy $(2.660 \pm 0.510, \text{ kurtosis} = 0.87, \text{ skewness} = -0.298)$ and learning engagement $(4.866 \pm 1.258, \text{ kurtosis} = 0.584, \text{ kur$ skewness = -0.81) were approximately normally distributed. Subjective well-being $(4.581 \pm 1.268, \text{ kurtosis})$ = -0.024, skewness = -0.253) exhibited characteristics of a normal distribution. The CV values for all variables ranged between 8.642% and 27.687%, indicating that the data variability was acceptable within the context of psychological research. kurtosis.

Descriptive statistics and correlations

The means, standard deviations, and correlation analysis results for parental educational expectations, selfefficacy, learning engagement, and subjective well-being are presented in Table 2. Significant positive correlations were found between parental educational expectations, self-efficacy, learning engagement, and subjective wellbeing. Specifically, parental educational expectations were significantly and positively correlated with subjective well-being (r=0.165, p<0.01), self-efficacy (r=0.143, p<0.01), and learning engagement (r=0.135, p<0.01). Subjective well-being was significantly and positively correlated with self-efficacy (r=0.340, p<0.01) and learning engagement (r=0.488, p<0.01), and self-efficacy

Path relationship		Point estimate	Product of coefficient		Bootstrapping			
				t	Bias-corrected 95% Cl		Percentile 95% Cl	
					Lower	upper	lower	upper
Test of indi	rect, direct and total effects							
DistallE	PEE→SE→LE→SW	0.081	0.024	3.375	0.040	0.136	0.039	0.135
LMIE	PEE→SE→SW	0.049	0.020	2.450	0.020	0.098	0.018	0.095
LEIE	PEE→LE→SW	0.090	0.039	2.308	0.021	0.177	0.021	0.176
TIE	Total indirect effect	0.221	0.056	3.946	0.123	0.341	0.124	0.346
DE	PEE→SW	0.223	0.096	2.323	0.043	0.418	0.027	0.400
TE	total effect	0.444	0.083	5.349	0.271	0.597	0.267	0.592
Percentage	e of indirect effects							
P1	DistalIE/TIE	0.368	0.090	4.089	0.230	0.599	0.221	0.573
P2	SEIE/TIE	0.223	0.071	3.141	0.087	0.366	0.090	0.367
P3	LEIE/TIE	0.409	0.131	3.122	0.141	0.654	0.130	0.652
P4	TIE/TE	0.497	0.167	2.976	0.233	0.858	0.256	0.906
P5	DE/TE	0.503	0.167	3.012	0.142	0.767	0.094	0.744

Table 3 Total, direct, and indirect effects of the theoretical model

Note: PEE=Parental educational expectations, SE=Self-efficacy, LE=Learning engagement, SW=Subjective well-being, IE=Indirect effect, TIE=Total Indirect Effect, DE=Direct Effect, TE=Total Effect, DIE=Distal Indirect Effect



Fig. 2 The path diagram

was significantly and positively correlated with learning engagement (r=0.428, p<0.01). These findings provide support for further validation of the structural equation model.

Testing for mediation effect

A structural equation model was constructed using Amos to examine whether the influence of parental educational expectations on adolescents' subjective well-being is mediated by self-efficacy and learning engagement. The model fit indices were $\chi^2/df = 1.249$ ($\chi^2 = 337.096$, df = 270), IFI = 0.996, CFI = 0.996, TLI = 0.996, GFI = 0.981, AGFI = 0.974, and RMSEA = 0.015, indicating that the model fit is good and acceptable.

The study employed the Bootstrap method with 5,000 resamples to calculate the 95% confidence interval and analyze the mediation effects. The results, as shown in Table 3; Fig. 2, confirm the direct effect of parental educational expectations on adolescents' subjective well-being, supporting Hypothesis 1. Additionally, self-efficacy and learning engagement were found to have partial mediating effects between parental educational

expectations and adolescents' subjective well-being. Specifically, the mediation effects were generated through three pathways. First, the indirect effect through the pathway from parental educational expectations to selfefficacy to learning engagement to subjective well-being was 0.081 [95% CI (0.040-0.136)], accounting for 36.8% of the total indirect effect. Second, the indirect effect through the pathway from parental educational expectations to self-efficacy to subjective well-being was 0.049 [95% CI (0.020-0.098)], accounting for 22.3% of the total indirect effect. Third, the indirect effect through the pathway from parental educational expectations to learning engagement to subjective well-being was 0.090, with a Bootstrap 95% CI (0.021-0.177), accounting for 40.9% of the total indirect effect. The Bootstrap 95% confidence intervals for all three indirect effects did not include zero, indicating that these indirect effects were all statistically significant, thus supporting Hypotheses 2, 3, and 4.

Discussion

This study employed a mediation model to examine the relationship between parental educational expectations and adolescents' subjective well-being, as well as the mechanisms through which self-efficacy and learning engagement operate, finding a positive relationship between parental expectations and adolescents' wellbeing, with self-efficacy and learning engagement playing mediating roles. These results provide valuable insights for seeking ways to enhance the subjective well-being of adolescents.

The close relationship between parental educational expectations and adolescents' subjective well-Being

This study explored the relationship and mechanisms between parental educational expectations and adolescents' subjective well-being, finding a positive association, which is similar to previous research [6, 16]. According to the Expectancy-Value Theory, parents can enhance their children's confidence in studying diligently by maintaining active communication, providing positive and reasonable encouragement and expectations, and urging them to complete learning tasks on time, thereby promoting academic development and enhancing their children's subjective well-being. In this sense, parents can play a more active role in the psychological health and academic achievement of adolescents, effectively promoting their comprehensive development and sense of well-being by expressing positive educational expectations and providing more care and guidance.

The mediating role of self-efficacy

The study's results indicate that self-efficacy partially mediates the relationship between parental educational expectations and adolescents' subjective well-being. This finding is consistent with previous research suggesting a positive relationship between parental educational expectations and self-efficacy [21, 23] as well as a positive association between self-efficacy and subjective wellbeing [10, 26]. According to Self-efficacy Theory, when students face challenges and tasks, an enhanced sense of self-efficacy improves their confidence in successfully completing tasks, which in turn increases the subjective well-being of adolescents. Moreover, this study specifically conceptualizes self-efficacy as a mediator rather than a moderator, supported by both theoretical and empirical evidence. First, social cognitive theory highlights self-efficacy as a key mechanism through which external factors, such as parental educational expectations, shape individuals' behaviors and psychological states via internal processes [8]. Second, prior studies have consistently shown that self-efficacy mediates the indirect effects of external environments on mental health outcomes [10, 23], which aligns well with this study's theoretical framework and aims. Thus, the mediating role of self-efficacy offers critical empirical insights into how parental educational expectations indirectly influence adolescents' subjective well-being through psychological pathways. This finding provides further evidence of the role of self-efficacy in the relationship between parental educational expectations and adolescents' subjective well-being.

The findings of this study should be interpreted within their specific cultural context. Parental educational expectations vary across cultures due to differences in social norms, educational systems, and cultural values. For example, in East Asian cultures, parents often set high academic expectations, reflecting the collective emphasis on educational success [6]. In contrast, Western cultures may prioritize children's interests and individualized goals, potentially altering the mechanisms linking educational expectations to subjective well-being [9]. This study's data, drawn from Chinese adolescents, reflect the mechanisms of parental educational expectations within the Chinese cultural context. However, in cultures with lower societal pressure, high educational expectations may negatively impact mental health [16]. Thus, the generalizability of these findings across cultures requires further validation. Future research should employ cross-cultural comparisons to explore how cultural differences shape the relationship between parental educational expectations and adolescents' subjective well-being.

The mediating role of learning engagement

The study's results indicate that learning engagement partially mediates the relationship between parental educational expectations and adolescents' subjective wellbeing. This finding is consistent with previous research suggesting a positive relationship between parental educational expectations and learning engagement [30–31], as well as a positive association between learning engagement and subjective well-being [32-33]. The reason may lie in the fact that parental educational expectations reinforce parental educational behaviors, prompting parents to invest more time and attention to their children's education, such as providing more educational resources, cognitive stimulation activities, learning materials, and academic tutoring, which meet children's needs for knowledge acquisition and skill development, thereby enhancing their subjective well-being.

The serial mediating role of self-efficacy and learning engagement

This study found that self-efficacy and learning engagement play a serial mediating role between parental educational expectations and adolescents' subjective well-being, which is consistent with previous research

where self-efficacy affects students' subjective wellbeing through learning engagement [35-36], demonstrating a close connection between self-efficacy and learning engagement. Enhanced self-efficacy motivates adolescents to engage more actively in learning, improving their focus and enthusiasm, which naturally enhances subjective well-being. Grounded in social cognitive theory, parental educational expectations strengthen self-efficacy by providing emotional support, resources, and role models [8, 23], while self-efficacy, in turn, promotes learning engagement by fostering competence and autonomy [9]. Furthermore, potential unexamined mediators or confounders, such as emotion regulation, peer support, and parenting styles, warrant exploration. Future research could employ multilevel models or longitudinal designs to better unravel the complexity of these mechanisms [10, 16].

The reason may be that parents' positive expectations for their children's academic achievements often come with more encouragement and resource investment, which significantly enhances children's self-efficacy. Enhanced self-efficacy motivates adolescents to engage in learning with more enthusiasm, thereby increasing their level of learning engagement and positivity, a process that naturally promotes an increase in their subjective wellbeing. It is worth noting that among the three mediating pathways, the mediation of self-efficacy is the most significant. This suggests that when aiming to enhance the subjective well-being of adolescents, cultivating their perception of self-efficacy should be given greater priority compared to enhancing their learning engagement.

Implications

Theoretical Implications are as follows. This study focuses on the new dynamics between parental educational expectations and students' subjective well-being, empirically verifying the significant impact of parental expectations on enhancing the subjective well-being of adolescents. The research not only delves into the key factors affecting adolescents' subjective well-being in the new era but also provides a new theoretical perspective and depth to the existing literature by constructing a serial mediation model of self-efficacy and learning engagement. The proposal of this model not only expands the application research of parental educational expectations in the field of education but also provides a new analytical framework for future explorations of how parental educational behaviors affect student well-being.

Practical implications are as follows. This study offers valuable insights for designing effective interventions to enhance the subjective well-being of adolescents. Interventions should focus not only on promoting parental educational expectations but also on cultivating students' self-efficacy and learning engagement. In terms of parental educational expectations, parents need to increase their emphasis on their children's education, which includes closely monitoring their children's growth and progress in the learning process. Parents should actively invest the necessary time, energy, and appropriate resources to support their children's comprehensive development throughout their educational journey. Additionally, by regularly communicating with teachers, parents can more accurately grasp their children's performance and needs at school, thereby providing more targeted assistance. To enhance self-efficacy, teachers should pay attention to the emotional changes of different student groups and be mindful of their words and actions in the teaching process. Especially in terms of language expression, teachers should use more positive and encouraging words to stimulate students' internal motivation and strengthen their confidence and selfefficacy. To strengthen learning engagement, teachers should delve into understanding the intricacies of adolescent needs and adeptly utilize strategies and techniques that bolster students' dedication to learning, facilitated by engaging and purposeful classroom experiences [46].

Limitations and future research directions

This study has several limitations. Firstly, this study is cross-sectional and cannot infer the dynamic process of how parental educational expectations, self-efficacy, and learning engagement affect the subjective well-being of adolescents. Future research could adopt a longitudinal design to more accurately clarify the causal relationships and developmental mechanisms between variables.

Secondly, the study discusses the factors related to adolescents' subjective well-being and their internal mechanisms from a family perspective. Future research could consider the interactive effects of complex environmental variables such as family, community, and school on adolescents' subjective well-being. Future research could further explore how cultural background influences the relationship between parental educational expectations and adolescents' subjective well-being. Parental expectations, shaped by social norms, educational policies, and cultural values, may function differently across cultures. For example, in academically driven cultures, high expectations may boost self-efficacy and well-being, while in more relaxed cultures, they could increase psychological pressure. Cross-cultural studies using multi-country data are needed to test these findings and uncover cultural variations.

Thirdly, this study did not thoroughly examine the specific psychological processes through which parental educational expectations affect adolescents' well-being. Key mediating variables, such as adolescents' emotional regulation skills, peer relationships, and parenting styles, were not explored in depth. Moreover, cultural differences may result in variations in how these mechanisms manifest across different cultural contexts [6]. Future research could adopt longitudinal designs and multi-level analytical methods to further investigate these potential mediating factors and the influence of cultural variables, thereby strengthening the theoretical depth and generalizability of the findings.

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Author contributions

XY designed the study, and contributed to writing the manuscript. SJ performed the statistical analysis. LZ also contributed to writing the manuscript. YS supervised all aspects of the study's implementation, and reviewed the manuscript. All authors have read and approved the final manuscript.

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Data availability

The datasets generated and/or analysed during the current study are not publicly available due to ethical issues but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This manuscript is not under review elsewhere and the results have not been published previously or accepted for publication. This manuscript has been seen and approved by all authors. All methods were performed in accordance with the relevant guidelines and regulations. The questionnaire and methodology for this study was approved by the research ethics committee of Weifang Engineering Vocational College.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Informed consent

Informed consent was obtained from all participants included in the study.

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