Original Article
Yonsei Med J 2025 Jul;66(7):421-428
https://doi.org/10.3349/ymj.2024.0501
Yonsei Medical Journal
YMJ
pISSN: 0513-5796 · eISSN: 1976-2437

Exploring the Relationship between Parental Stress and Child Behavioral Problems in Precocious Puberty: The Role of Parenting and Coping Strategies

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Purpose: Children with precocious puberty undergo rapid physical changes that may lead to behavioral problems. Parenting style, along with parental stress and coping mechanisms, are important parental factors that affect the development of behavioral problems in children. Therefore, we examined the serial mediating effects of parenting style and parent's coping mechanisms on the relationship between parental stress and behavioral problems in girls with precocious puberty.
Materials and Methods: This cross-sectional study analyzed a convenience sample of 200 mothers of girls with precocious puberty at a university hospital located in a metropolitan area of Korea. Mothers completed The Parental Stress Measurement, Parents as Social Context Questionnaire, Coping Inventory for Stress Situations, and Korean version of the Child Behavior Checklist 6–18. Descriptive statistics, t-tests, Pearson's correlations, and bootstrap analyses were used to analyze the collected data.
Results: Parental stress from family and personal roles triggers emotion-oriented coping, which reinforces negative parenting and contributes to children's behavioral issues. Conversely, stress from relationships promotes task-focused coping, which enhances positive parenting attitudes and reduces negative ones.
Conclusion: Interventions should be developed and applied to help mothers of children with precocious puberty use task-focused coping strategies in stressful situations to positively impact their children's behavioral problems.

Key Words: Parenting, stress, coping, problem behavior, precocious puberty

INTRODUCTION

Children with precocious puberty undergo physical, mental, psychological, and social changes much earlier than their peers. The rapid, unexpected changes in physique and early development can lead to imbalanced physical and mental maturation and may also trigger behavioral problems such as depression, withdrawal, anger, and frustration.[1,2]

Parental factors have long been considered important in the development of behavioral problems in children.[3] Girls with precocious puberty are affected not only by physical changes but also by parental factors, such as parental stress or parenting style, directly or indirectly, which can worsen their behavioral problems. In fact, parents of children with precocious puberty experience higher levels of parenting stress compared to parents of children without the condition. This increased stress stems not only from managing and raising a child with precocious puberty but also from the emotional impact of their child's physical and psychosocial changes. Additionally, they often experience concerns, anxiety, and guilt regarding the symptoms and prognosis of precocious puberty.[4,5] In addi-

Received: January 22, 2025 **Revised:** January 31, 2025
Accepted: February 3, 2025 **Published online:** February 18, 2025
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•The authors have no potential conflicts of interest to disclose.

tion, when parents experience such stress, their parenting style can be negatively affected.[6,7] Our previous study[8] examined the direct and indirect effects of parental factors on behavioral issues in girls with precocious puberty based on Abidin's parenting stress model.[9] Negative parenting style had a full mediating effect on the relationship between parental stress and the internalization and externalization of behavioral problems.

This study also explores another interesting topic: parental coping. In the ABC-X model, coping affects parenting style, which is an expression of adaptation.[10] That is, parenting style can vary depending on the coping strategies parents use. Coping is an effort to manage stress and refers to the process of regulating the emotions generated between the individual and the environment.[11] Effective coping strategies should provide a buffer between environmental stressors and their negative impacts on individuals.[12] When assessing the relationship between coping strategies and outcomes, contemporary coping models emphasize the context in which stressful events occur. According to these models, the type of stressor moderates the impact of coping strategies on outcomes.[13,14] Therefore, it is necessary to identify the stressors that the participants experience and study their coping strategies accordingly. Furthermore, a particular coping strategy may be useful in one context but not in another, which requires future research.

Some studies[15] have found that parents with high parenting stress use passive coping strategies, such as emotional coping, to overcome stressors that are uncontrollable or difficult to ameliorate, and show signs of growth, while others have found that a lack of task-focused coping strategies leads to negative parenting styles.[16,17] The results of these studies have been inconsistent, possibly because they did not include analyses of participant characteristics or detailed aspects of the stress involved.

Therefore, this study delineated the sequence of parental factors that may influence children's behavioral problems, including the subfactors of parental stress, coping strategy, and parenting style.

The conceptual framework of this study was built by combining Abidin's parenting stress model with McCubbin and Patterson's[10] coping and adaptation paths of the Double ABC-X Stress model.

The hypotheses of this study are as follows:

Hypothesis 1: Coping strategies mediate the relationship between parental stress and parenting style.

Hypothesis 2: Parenting style mediates the relationship between coping strategies and children's behavioral problems.

Hypothesis 3: Parental stress is associated with children's behavioral problems through coping and parenting styles.

The proposed model demonstrating the hypothesized relationships is presented in Fig. 1.

This study contributes to a deeper understanding of the development of behavioral problems in children with precocious puberty by examining the serial mediating effects of coping strategies and parenting on the effects of parental stress on children's behavioral problems. Combining Abidin's[9] parenting stress model with McCubbin and Patterson's[10] Double ABC-X Stress Model may also be useful to validate the family model for children with chronic illnesses, such as precocious puberty.

MATERIALS AND METHODS

Study design and data collection procedure

This descriptive study analyzed the relationships among behavioral problems in children with precocious puberty and parental stress, coping strategies, and parenting style. Data were collected from March to June 2023 after obtaining approval from the Institutional Review Board of Severance Hospital in South Korea (Approval No. 4-2022-0606). Researchers unaffiliated with the hospital or unrelated to the direct clinical team distributed information to the mothers who expressed interest in participating. Those who read the materials and expressed willingness to participate were then provided face-to-face explanations about the study. The researchers informed the participants about the study's purpose and methods, emphasized their right to withdraw from the study at any time, and provided contact information to address issues or concerns during the research process. Those who agreed to participate provided consent and completed the questionnaire in the designated space. The participants took an average of 15–30 minutes to complete the questionnaire, and received a gift voucher as a token of appreciation afterwards.

Participants

This study targeted mothers of girls aged 6 years and above diagnosed with precocious puberty who had visited the hospital for outpatient care and treatment. Specific inclusion criteria were individuals aged 19 years and above who understood the study's purpose, agreed to participate, could comprehend the questionnaire content, and were capable of communicating in Korean. The G*Power 3.1.9.2 program (Heine Heinrich University, Düsseldorf, Germany) was used to calculate the required sample size,[18] considering a significance level of 0.05, medium effect size of 0.15, power of 0.95, and 12 predictor variables for multiple regression. The minimum calculated sample size was 184. To account for an approximately 10% dropout

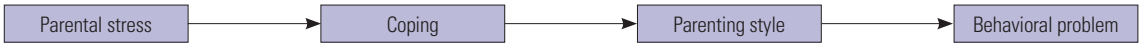

Fig. 1. Conceptual framework and proposed study hypotheses.

https://doi.org/10.3349/ymj.2024.0501

rate, the target sample size was set at 200. While 210 individuals expressed willingness to participate, 10 were excluded due to questionnaire response omissions, resulting in a total of 200 participants for data analysis.

Measurements

General characteristics

The mothers' age, religion, level of education, number of children, and age at menarche were investigated. Additionally, information was collected on the children's age, height, weight and body mass index (BMI), age at which precocious puberty was diagnosed, and administration of gonadotropin-releasing hormone (GnRH) agonist treatment.

Parental stress

Parental stress in mothers caring for children with precocious puberty was assessed using the stress measurement tool developed by Kim[19] and modified by Park.[20] The measurement comprised 38 items organized into four dimensions: disease status and prognosis, disease treatment, family and personal roles, and interpersonal relationships. Each item was measured on a 4-point Likert scale, whereby higher scores indicated higher levels of parental stress. Cronbach's α was 0.95 in this study.

Coping strategy

Coping strategy in mothers of daughters with precocious puberty was measured using the Coping Inventory for Stressful Situations (CISS), developed by Endler and Parker,[21] which reflects coping styles based on temperament. In Korea, Park, et al.[22] confirmed the validity of the CISS for high school students, and Choi, et al.[23] validated it for adults. The inventory comprises 48 items organized into three dimensions: task-, emotion-, and avoidance-oriented coping strategies. Each subscale comprises 16 items, and respondents report the frequency of specific reactions to stressful situations for each item using a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The scores were calculated by summing the responses for each subscale, with higher scores indicating a greater tendency to use specific coping strategies. In this study, Cronbach's α ranged from 0.78 (emotion-oriented coping strategies) to 0.89 (task-oriented coping strategies).

Parenting style

Our study used the Parents as Social Context Questionnaire, developed by Skinner, et al.[24] with adjustments and validation for the Korean context by Jeong and Shin.[25] The measure consists of 23 items organized into six subdomains: warmth, rejection, structure, chaos, autonomy, and coercion. The responses were measured using a 4-point Likert scale. Warmth, structure, and autonomy reflected positive parenting styles, with higher scores indicating more positive parenting actions. Higher scores for rejection, chaos, and coercion signified a more negative parenting style. In this study, Cronbach's α values ranged from 0.68 (positive parenting styles) to 0.85 (negative parenting styles).

Behavioral problems

The Korean version of the Child Behavior Checklist 6–18 was used to measure children's behavioral problems. Developed by Achenbach and Rescorla[26] for parents to assess children aged 6–18 years, this tool was translated and standardized in Korea by Oh and Kim.[27] It is a standardized instrument for assessing the adaptive functioning and problematic behaviors of children and adolescents as perceived by their caregivers over the past 6 months. Comprising 120 items, responses are measured on a 3-point Likert scale with response options such as the following: "Not true," "Somewhat or sometimes true," and "Very true or often true." In this study, Cronbach's α for the total behavioral problems score was 0.93.

Data analysis

Data were analyzed using SPSS (version 25.0; IBM Corp., Armonk, NY, USA) and the R package "lavaan."[28] To encompass variations in the scores for parental stress, coping strategies, parenting style, and child behavioral problems, we calculated the averages, standard deviations, and potential score ranges. Pearson's correlation coefficients were calculated to determine the association between child behavioral problems and other variables. The reliability of the scales was assessed using Cronbach's alpha coefficient.

The proposed hypotheses were examined using a serial mediation analysis. We analyzed mediation effects by employing bootstrapping with 95% confidence intervals (CI). Bootstrapping for indirect effects was set to 5000 samples. If the 95% CI of the mediation effect did not include zero, it was considered statistically significant at a threshold of 0.05.

RESULTS

Participants' general characteristics

A total of 200 mothers with an average age of 42.5 years participated in this study. The mean number of children was approximately two. Eighty-five (42.5%) participants were religious, and 141 were college or university graduates. The mean age of maternal menarche was 12.8 years. The average age of the children was approximately 10 years, and their average BMI was 19.3 kg/m^2. Obesity was categorized using percentiles according to sex and age, according to Kim, et al.[29] and the Committee of Clinical Practice Guidelines, Korean Society for the Study of Obesity's guidelines for the management of obesity in Korea; 42.5% (85 females) of the participants were overweight or obese. The mean age at diagnosis of precocious puberty was 8 years, and 90% of the girls received GnRH agonist treatment (Table 1).

Descriptive statistics and correlations among variables

The mean score for parental stress was 75.43±23.65, with the highest score for disease status and prognosis as a percentage of the number of items. In terms of coping strategies, the task-oriented coping strategy received the highest ratings, at 55.64±8.59, and the emotion-oriented coping strategy received the lowest ratings, at 41.39±9.85. The mean scores of positive and negative parenting styles were 3.12±0.36 and 1.92±0.48, re-

Table 1. General Characteristics of Participants (n=200)

Characteristics	Value
Mother	
Age (yr)	42.45±3.66 (31–50)
Number of children	1.83±0.63 (1–3)
Religion	
Yes	85 (42.5)
No	115 (57.5)
Education level	
High school	17 (8.5)
College or University	141 (70.5)
Graduate school	42 (21.0)
Age of menarche (yr)	12.57±1.45 (9–16)
Child	
Age (yr)	9.99±1.28 (8–14)
BMI (kg/m^2)	19.29±3.07 (13.20–31.23)
Underweight	3 (1.5)
Normal weight	112 (56.0)
Overweight	39 (19.5)
Obese	46 (23.0)
Age at diagnosis (yr)	8.06±1.06 (5–13)
GnRH agonist treatment	
Yes	180 (90.0)
No	20 (10.0)

BMI, body mass index; GnRH, gonadotropin-releasing hormone.
Data are presented as mean±standard (range) deviation or n (%).

Table 2. Parental Stress, Coping with Stress, Parenting Styles, Behavioral Problems Scores (n=200)

Variables	Mean±SD	Min.	Max.	Range
Parental stress	75.43±23.65	38	142	38–152
Disease status and prognosis	16.54±6.54	7	28	7–28
Disease management	24.78±7.69	11	44	11–44
Family- and personal-roles	24.30±7.88	14	48	14–56
Interpersonal relationships	9.81±3.78	6	22	6–24
Task-oriented coping	55.64±8.59	28	78	16–80
Emotion-oriented coping	41.39±9.85	16	70	16–80
Avoidance-oriented coping	46.66±9.31	16	75	16–80
Positive parenting styles	3.12±0.36	2.33	4	1–4
Negative parenting styles	1.92±0.48	1	3.43	1–4
Total behavioral problems (T-score)	45.73±10.27	30	81	
Internalizing problems	48.50±9.95	37	90	
Externalizing problems	47.87±8.11	37	69	

Table 3. Correlation between Major Variables

	(1) r (p)	(2) r (p)	(3) r (p)	(4) r (p)	(5) r (p)	(6) r (p)	(7) r (p)	(8) r (p)	(9) r (p)
Parental stress (1)	1								
Task-oriented coping (2)	0.178 (0.012)*	1							
Emotion-oriented coping (3)	0.345 (<0.001)***	0.229 (<0.001)***	1						
Avoidance-oriented coping (4)	0.179 (0.011)*	0.346 (<0.001)***	0.343 (<0.001)***	1					
Positive parenting styles (5)	-0.038 (0.596)	0.260 (<0.001)***	-0.070 (0.327)	0.068 (0.337)	1				
Negative parenting styles (6)	0.024 (0.738)	-0.170 (0.016)*	0.386 (<0.001)***	0.077 (0.276)	-0.307 (<0.001)***	1			
Total behavioral problems (7)	0.177 (0.012)*	-0.032 (0.650)	0.214 (0.002)**	0.074 (0.296)	-0.157 (0.026)*	0.389 (<0.001)***	1		
Internalizing problems (8)	0.169 (0.017)*	-0.027 (0.699)	0.167 (0.018)*	0.079 (0.267)	-0.145 (0.040)*	0.228 (0.001)**	0.853 (<0.001)**	1	
Externalizing problems (9)	0.140 (0.049)*	-0.059 (0.405)	0.158 (0.026)*	0.095 (0.182)	-0.120 (0.089)	0.382 (<0.001)***	0.876 (<0.001)***	0.672 (<0.001)***	1

*p<0.05;**p<0.01;***p<0.001.

https://doi.org/10.3349/ymj.2024.0501

spectively. Behavioral problems were calculated by T-score; the total behavioral problem score was 45.73±10.27, the internalizing problems score was 48.50±9.95, and that for externalizing problems was 47.87±8.11 (Table 2).

The total behavioral problems score was significantly related to parental stress (r=0.177, p=0.012) and emotion-oriented coping strategies (r=0.214, p=0.002), positive parenting styles (r=-0.157, p=0.026), and negative parenting styles (r=0.389, p< 0.001) (Table 3).

Testing serial mediation model

We investigated the effects of parental stress on behavioral problems through coping strategies and parenting styles (Table 4 and Fig. 2). Family- and personal-roles stress was positively associated with emotion-oriented coping strategy (β= 0.52, p<0.001). Stress in interpersonal relationships was positively associated with task-oriented coping strategy (β=0.30, p=0.035). The task-oriented coping strategy was negatively associated with negative parenting styles (β=-0.27, p<0.001) and positively associated with positive parenting styles (β=0.29, p<0.001). Emotion-oriented coping strategy was positively associated with negative parenting styles (β=0.43, p<0.001), and negative parenting styles were positively associated with externalizing problems (β=0.45, p<0.001) and internalizing problems (β=0.21, p=0.005). The results indicated that parental stress affects a child's externalizing and internalizing problems through the serial mediation of coping strategies and parenting style.

DISCUSSION

Our study examined the pathway through which parental stress affects children's behavioral problems based on Abidin's parenting stress model and McCubbin, et al.[10] coping and adaptation path of the double ABC-X stress model, mediated by the coping strategies and parenting styles of mothers of girls diagnosed with precocious puberty.

The first significant path we described is from family- and personal-role parental stress to the use of emotional coping strategies, which in turn reinforces negative parenting and subsequently affects internalizing and externalizing behavioral

Table 4. Regression Coefficients in the Serial Mediation Analysis (n=200)

Paths			b	SE	t	β	R^2
Internalizing problems	←	Negative parenting styles	4.17**	1.53	2.72	0.21**	0.05
		Positive parenting styles	-2.28	1.95	-1.17	-0.08	
Externalizing problems	←	Negative parenting styles	6.37***	1.11	5.72	0.45***	0.15
		Positive parenting styles	-0.08	1.73	-0.04	-0.003	
Negative parenting styles	←	Task-oriented coping	-0.02***	0.004	-3.84	-0.27***	0.25
		Emotion-oriented coping	0.02***	0.004	6.03	0.43***	
		Avoidance-oriented coping	0.001	0.004	0.29	0.02	
Positive parenting styles	←	Task-oriented coping	0.01***	0.003	3.79	0.29***	0.10
		Emotion-oriented coping	-0.01	0.003	-1.90	-0.14	
		Avoidance-oriented coping	0.001	0.003	0.23	0.02	
Task-oriented coping	←	Family and personal roles	-0.08	0.15	-0.54	-0.08	0.06
		Interpersonal relationships	0.68*	0.32	2.11	0.30*	
Emotion-oriented coping	←	Family and personal roles	0.65***	0.15	4.43	0.52***	0.19
		Interpersonal relationships	-0.28	0.33	-0.84	-0.11	
Avoidance-oriented coping	←	Family and personal roles	-0.05	0.17	-0.26	-0.04	0.04
		Interpersonal relationships	0.57	0.37	1.55	0.23	
			Cov	**SE**	**t**	**r**	
Internalizing problems	↔	Externalizing problems	46.94***	6.73	6.7	0.65**	

*p<0.05;**p<0.01;***p<0.001.

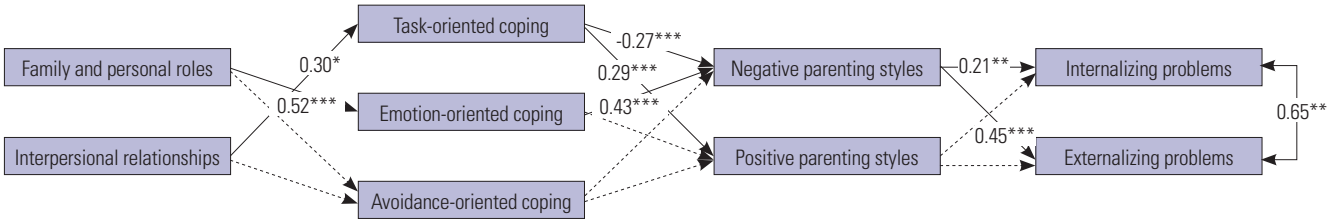

Fig. 2. Serial mediation model of the relationship between parental stress and problem behaviors. *p<0.05; **p<0.01, ***p<0.001; standardized coefficients are depicted.

problems in children. Family- and personal-roles stress is the burden that comes from caring for a child diagnosed with precocious puberty; guilt; decreased confidence in caring for other children, one's husband, and other family members; and changes in the family atmosphere that may result from the child's condition.[30] Similar to mothers of children with other chronic illnesses, mothers of children with precocious puberty experience shock and grief over their child's diagnosis and feel guilty as they attribute their child's condition to poor parenting or genetics.[31] They also experience a family financial burden due to medical expenses incurred during their child's treatment, loneliness, and depression due to unsupportive husbands and family members.[32] Furthermore, parental role strain has also been reported for children who experience early puberty.[33,34]

In this study, family- and personal-roles parental stress was associated with the use of emotion-focused coping strategies. Emotion-focused coping strategies are intended to regulate emotional distress caused by stress rather than directly solving problems.[11] The parents used rumination and daydreams to preoccupy themselves to cope with the problem and maintain emotional balance. There are many reasons why the stress of caregiving and family roles may lead to a tendency to deal with problems emotionally rather than solve them directly. Emotional coping strategies are used in situations perceived as less controllable.[35] Mothers of children with precocious puberty often feel responsible for managing their child's symptoms and solving family problems caused by their child's condition, leading to feelings of guilt. Consequently, they may use coping strategies to manage their emotions related to their own struggles and difficulties, rather than engage in direct problem-solving. Essentially, they might focus on emotional regulation as they feel solely responsible for dealing with emotional and role conflicts in the family.

Emotion-focused coping strategies may serve to buffer stress or facilitate the use of task-oriented coping strategies when direct problem-solving is difficult.[15] However, a large body of empirical evidence links reliance on emotion-focused coping strategies with negative outcomes.[36-38] Our study found that emotion-focused coping strategies were associated with negative parenting behaviors, which in turn had a detrimental effect on children's internalizing and externalizing problem behaviors. This finding is consistent with the results of our previous study.[8,39,40] The burdens of emotions and role experienced by the mothers did not fall within the scope of a task-oriented coping strategy. In Korea, mothers are still expected to be the primary caregivers of their children,[41] and in the case of daughters with precocious puberty, mothers often deal with most of the problems.[42,43] Therefore, interventions are needed to help mothers address role-related parental stress within the family through task-oriented coping strategies rather than emotion regulation. In particular, issues that can be directly resolved, such as child education and management, as well as mothers' psychological challenges, should be tackled collaboratively with family members for more effective outcomes.[44]

The second significant path indicated that parental stress related to interpersonal relationships predicted the use of task-oriented coping strategies, which was associated with increased positive parenting attitudes and decreased negative ones. Interpersonal relationship stress refers to the stress experienced in meeting, being understood, and discussing a child's illness with neighbors, healthcare providers, and others. Interestingly, unlike intrafamilial stress, interpersonal stress related to a child's health condition was associated with the use of task-oriented coping strategies. Thus, mothers tend to view stress outside the family as a solvable problem and actively try to solve it with the person in question without becoming emotionally involved. Mothers of children with precocious puberty separately typically deal with intrafamilial stress through emotional regulation and address stress from outsiders through direct problem-solving. This finding is expected, especially in Korean society, where dedication and sacrifice within the family are considered virtues. However, task-oriented coping strategies positively influenced parenting attitudes by promoting positive parenting attitudes and reducing negative ones, suggesting that family care interventions should emphasize the development and promotion of task-oriented coping strategies.

Another significant finding is that coping strategies may vary depending on the nature of the stress. This implies that mothers of children with precocious puberty do not rely on a single type of coping strategy in stressful situations related to their child's condition; instead, they may use a combination of different coping strategies depending on the situation. Accurate awareness of an individual's coping strategies in various situations can positively support parents in effectively using these strategies. Most importantly, mothers' problem-focused coping strategies can positively influence their parenting style, while emotion-focused coping strategies can negatively influence it. Therefore, education and interventions are needed to help parents use appropriate coping strategies to ensure that the multiple stresses experienced by parents of children with chronic conditions, such as precocious puberty, do not negatively impact their children's behavioral problems. However, there are still not many programs that intervene in coping strategies in medical setting.[45] Therefore, various social support programs should continue to be developed and implemented to help mothers adopt a task-oriented approach to managing parental stress, incorporating functions such as child education, management, and psychosocial support.[43]

Finally, it was found that avoidance-oriented coping strategy did not affect parenting style. This result differs from previous studies, which suggest that avoidance-oriented coping strategies influence the parenting styles of parents of children with chronic illnesses and affect the children's adaptation.

https://doi.org/10.3349/ymj.2024.0501

Avoidance-oriented coping is a strategy that shifts an individual's attention away from immediate problems by diverting focus elsewhere.[21] Research on the effects of avoidance-oriented coping strategies among parents and children with chronic illnesses has so far been inconsistent. Avoidance-oriented coping may limit coping flexibility, leaving negative emotions unresolved, which can lead to negative parenting styles, such as emotional detachment or neglect. This, in turn, may result in more difficulties in the parent-child relationship.[46,47] However, some studies suggest that in the early stages of treatment for children with cancer, avoidance-oriented coping strategies can help parents reduce anxiety and facilitate adaptation.[48] Further research is needed to fully understand the impact of avoidance-oriented coping strategies on children with precocious puberty and their mothers.

Our study had several limitations. First, behavioral problems were measured solely through parents' self-reports. Future studies should include direct responses to behavioral problems from children themselves to confirm the consistency between reports from children and their parents. Second, this study only included girls with precocious puberty and their mothers, who traditionally care for children in the Korean culture. The inclusion of boys and fathers in future studies will be fruitful for explaining other aspects of the relationship between behavioral problems, parental stress, and parenting styles in children with precocious puberty. Third, participants were recruited from a single hospital in Korea, which may limit the generalizability of our findings. Fourth, this study was cross-sectional, thus limiting it in terms of inferring causal relationships among variables. We suggest a longitudinal study to more robustly explore the related mechanisms.

Despite these limitations, this study supported a model in which mothers' coping strategies influenced their parenting style and, in turn, their children's behavioral problems. Coping strategies were found to play a key role in regulating parental stress and served as the main mediating variable.

ACKNOWLEDGEMENTS

This work was supported by the Sungshin Women's University Research Grant 2021 (H20210011).

AUTHOR CONTRIBUTIONS

Conceptualization: Ahreum Kwon, Young Il Cho, and Dong Hee Kim. Data curation: Young Il Cho, Hyo Jin Kim, Eun Seo Park, and Dong Hee Kim. Formal analysis: Young Il Cho, Hyo Jin Kim, Eun Seo Park, and Dong Hee Kim. Funding acquisition: Dong Hee Kim. Investigation: Ahreum Kwon, Hyo Jin Kim, Junghwan Suh, and Dong Hee Kim. Methodology: Young Il Cho and Dong Hee Kim. Project administration: Dong Hee Kim. Supervision: Dong Hee Kim. Validation: Ahreum Kwon, Young Il Cho, and Junghwan Suh. Writing—original draft: all authors. Writing—review & editing: Ahreum Kwon, Young Il Cho, and Dong Hee Kim. Approval of final manuscript: all authors.

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https://doi.org/10.3349/ymj.2024.0501