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Associations of socioeconomic status, parenting style, and grit with health behaviors in children using data from the Panel Study on Korean Children (PSKC)

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Purpose: This study aimed to comprehensively explore the associations of socioeconomic status, parenting style, and grit with children's health behaviors. **Methods:** This was a cross-sectional study of 1,040 parents and their children using data from the 2018 Korean Children's Panel Survey. Socioeconomic status was measured in terms of household income and subjective socioeconomic status. Parenting style and grit and were measured using 62 and 8 items, respectively. Health behaviors were measured by assessing healthy eating habits, physical activity, and sedentary behavior. **Results:** Higher household income (β=.07, p=.018) and high maternal levels of an authoritative parenting style (β =.20, p<.001) were associated with higher compliance with healthy eating habits among children. Higher grit was associated with a higher number of weekly physical activity days (β=.08, p=.028) and sedentary behavior for <2 hours (odds ratio [OR]=1.04, 95% confidence interval [CI]=1.01-1.07) in children. A maternal permissive parenting style was associated with sedentary behavior for >2 hours on weekdays (OR=0.43, 95% CI=0.27-0.69). **Conclusion:** We suggest that when planning interventions to improve children's health behavior, it is essential to adopt a multifaceted approach that avoids practicing a maternal permissive parenting style, promotes an authoritative parenting style, and incorporates strategies to increase children's grit.

Key words: Child; Health behavior; Parenting; Socioeconomic factors

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INTRODUCTION

Childhood obesity is recognized as a major public health problem worldwide, particularly in the United States, wherein 1 out of 3 children is overweight or obese [1]. In Korea, the childhood obesity rate among elementary school students is also on the rise, from 21.9% in 2015 to 25.8% in 2019 [2]. Changes in health behaviors, such as healthy eating, increased physical activity, and reduced sedentary lifestyle, are essential to reduce obesity in children [3].

The links between low socioeconomic status, children's health behaviors, and poor health are well known among the general population [4]. Children's socioeconomic status and health behaviors are especially closely related. Adolescents with low socioeconomic status are reported to have low levels of health promotion behavior [5]. In addition, family-level behaviors, particularly parenting and constructing family health routines, affect children's health behaviors [6].

The social-ecological theory suggests that parenting may have an important role in children's health behavior, as the family is a child's most familiar social environment [7,8]. Parents play an influential role in shaping the behavior of their children [9]. Parenting styles include attitudes and behavioral patterns toward their children. Baumrind [10] categorized parenting styles as authoritative, authoritarian, and permissive according to parents' reactions to responses and demands. The authoritative style is characterized by parents providing positive reinforcement to their children to monitor and improve their children's health behavior [11]. Authoritative parenting styles tend to promote healthy behavior of children when compared with authoritarian parenting styles, which are characterized by parents forcing children to obey. Furthermore, permissive parenting styles are too generous and involve inconsistent principles [11]. Meanwhile, there

may be differences between maternal and paternal parenting styles, with corresponding impacts on children's health behavior [12]. Maternal parenting styles are closely related to whether children consume a healthy diet, whereas paternal parenting styles are more related to their level of physical activity [12]. In Korea, research has focused mainly on the relationship between parenting behaviors and children's problem behaviors or depression [13,14], whereas few studies have investigated the relationship between the parenting styles of both parents and children's health behaviors.

From a positive psychological point of view, children form grit by experiencing a positive relationship with their parents. Grit consists of two facets: individual perseverance of effort and consistency in interest [15]. Grit is associated with reduced depression, emotional well-being, and sustainable behavior [16]. Specifically, grit is negatively predictive of depression, whereas it is positively predictive of psychological well-being and sustainable performance [16].

In Korea, previous research [17] has mainly focused on the relationship between grit and academic achievement; however, the relationship between grit and health behaviors is not well understood. Therefore, this study aimed to comprehensively explore the associations of socioeconomic status, parenting style, and grit with children's health behaviors.

METHODS

Ethics statement: This study was approved by the Institutional Review Board of Daejin University (No. 1040656-202104-SB-01-06).

1. Study Design

This cross-sectional correlational study aimed to examine the relationships of socioeconomic status, parenting style, and grit with children's health behaviors.

2. Data and Study Participants

This study targeted parents and their children using data from the 11th Panel Study on Korean Children (PSKC) in 2018. The PSKC collected a national representative sample of parents and children born between April and July 2008. The PSKC data are freely available for use by all researchers for academic purposes. The first survey began in 2008, and finally, the 11th survey was conducted in 2018 using self-administered questionnaires for the parents and their children's face-to-face interviews with trained interviewers. The 11th survey aimed to investigate the growth and developmental characteristics of children and the impacts of parenting, parenting support, and policy measures.

Data were provided on 2,150 participants in the 11th PSKC. Data regarding age, sex, and grit were not recorded for 742 participants, data on household income were not recorded for 113 participants, and information on parenting style was not recorded for 251 participants; these were all excluded from the analysis. In addition, four children with disabilities were also excluded. Finally, 1,040 parents and their children were included in the data analysis (Figure 1).

3. Measurements

1) General characteristics of study participants

Age, sex, and self-rated health were analyzed in this study. Self-rated health was measured as follows: "How do you rate your health in general?" on a 5-point Likert scale, from "very poor (1 point)" to "very good (5 points)."

2) Socioeconomic status

Socioeconomic status had two indicators: subjective socioeconomic status and household income. Socioeconomic status was subjective and measured on a 10-point Likert scale. In addition, the following question was used to determine a family's household income: "What was the average monthly income for the household last year?".

3) Parenting styles

The parenting style instrument was used to measure the frequency of specific behaviors of parents toward their children. This instrument consists of three typologies based on Baumrind's conceptualization: authoritative, authoritarian, and permissive parenting styles. Parenting styles were measured using the Parenting Styles and Dimensions Questionnaire tool developed by Robinson et al. [18], which was translated and modified by PSKC researchers [19]. The scale consists of 62 items and is divided into three sub-factors: authoritative (27 items), authoritarian (20 items), and permissive (15 items) parenting styles. It was scored on a 5-point Likert scale from "very unlikely (1 point)" to "very likely (5 points)." The authoritative parenting style includes "encouraging the child to share his or her concerns" and "explaining to the child why he or she should follow the rules." The authoritarian parenting style includes "punish the child rather than explain" and "scream when the child does something wrong." The permissive parenting style includes "the child's pampering is well received." The reliability in a previous study for the authoritative, authoritarian, and permissive parenting styles was .92, .89, and .64, respectively [14], whereas in the present study, the reliability of parental paternal parenting styles was .92,

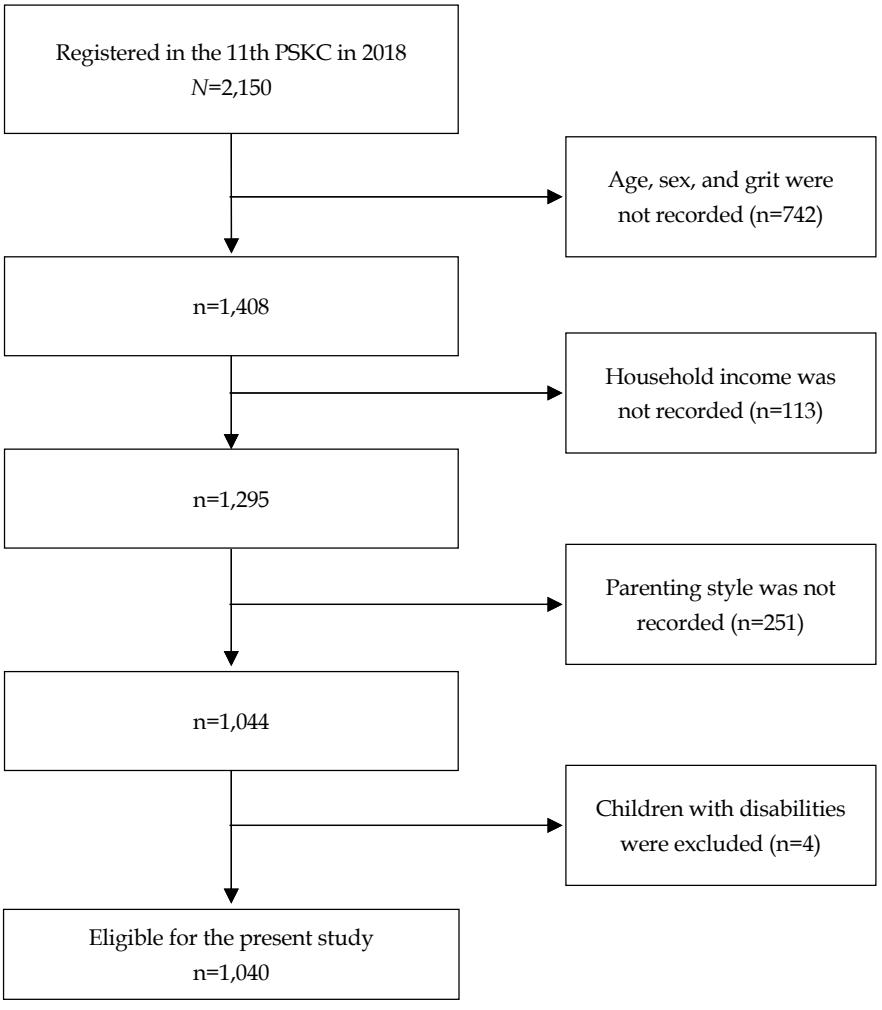

Figure 1. Flow chart of participants. PSKC, Panel Study on Korean Children.

.89, and .67, and that of maternal parenting styles was .91, .89, and .68, respectively.

4) Happiness

This study used a tool translated by PSKC researchers from the Children's Happiness Tool of the Millennium Cohort Study (MCS) [19]. The scale consists of six items and a four-point Likert scale, from "I am not happy (1 point)" to "I am very happy (4 points)." Questions included, "How do you feel when you think about your family?" and "What do you think of your current school?" In a previous study, the reliability of happiness was .71 [20], while in this study, it was .78.

5) Grit

Grit was measured using the Korean version of the Children's Grit tool developed by Kim and Hwang [21]. Grit was assessed using a five-point Likert scale with eight items and scored from "not at all (1 point)" to "very likely (5 points)." Of the eight questions, items 2, 4, 7, and 8, which assess "persistence of effort," are positive-coded questions, and items 1, 3, 5, and 6, which assess "consistency of interest," are reverse-coded questions. In previous studies, the reliability was .71 [21], while in this study, it was .60.

6) Children's health behaviors

Children's health behaviors were assessed using data from the PSKC [19], which measured healthy eating, physical activity, and sedentary behavior. Children's healthy eating habits were evaluated using six items with responses on a 3-point Likert scale, corresponding to "very likely" (3 points), "moderate (2 points)", and "very unlikely (1 point)". Healthy eating habits included "consuming at least two bottles of milk or dairy each day", "eating meat, fish, eggs, and beans with each meal", and consuming a balanced diet that included regular meals with daily vegetable and fruit intake.

Physical activity was measured as the average number of

days that children engaged in indoor or outdoor activities for at least 30 minutes daily.

The recommendation level for sedentary behavior is defined as limiting screen time to less than 2 hours per day on weekdays; children were categorized as meeting this recommendation (coded as "1") or not meeting it (coded as "0") [22].

4. Ethical Considerations

This study conducted a secondary data analysis using public data from the PSKC, and was approved by the Institutional Review Board of Daejin University (No.1040656-202104-SB-01-06).

5. Statistical Analysis

All statistical analyses were conducted using SPSS for Windows version 23.0 (IBM, Armonk, NY, USA). In Table 2, the association of each variable with children's health behaviors, such as healthy eating and physical activity, was tested using linear regression analysis, while its association with sedentary behavior was tested using logistic regression analysis. In the final model in Table 3, children's age, sex, and subjective health status were adjusted, and the association between all major variables and children's health behaviors were analyzed using multiple linear or multiple logistic regression.

RESULTS

1. General Characteristics of Participants

The average age of children was 10.3 years; 51.5% were boys, and 48.5% were girls, and their overall health status was good (4.2 points). The average monthly household income was 5.71 million KRW, and the socioeconomic status perceived by children was 7.2 points. Children's happiness score averaged 19.9 points out of 24, and their average grit score was 27.4 points out of 40. The average scores for maternal authoritative, authoritarian, and permissive parenting styles were 3.80, 2.43, and 2.35 points, respectively, whereas those for paternal parenting styles were 3.68, 2.35, and 2.44 points, respectively. The average score for healthy eating was 13.7 points out of 18, and the number of days with physical activity was 3.3 days per week. The sedentary behavior rate of children as operationalized by having more than 2 hours of screen time on weekdays was 43.7% (Table 1).

2. Crude Associations of Socioeconomic Status, Parenting Styles, and Grit with Children's Health Behaviors

These results are presented in Table 2. Higher household income (β=.09, p=.003) and perceived socioeconomic status (β=.08, p=.007) were associated with higher healthy eating be-

Table 1. General Characteristics of Study Participants (N=1,040)

Variables	Categories	n (%) or M±SD	Range
Age (year)		10.3±0.10	10.0-11.0
Gender	Boy Girl	536 (51.5) 504 (48.5)	
Self-rated health		4.2±0.73	1.0-5.0
Monthly household income (10,000 KRW)		571.9±514.10	90-8,000
Perceived socioeconomic status		7.2±1.82	1.0-10.0
Happiness		19.9±2.76	6.0-24.0
Grit		27.4±4.32	12.0-40.0
Maternal parenting style	Authoritative Authoritarian Permissive	3.80±0.39 2.43±0.46 2.35±0.36	2.5-5.0 1.3-3.9 1.3-3.8
Paternal parenting style	Authoritative Authoritarian Permissive	3.68±0.44 2.35±0.50 2.44±0.38	2.3-4.9 1.1-4.3 1.4-3.7
Child's health behavior	Healthy eating Physical activity (≥30 min, days per week)	13.7±2.48 3.3±1.44	7.0-18.0 1.0-6.0
Sedentary behavior (hr/day)	<2 ≥2	585 (56.3) 455 (43.7)	

KRW, Korean won.

havior scores. Higher happiness levels (β=.12, p<.001) and grit (β=.14, p<.001) were associated with higher healthy eating habits.

In addition, a higher maternal level of an authoritative parenting style was associated with a higher score for healthy eating behavior (β=.24, p<.001). In contrast, higher maternal levels of authoritarian (β=-.12, p<.001) or permissive (β=-.15, p<.001) parenting styles were associated with a lower score for healthy eating behavior. A higher paternal level of an authoritative parenting style was associated with a higher score for healthy eating behavior (β=.12, p<.001), and a lower paternal level of a permissive parenting style was associated with a higher score for healthy eating behavior (β=-.09, p=.004).

Boys had more physical activity days per week than girls (β=.28, p<.001), and a higher level of perceived socioeconomic status was associated with a higher number of children's physical activity days per week (β=.07, p=.018). As a psychosocial characteristic, higher levels of happiness (β=.08, p=.012) and grit were associated with a higher number of children's physical activity days per week (β=.11, p=.001).

Boys were likely to engage in sedentary behavior for more than 2 hours on weekdays than girls (odds ratio [OR]=0.69, 95% confidence interval [CI]=0.54-0.89). Higher socioeconomic status was associated with engaging in sedentary behavior for less than 2 hours on weekdays (OR=1.08, 95% CI=1.01-1.16). Higher levels of happiness (OR=1.10, 95% CI=1.04-1.15) and grit (OR=1.07, 95% CI=1.03-1.10) were associated with engaging in sedentary behavior for less than 2 hours on weekdays. A high maternal level of an authoritative parenting style was associated with sedentary behavior for less than 2 hours on weekdays (OR=2.06, 95% CI=1.49-2.85). In contrast, high levels of authoritarian (OR=0.72, 95% CI=0.55-0.95) or permissive (OR=0.39, 95% CI=0.27-0.56) parenting styles were associated with sedentary behavior for more than 2 hours on weekdays.

A high paternal level of an authoritative parenting style was associated with sedentary behavior for less than 2 hours on weekdays (OR=1.58, 95% CI=1.19-2.09). In contrast, a high paternal level of a permissive parenting style was associated with more than 2 hours of sedentary behavior on weekdays (OR=0.67, 95% CI=0.48-0.94).

3. Associations of Socioeconomic Status, Parenting Styles, and Grit with Children's Health Behaviors

In the final model, demographic factors, such as age, sex, and subjective health status of children, were adjusted, and the associations of socioeconomic status, parenting style, and grit with children's health were evaluated (Table 3). Higher levels of household income (β=.07, p=.018) and a maternal authoritative parenting style (β=.20, p<.001) were associated with a higher level of children's healthy eating behavior. Higher levels of grit were associated with more physical activity days per week (β=.08, p=.028) and engaging in sedentary behavior for less than 2 hours on weekdays (OR=1.04, 95%

Table 2. Crude Associations of Socioeconomic Status, Parenting Styles, and Grit with Children's Health Behaviors (*N*=1,040)

Variables	Categories	Healthy eating		Physical activity (≥30 min, days per week)		Sedentary behavior (<2 hr/day)	
		β (SE)	*p*	β (SE)	*p*	Odds ratio (95% CI)	*p*
Age (year)		.02 (0.73)	.635	.03 (0.43)	.363	1.43 (0.44–4.60)	.553
Gender (ref.: girl)		–.02 (0.15)	.615	.28 (0.09)	<.001	0.69 (0.54–0.89)	.003
Self-rated health		.11 (0.10)	<.001	.03 (0.06)	.367	1.10 (0.93–1.30)	.283
Monthly household income (10,000 KRW)		.09 (0.00)	.003	.04 (0.00)	.179	1.00 (1.00–1.00)	.341
Perceived socioeconomic status		.08 (0.04)	.007	.07 (0.02)	.018	1.08 (1.01–1.16)	.018
Happiness		.12 (0.03)	<.001	.08 (0.02)	.012	1.10 (1.04–1.15)	<.001
Grit		.14 (0.02)	<.001	.11 (0.01)	.001	1.07 (1.03–1.10)	<.001
Maternal parenting style	Authoritative	.24 (0.19)	<.001	.06 (0.12)	.050	2.06 (1.49–2.85)	<.001
	Authoritarian	–.12 (0.17)	<.001	.00 (0.10)	.936	0.72 (0.55–0.95)	.017
	Permissive	–.15 (0.21)	<.001	–.03 (0.13)	.368	0.39 (0.27–0.56)	<.001
Paternal parenting style	Authoritative	.12 (0.17)	<.001	.01 (0.10)	.645	1.58 (1.19–2.09)	.002
	Authoritarian	–.05 (0.15)	.108	.04 (0.09)	.197	0.85 (0.67–1.08)	.188
	Permissive	–.09 (0.21)	.004	–.02 (0.12)	.468	0.67 (0.48–0.94)	.019

CI, confidence interval; KRW, Korean won; ref., reference criteria.

Table 3. Associations of Socioeconomic Status, Parenting Styles, and Grit with Children's Health Behavior (*N*=1,040)

Variables		Healthy eating		Physical activity (≥30 min, days per week)		Sedentary behavior (<2 hr/day)	
		β (SE)	*p*	β (SE)	*p*	Odds ratio (95% CI)	*p*
Age (year)		.01 (0.71)	.799	.03 (0.41)	.339	1.18 (0.35-3.97)	.787
Gender (ref.: girl)		-.01 (0.15)	.738	.29 (0.09)	<.001	0.68 (0.53-0.89)	.004
Self-rated health		.07 (0.10)	.020	.02 (0.06)	.560	0.99 (0.83-1.18)	.885
Monthly household income (10,000 KRW)		.07 (0.00)	.018	.05 (0.00)	.071	1.00 (1.00-1.00)	.618
Perceived socioeconomic status		.04 (0.04)	.167	.05 (0.02)	.082	1.04 (0.97-1.12)	.303
Happiness		.05 (0.03)	.202	.04 (0.02)	.282	1.04 (0.98-1.10)	.168
Grit		.05 (0.02)	.131	.08 (0.01)	.028	1.04 (1.01-1.07)	.047
Maternal parenting style	Authoritative	.20 (0.24)	<.001	.04 (0.14)	.318	1.40 (0.92-2.11)	.114
	Authoritarian	.01 (0.21)	.753	.01 (0.12)	.838	1.29 (0.89-1.87)	.174
	Permissive	-.03 (0.28)	.520	-.01 (0.16)	.901	0.43 (0.27-0.69)	<.001
Paternal parenting style	Authoritative	.05 (0.20)	.202	.02 (0.12)	.596	1.39 (0.98-1.97)	.067
	Authoritarian	.05 (0.19)	.234	.04 (0.11)	.278	1.22 (0.89-1.68)	.222
	Permissive	-.03 (0.24)	.477	.01 (0.14)	.773	0.96 (0.63-1.44)	.828
		R^2=.100, p<.001		R^2=.102, p<.001		Nagelkerke R^2=.080, p<.001	

CI, confidence interval; KRW, Korean won; ref., reference criteria.

CI=1.01-1.07). In addition, a higher maternal level of a permissive parenting style was associated with more than 2 hours of sedentary behavior on weekdays (OR=0.43, 95% CI=0.27-0.69).

DISCUSSION

This study examined the relationships of socioeconomic status, parenting style, and grit with children's health behaviors. Higher levels of household income and maternal authoritative parenting were associated with higher levels of children's healthy eating behavior. These results are similar to the findings of Eo and Kim's study [23], in which the family's socioeconomic status was positively associated with children's health behaviors, and parental attention had a moderating effect on this relationship. Therefore, the association of socioeconomic status with children's health behavior may also be related to parental factors.

An authoritarian parenting style, in which parents exert excessive pressure or limitations on their children regarding eating, is associated with adverse outcomes in children's healthy behaviors [24]. In contrast, an authoritative parenting style was associated with children's healthy eating habits, such as the consumption of fruit and vegetables [25]. Similarly, Collins et al. [26] found that parents with authoritative styles focused more on their children's eating behavior than parents with permissive styles. Our study showed that only a maternal authoritative style was significantly related to children's healthy eating behaviors. According to a study by Shek and Dou [27], mothers have been reported to have better parenting quality in parent-child relationships than fathers. In Korea, the mother's contribution to raising children, managing household affairs, and creating a healthy environment may be relatively more influential than the father's [28]. This association might be due to differences in socio-cultural backgrounds, and only a maternal authoritative parenting style is considered to be related to children's healthy eating behaviors.

A higher level of grit was related to a higher number of physical activity days per week among children. Our results are similar to those of a study by Allee et al. [29], in which a higher level of grit among children was associated with a higher level of physical activity. According to a previous study [7], family culture and parental policies on physical activity can substantially promote healthy physical activity in children and adolescents. Therefore, strategies to improve grit, which can be changed by individual will and efforts, and improvements to policies and culture within the family that promote physical activity are important for increasing children's physical activity.

In this study, higher grit was associated with children engaging in sedentary behavior for less than 2 hours on weekdays. Moreover, a permissive parenting style among mothers was associated with sedentary behavior for more than 2 hours on weekdays. These results are similar to those of a previous study [30] in which children of mothers with a permissive pa-

renting style had a 5.2 times more likely to watch television for 4 hours or more per day than children of mothers with an authoritative parenting style. According to Lloyd et al. [12], a maternal parenting style that involves limiting children's screen time or providing reinforcement was associated with low levels of sedentary behaviors in children. Little is known about the direct association between grit and sedentary behavior; however, grit is known to be related to sustainable behavior [16]. Our study suggests that children's grit is important for reducing sedentary behavior. Moreover, ongoing efforts that enable children to set their own goals and persistently develop healthy habits in difficult situations are important. In addition, to improve children's sedentary behavior, it is necessary for parents to limit their children's screen time or provide recognition for reducing sedentary behavior, and to avoid practicing a permissive parenting style.

This study has limitations as it only included Korean parents and their children, and careful consideration would be needed to interpret and generalize the findings to other socio-cultural populations. Moreover, the cross-sectional nature of the study limits causal inferences.

CONCLUSION

A maternal authoritative parenting style and high levels of grit in children were found to be associated with healthy behaviors. Parenting style and grit of children are both factors that are modifiable to improve children's behaviors and foster healthy living. The significance of this study is that parenting style and grit can be important strategies to improve health behaviors in children. Therefore, family-based education interventions and strategies that discourage a maternal permissive parenting style, encourage an authoritative parenting style, and promote grit in children would be beneficial to increase children's healthy behaviors, especially in socio-economically vulnerable groups. In practice, a family-based approach could have tangible impacts on the prevention of obesity in children by improving children's health behaviors.

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Authors' contribution

Conceptualization: Hwa-Mi Yang; Data collection, Formal analysis: Hwa-Mi Yang; Writing-original draft, Writing-review and editing: Hwa-Mi Yang; Final approval of published version: Hwa-Mi Yang.

Conflict of interest

No existing or potential conflict of interest relevant to this article was reported.

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Data availability

Please contact the corresponding author for data availability.

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