

Effects of Parental Involvement during Prenatal and Postnatal Periods on Infants' Social and Cognitive Development in South Korea

Yoonjoo Cho¹⁾

Sungshin Women's University

Abstract

Despite South Korea's declining fertility rate and increased parental investment in early childhood, research on the effects of parental involvement during prenatal and postnatal periods on infant development remains limited. This study investigated how parental involvement in prenatal and postnatal parenting affects infants' social and cognitive development. Participants included 707 children from South Korea, selected from the first wave of the Korean Early Childhood Education & Care Panel Study (2024). The Korea Institute of Child Care and Education supervised the study, which began with a baseline survey in September 2021 and continued through December 2022. The panel sample was chosen using a stratified cluster sampling method. Descriptive statistics summarized key variables, Pearson's correlation coefficients assessed relationships among variables, and hierarchical multiple regression determined the relative influence of parental involvement on infants' development. The findings are as follows. First, the scores for mothers' physical and emotional activities during pregnancy and fathers' participation in childbirth and parenting-related education were at moderate levels, whereas the scores for postnatal variables such as mothers' parenting behaviors and fathers' involvement in parenting were relatively high. Infants' social and cognitive development scores were high relative to the scale midpoints. Second, mothers' prenatal activities, postnatal parenting behaviors, and fathers' involvement in parenting were positively correlated with infants' social and cognitive development. Third, infants' gender, infants' age in months, and fathers' involvement in parenting were common variables influencing both social and cognitive development. Mothers' prenatal activities and postnatal parenting behaviors affected social development. Infants' age in months had the strongest effect on both social and cognitive development. These findings indicate the need for policies that support both mothers' and fathers' involvement in prenatal and postnatal parenting to promote infants' social and cognitive development.

Keywords : *parental involvement, prenatal and postnatal periods, infant, social and cognitive development*

Corresponding author, ¹⁾ bijucho@sungshin.ac.kr

Introduction

South Korea's total fertility rate is 0.75, the lowest among the 38 OECD countries, which have an average of 1.51 (Statistics Korea, 2025a). Although the number of children is decreasing, interest in child rearing is increasing, as shown by rising educational expenses. In 2024, private education expenditures for elementary, middle, and high school students reached approximately 29.2 trillion KRW, a 7.7% increase from the previous year (Statistics Korea, 2025b). South Korea also has the highest child-rearing cost relative to per capita income worldwide, with the expense to raise one child until age 18 reaching approximately 335 million KRW (Moon, 2024). Enthusiasm regarding education is also beginning at younger ages, with the "4-year-old exam" trend gaining popularity, where children take gifted testing to enter English-language kindergartens (Lee & Gook, 2024).

An underlying foundation of unconditional love and dedication toward children exists, with parents continually seeking their children's holistic development. Early childhood represents the most critical period in human development (Barker, 1998; Irwin et al., 2007). In the first year after birth, sensory and higher cognitive functions develop rapidly, and health inequalities during this time are linked to skill acquisition and learning in adolescence and adulthood (Black et al., 2017; Britto et al., 2017; Richter et al., 2017). Infancy is characterized by rapid development and greater environmental influence than other stages. Interactions with primary caregivers form the basis for later social-emotional development and interpersonal relationships; sensitive, responsive parental interactions promote healthy development in children (Fonagy et al., 2002; Grossmann et al., 2005; Music, 2011).

The significance of early life experiences has been widely recognized and studied. However, most research has concentrated on postnatal parenting, with limited studies on infants because of methodological constraints. The prevailing view that mothers are primarily responsible for child rearing has resulted in research emphasizing maternal variables when examining parenting behavior and child development. Several studies have shown that maternal parenting behavior affects infant development more than maternal psychological characteristics such as self-efficacy, self-esteem, depression, and parenting stress (Choi, 2015). For example, Park and Seo (2005) found that mothers engage in more object-oriented

interaction behaviors with daughters than with sons; these interactions increase with age, while social interactions decreased. Additionally, Kim et al. (2019) reported that higher infant cognitive development and more positive parental parenting behaviors are associated with higher language development, and female infants demonstrate higher language development levels. By contrast, some studies found no differences in maternal interaction behaviors based on the child's gender (Yang & Park, 2011). However, differences are observed by age in months, with greater maternal responsiveness toward older infants.

Research on fathers has increased in recent years. Regarding the influence of fathers on children's social and cognitive development, Roh and Park (1999) surveyed fathers of 4- to 5-year-old Korean children and found that fathers provide logical guidance and rational explanations when disciplining their children. Joo (2012) found that daily life support is the most common form of fatherly involvement in parenting. He also found that infants' social-emotional development-particularly in basic emotions, social behavior, cognitive regulation, and social relationships-is closely related to being an only child, the father being in the 36-40 years age range, and the mother being employed. Additionally, Ryu et al. (2016) found that infant temperament is negatively correlated with certain aspects of fathers' involvement in parenting, specifically leisure guidance and daily life guidance, but positively correlated with externalizing behaviors within social-emotional behavior, such as activity and impulsiveness. Fathers' involvement in parenting is also positively correlated with social-emotional behaviors, including attention, imitation, and play.

Satoh and Miyake (1978) observed interactions between Japanese fathers and 5-year-old preschool children during problem-solving tasks, finding that paternal sensitivity and responsiveness correlate positively with children's achievement motivation, sociability, and cognition. Chen et al. (2000) reported that, in China, paternal warmth predicts school achievement among 12-year-olds, while maternal warmth predicts emotional adjustment. Studies examining within-cultural differences in Chinese parenting styles and young children's social and cognitive outcomes have revealed relationship patterns similar to those found in Western samples (Zhou et al., 2004). Frewen et al. (2015) found that Chinese parents demonstrate less involvement at home and school, and place less emphasis on developing creative and practical skills and conforming behaviors, compared to parents from other Asian

backgrounds; this effect is independent of gender, parental education, and income. Although research on fathers' effects on children's social and cognitive development is increasing, studies focusing on infants remain limited.

Circumstances before birth are significant, and parental interest in prenatal care has increased alongside the trend toward having fewer children. The prenatal environment experienced by the mother can affect the fetus's physical and mental health throughout life (Barker, 1998). In South Korea, "taegyo" refers to prenatal education based on the belief that a pregnant woman's behavior affects the fetus psychologically, emotionally, and physically. This tradition emphasizes avoiding negative speech and behavior to positively influence the fetus and creating a supportive environment for fetal development during pregnancy. Fathers are also expected to be mindful of their words and actions to help maintain the mother's well-being and positively affect the fetus. Study results indicate that genetics account for 48% of a person's intelligence quotient, while the prenatal environment accounts for 52%. Consequently, more parents are interested in how the prenatal environment affects the fetus (Jeon, 2017).

Black et al. (2017) reported that disruptions beginning before conception and continuing through prenatal and early life can affect brain development, attachment, and early learning. The prenatal period and the first 24 months after birth are the most sensitive for later cognition, executive function, and school achievement. Bronfenbrenner's (1979) ecological systems theory emphasized that multiple environmental levels interact to shape individual growth, behavior, and development across the lifespan. He later expanded this theory into the bioecological model, highlighting that proximal processes-ongoing interactions between individuals and their environments-drive development (Guy-Evans, 2025). Further, Vygotsky (1987) argued that cognitive development precedes language development.

Although the significance of parental influence on child development is well established, existing studies have several limitations. First, previous studies have focused on mothers, reflecting the stereotype of mothers as primary caregivers. Even when studies included fathers, they often addressed paternal variables only partially or focused exclusively on fathers. Second, most literature has examined the postnatal period, while prenatal research has been limited and primarily conducted within medical and public health fields, focusing

on physical health. Third, research has mainly addressed toddlers or children, with relatively few studies on infants, especially those older than 12 months. Fourth, relevant studies often refer to variables collectively as infant development, define development as temperament, or examine specific domains such as language, social-emotional, or cognitive development. Therefore, research that examines both maternal and paternal involvement during the prenatal and postnatal periods, as well as their distinct and combined effects on early infant development, is needed. This study addresses these gaps by investigating the effects of parental involvement in prenatal and postnatal parenting on 4–5 months infants' social and cognitive development in South Korea.

This study referenced findings indicating that child mortality rates were lower when mothers were in their 20s compared to other age groups, while fathers' ages showed no significant effect (Jung, 2019). Other studies have reported that maternal or parental education level, income, and socioeconomic status are important factors closely associated with child health (Ermisch, 2008; Olson et al., 2010). Black et al. (2017) provided neuroscientific evidence that nurturing care during early childhood reduces the negative effects of low socioeconomic status on brain development. Additional research has highlighted the relevance of the child's gender and age in months (Ahn et al., 2021; Leaper, 2002; Park & Seo, 2005). Accordingly, this study included demographic variables such as parents' age, education level, household income, child's gender, and age in months as control variables. The aim is to provide foundational data to support the social and cognitive development of infants. The research questions and path diagram for this objective are as follows.

Research Question 1. What are the general patterns of involvement in prenatal parenting (mothers' physical and emotional activities during pregnancy, fathers' participation in childbirth and parenting-related education), involvement in postnatal parenting (mothers' parenting behavior, fathers' involvement in parenting), and infants' social and cognitive development?

Research Question 2. What are the relationships among involvement in prenatal parenting (mothers' physical and emotional activities during pregnancy, fathers' participation in

childbirth and parenting-related education), involvement in postnatal parenting (mothers' parenting behavior, fathers' involvement in parenting), and infants' social and cognitive development?

Research Question 3. What are the relative effects of involvement in prenatal parenting (mothers' physical and emotional activities during pregnancy, fathers' participation in childbirth and parenting-related education) and involvement in postnatal parenting (mothers' parenting behavior, fathers' involvement in parenting) on infants' social and cognitive development?

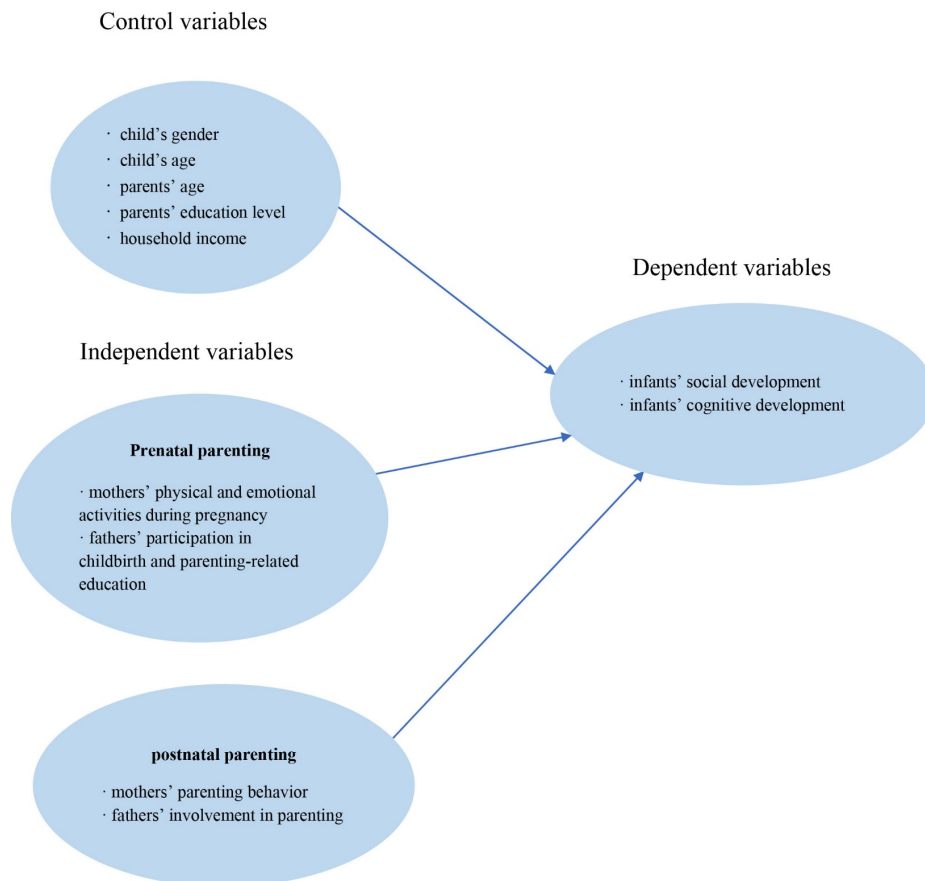


Figure 1. Path diagram

Research Method

Participants and Procedures

This study analyzed first-wave data from the Korean Early Childhood Education & Care Panel Study (2024), conducted under the supervision of the Korea Institute of Child Care and Education (KICCE). The baseline survey began in September 2021 and continued until December 2022. KICCE, the leading national research institute in this field, publicly released the data in 2024. The analysis used de-identified panel data and met ethical standards for secondary data research (IRB no.: KICCEIRB-2022-01). The panel sample, selected using stratified cluster sampling, included children born in 2022 and their household members.

The study included 707 children and their parents from across the country; demographic details are shown in Table 1. Among the children, 367 (51.9%) were “male” and 340 (48.1%) were “female.” In terms of age, 62.8% were “4 months” and 37.2% were “5 months,” with a mean age of 4.62 months ($SD = 0.59$). Fathers had a mean age of 35.54 years ($SD = 4.66$), with the largest group (29.3%) in the “35–39” range, followed by “30–34” (22.5%). Mothers’ mean age was 33.31 years ($SD = 4.01$), with most in the “30–34” group (45.8%), followed by “35–39” (30.6%). The most common educational level was “university graduate” for both fathers (38.5%) and mothers (52.2%). For fathers, the next most common levels were “high school graduate” (13.0%) and “junior college (vocational college) graduate” (12.2%); for mothers, these were “junior college (vocational college) graduate” (19.1%) and “high school graduate” (13.9%). The average monthly household income ranged from 1 million KRW to 25 million KRW, with a mean of 4.8842 million KRW ($SD = 234.82$).

Measurement Tools

Mothers’ physical and emotional activities during pregnancy

This variable comprised 10 items (e.g., “reading books,” “talking to the fetus and listening to music,” “listening to and singing children’s songs”). Each item was rated on a 5-point Likert scale from “Never (1 point)” to “Always (5 points).” Higher scores reflected greater

Table 1. *Demographic Information of Participants* (N=707)

Category	Persons (%)
Child's gender	
Male	367 (51.9)
Female	340 (48.1)
Child's age in months	
4 months	444 (62.8)
5 months	263 (37.2)
Father's age	
24 and under	3 (0.4)
25–29	46 (6.5)
30–34	159 (22.5)
35–39	207 (29.3)
40–44	66 (9.3)
45–49	12 (1.7)
50 and above	5 (0.7)
Non-response	209 (29.6)
Mother's age	
24 and under	13 (1.8)
25–29	86 (12.2)
30–34	324 (45.8)
35–39	216 (30.6)
40–44	38 (5.3)
45 and above	2 (0.3)
Non-response	28 (4.0)
Father's educational level	
Middle school graduate	5 (0.7)
High school graduate	92 (13.0)
Junior college (vocational college) graduate	86 (12.2)
University graduate	272 (38.5)
Master's degree graduate	43 (6.1)
Doctoral degree graduate	5 (0.7)
Non-response	204 (28.8)
Mother's educational level	
Middle school graduate	7 (1.0)
High school graduate	98 (13.9)
Junior college (vocational college) graduate	135 (19.1)
University graduate	369 (52.2)
Master's degree graduate	63 (8.9)
Doctoral degree graduate	7 (1.0)
Non-response	28 (3.9)
Average monthly household income	
3 million KRW or below	148 (20.9)
3.01 million – 5 million KRW	274 (38.9)
5.01 million – 7 million KRW	119 (16.7)
7.01 million – 10 million KRW	58 (8.2)
10.01 million – 15 million KRW	11 (1.6)
15.01 million – 20 million KRW	3 (0.4)
20.01 million KRW or above	1 (0.1)
Non-response	93 (13.2)

engagement in physical and emotional activities during pregnancy. The total possible score ranged from 10 to 50 points, and Cronbach's alpha for this study was .80.

Fathers' participation in childbirth and parenting-related education

Fathers' attendance at childbirth and parenting-related education was measured with one item ("participation in education promoting interaction with the newborn"). Responses were coded as "Yes (1 point)" or "No (2 points)." Reverse scoring was not applied.

Mothers' parenting behavior

Mothers' parenting behavior was measured using nine items from the Parental Style Questionnaire developed by Bornstein et al. (1996), rated on a 5-point Likert scale from "Strongly disagree (1 point)" to "Strongly agree (5 points)" (e.g., "I spend time talking to or having conversations with my child"). The total score ranged from 9 to 45, with higher scores indicating more positive parenting behavior. Cronbach's alpha for this study was .83.

Fathers' involvement in parenting

Fathers' involvement in parenting was measured with four items rated on a 5-point Likert scale from "Strongly disagree (1 point)" to "Strongly agree (5 points)." Total scores ranged from 4 to 20, with higher scores reflecting greater paternal involvement in parenting (e.g., "I often play with my child or talk with them"). Cronbach's alpha for this study was .78.

Infants' social and cognitive development

Infants' social and cognitive development were measured using eight items from the Korean Development Screening Test for Infants and Children at 4–5 months of age. Each item was rated on a 4-point Likert scale from "Not at all (0 points)" to "Very well (3 points)," resulting in a total score range of 0–24. Higher scores indicated better social and cognitive development (e.g., social development: "When the mother (or caregiver) leaves and then returns, the infant recognizes her and stops crying"; cognitive development: "When a new sound is heard while listening to a certain sound, the infant shifts attention to the new sound"). Cronbach's alpha was .70 for social development and .66 for cognitive development in this

study.

Analysis Method

The data were analyzed using SPSS ver. 29.0 [SPSS Inc., Chicago, IL, USA]. Descriptive statistics, including frequency, percentage, and mean, were used to examine the general characteristics of the key variables. Pearson product–moment correlation coefficients were calculated to assess relationships among variables, and hierarchical multiple regression was conducted to determine the relative influence of the variables.

Results

General Patterns of Parental Involvement in Prenatal and Postnatal Parenting and Infants' Social and Cognitive Development

Table 2 presents the general patterns of the key variables related to the first research question. For prenatal variables, the mean score for mothers' physical and emotional activities during pregnancy was 30.58 (SD = 6.05), slightly above the midpoint of 30. Fathers' participation in childbirth and parenting-related education had a mean score of 1.51 (SD = 0.50), indicating a moderate level. For postnatal variables, mothers' parenting behavior had a mean score of 35.31 (SD = 4.71), which is relatively high compared to the midpoint of 27. Fathers' involvement in parenting had a mean score of 16.60 (SD = 3.12), also high relative to the midpoint of 12. The mean scores for infants' social development and cognitive development were 19.14 (SD = 3.51) and 20.18 (SD = 3.49), respectively, both high compared to the midpoint of 12.

Table 2. *General Patterns of Key Variables* (N=607)

Category	Mean (SD)	Score range (midpoint)
Mother's physical and emotional activities during pregnancy	30.58 (6.05)	10–50 points (30 points)
Father's participation in childbirth and parenting-related education	1.51 (0.50)	1–2 points (1.5 points)
Mother's parenting behavior	35.31 (4.71)	9–45 points (27 points)
Father's involvement in parenting	16.60 (3.12)	4–20 points (12 points)
Child's social development	19.14 (3.51)	0–24 points (12 points)
Child's cognitive development	20.18 (3.49)	0–24 points (12 points)

Correlations between Parental Involvement in Prenatal and Postnatal Parenting and Infants' Social and Cognitive Development

Table 3 presents the correlation results for the key variables related to the second research question. For infants' social development, mothers' physical and emotional activities during pregnancy, mothers' parenting behavior, and fathers' involvement in parenting were positively correlated. Specifically, mothers' greater engagement in physical and emotional activities during pregnancy ($r = .15^{***}$) was associated with more positive maternal parenting behavior ($r = .14^{***}$), and higher paternal involvement in parenting ($r = .09^*$) was linked to improved social development in infants. For infants' cognitive development, mothers' physical and emotional activities during pregnancy, mothers' parenting behavior, and fathers' involvement in parenting also showed positive correlations. That is, increased

Table 3. *Correlations between Key Variables* (N=607)

Category	Child's social development	Child's cognitive development
Mother's physical and emotional activities during pregnancy	.15 ^{***}	.06 ⁺
Father's participation in childbirth and parenting-related education	.01	-.02
Mother's parenting behavior	.14 ^{***}	.09 [*]
Father's involvement in parenting	.09 [*]	.10 ^{**}

⁺ $p < .10$, ^{*} $p < .05$, ^{**} $p < .01$, ^{***} $p < .001$

maternal engagement in physical and emotional activities during pregnancy ($r = .06^+$), more positive maternal parenting behavior ($r = .09^*$), and greater paternal involvement in parenting ($r = .10^{**}$) were associated with enhanced cognitive development in infants.

Relative Effects of Parental Involvement in Prenatal and Postnatal Parenting on Infants' Social and Cognitive Development

To address the third research question regarding the relative effects of variables on infants' social and cognitive development, assumption tests were conducted. Normal P-P plots indicated linearity, and tolerance values ranged from .59 to .98. Additionally, Durbin-Watson values were 1.81 for social development and 1.62 for cognitive development. Variance inflation factor values ranged from 1.01^{***} to 1.71^{***}, confirming the data's

Table 4. *Relative Effects of Variables Explaining Infant Children's Social Development* ($N=607$)

Category	Step 1 β	Step 2 β	Step 3 β
Child's gender	.08 ⁺	.07 ⁺	.07 ⁺
Child's age in months	.32 ^{***}	.31 ^{***}	.31 ^{***}
Father's age	-.07	-.07	-.06
Mother's age	.03	.04	.05
Father's educational level	.03	.04	.02
Mother's educational level	-.02	-.03	-.04
Average monthly household income	-.02	-.03	-.04
Mother's physical and emotional activities during pregnancy		.13 ^{***}	.09 [*]
Father's participation in childbirth and parenting-related education		.05	.07
Mother's parenting behavior			.10 [*]
Father's involvement in parenting			.07 ⁺
R^2	.115	.132	.146
ΔR^2		.017	.014
F	11.08 ^{***}	10.11 ^{***}	9.27 ^{***}

⁺ $p < .10$, ^{*} $p < .05$, ^{***} $p < .001$

suitability for regression analysis. Table 4 presents these results. To examine effects on social development, Step 1 included demographic variables: infants' gender, infants' age in months, parents' age, parents' educational attainment, and average monthly household income.

The results indicated that infants' gender ($\beta = .08^+$) and age in months ($\beta = .32^{***}$) were significant predictors, accounting for 11.5% of the variance ($F = 11.08^{***}$). In other words, infants demonstrated greater social development when they were female and older. In Step 2, variables related to prenatal parental involvement-including mothers' physical and emotional activities during pregnancy and fathers' participation in childbirth and parenting-related education-were added to the model. Infants' gender ($\beta = .07^+$) and age in months ($\beta = .31^{***}$) remained significant, and mothers' physical and emotional activities during pregnancy ($\beta = .13^{***}$) also reached significance. These variables explained an additional 1.7% of the variance, for a total of 13.2% ($F = 10.11^{***}$). Infants' social development progressed more smoothly when the infant was female, the infant was older, and the mother engaged in more physical and emotional activities during pregnancy. In Step 3, the analysis included mothers' postnatal parenting behavior and fathers' involvement in parenting. Significant variables were infants' gender ($\beta = .07^+$), infants' age in months ($\beta = .31^{***}$), mothers' physical and emotional activities during pregnancy ($\beta = .09^*$), mothers' parenting behavior ($\beta = .10^*$), and fathers' involvement in parenting ($\beta = .07^+$). Thus, infants' social development showed greater progress when the infant was female, the infant was older, the mother engaged more in prenatal physical and emotional activities, the mother's postnatal parenting behavior was more positive, and the father was more frequently involved in parenting. This step explained an additional 1.4% of the variance, for a total of 14.6% ($F = 9.27^{***}$), with infants' age in months having the strongest effect.

The same variables were included for cognitive development, with results shown in Table 5. In Step 1, among the sociodemographic variables, infants' gender ($\beta = .10^*$) and age in months ($\beta = .29^{***}$) were significant; cognitive development showed greater progress in female and older infants. This step explained 10.2% of the variance ($F = 9.72^{***}$). In Step 2, none of the prenatal parenting involvement variables were significant, while infants' gender ($\beta = .10^*$) and age in months ($\beta = .28^{***}$) remained significant. An additional 0.1% of the variance was explained, resulting in a total explanatory power of 10.3% ($F = 7.65^{***}$). In

Step 3, mothers' postnatal parenting behavior and fathers' involvement in parenting were added. Infants' gender ($\beta = .09^*$), infants' age in months ($\beta = .28^{***}$), and fathers' involvement in parenting ($\beta = .09^*$) were significant variables. Thus, cognitive development in infants progressed more when the infant was female, the infant was older, and the father was more frequently involved in parenting. This step explained an additional 1.0% of the variance, increasing the total to 11.3% ($F = 6.89^{***}$), with infants' age in months having the strongest effect.

Table 5. *Relative Effects of Variables Explaining Infant Children's Cognitive Development* ($N=607$)

Category	Step 1 β	Step 2 β	Step 3 β
Child's gender	.10*	.10*	.09*
Child's age in months	.29***	.28***	.28***
Father's age	-.05	-.05	-.05
Mother's age	-.08	-.08	-.07
Father's educational level	.03	.03	.01
Mother's educational level	.00	-.00	-.01
Average monthly household income	.03	.03	.03
Mother's physical and emotional activities during pregnancy		.04	.01
Father's participation in childbirth and parenting-related education		.02	.04
Mother's parenting behavior			.04
Father's involvement in parenting			.09*
R^2	.102	.103	.113
ΔR^2		.001	.010
F	9.72***	7.65***	6.89***

* $p < .05$, *** $p < .001$

Discussion and Suggestions

General Patterns of Parental Involvement and Infants' Social and Cognitive Development

The scores for prenatal variables, including mothers' physical and emotional activities during pregnancy and fathers' participation in childbirth and parenting-related education, were at moderate levels. By contrast, the scores for postnatal variables such as mothers' parenting behavior and fathers' involvement in parenting were relatively high. The score for infants' social and cognitive development was also high. Mothers' engagement in physical and emotional activities during pregnancy indicates that some parents remained attentive and involved even before birth. The above average scores for fathers' involvement may reflect growing personal and social interest in, and demand for, shared childcare responsibilities that were traditionally managed by mothers. The high level of postnatal involvement suggests that parents became more actively engaged in parenting after the child's birth, possibly because involvement was less defined during pregnancy but became clearer once the child was present. The high levels of social and cognitive development in infants may be due to the rapid developmental growth characteristic of this period compared to other stages.

Correlations between Parental Involvement and Infants' Social and Cognitive Development

Mothers' physical and emotional activities during pregnancy, postnatal parenting behavior, and fathers' involvement in parenting were positively correlated with infants' social and cognitive development, supporting previous findings (Ahn et al., 2021; Joo, 2012; Ryu et al., 2016; Yang & Park, 2011; Vitale et al., 2021). Because mothers' physical and emotional activities during pregnancy have rarely been measured using the same variable as in this study, direct comparisons are limited. However, a related concept-parental views on children-has been adopted. These beliefs are established before childbirth and are influenced by the individual's environment and sociocultural background (Ahn et al., 2021). Therefore, the

present result is consistent with the significant positive correlation between mothers' positive parental views and their engagement in interaction with infants. This result also aligns with Yang and Park's (2011) finding indicating a positive correlation between mothers' postnatal parenting behavior and parental values regarding children.

Relative Effects of Parental Involvement on Infants' Social and Cognitive Development

In the regression analysis, infants' gender, infants' age in months, and fathers' involvement in parenting were common variables influencing both social and cognitive development. Mothers' physical and emotional activities during pregnancy and mothers' postnatal parenting behavior were identified as variables affecting social development. Among these, infants' age had the strongest effect on both social and cognitive development. Specifically, infants demonstrated greater social development when they were female, they were older, their mothers engaged more in prenatal physical and emotional activities, their mothers' postnatal parenting behavior was more positive, and their fathers were more frequently involved in parenting. For cognitive development, infants showed greater progress when they were female, they were older, and their fathers were more frequently involved in parenting.

Gender and age effects

The finding that female infants demonstrated faster social and cognitive development than male infants is consistent with general results showing that girls typically develop earlier than boys (Choi et al., 2024). These results may be influenced by cultural or measurement factors. In Korea, parental roles have historically differed for sons and daughters; fathers often focused on sons, while mothers attended more to daughters (Lamb, 2004). As the primary caregiver, the mother may feel closer to female infants than to male infants, leading her to assess female infants as having higher developmental levels. Age in months was also positively associated with development, which aligns with studies reporting greater responsiveness in older infants to mothers' interaction behaviors (Park & Seo, 2005; Yang & Park, 2011). As infants age in months, their development generally shows more growth

than decline, supporting claims that developmental rates during the first two to three years of life are significantly higher than in later periods.

Fathers' postnatal influence

Fathers' postnatal involvement in parenting also affected social and cognitive development. Mother-related variables were not significant for cognitive development; only father-related variables influenced this aspect. This finding is consistent with Shorer and Leibovich's (2022) argument that fathers' playfulness acts as a protective factor by alleviating children's stress and reducing problematic behaviors, while mothers' playfulness is not significant. Parental characteristics may therefore affect children differently. The mother's parenting behavior, as the primary caregiver, may be perceived by the child as a repetitive routine maintained throughout the day, whereas the father's involvement-though shorter in duration-may be experienced as a novel stimulation, potentially exerting a stronger influence.

Cabrera et al. (2018) found that fathers, compared to mothers, are more likely to tease their children, encourage calculated risk-taking, and participate in rough and tumble play. The quality of fathers' rough and tumble play has been linked to the development of children's behaviors. Neuroscience provides insight into caregiving behaviors, showing that during the transition to parenting, both mothers' and fathers' brains exhibit plasticity and adapt by significantly remodeling neural networks through complex hormonal changes, which are associated with increased social-emotional engagement. Although neural network changes after becoming parents are similar, differences remain between mothers and fathers (Black et al., 2017).

Mothers' prenatal and postnatal influence

Mothers' physical and emotional activities during pregnancy have been identified as variables influencing infants' social development. Although few previous studies exist, limiting direct comparison, this variable can be analyzed in relation to parental views on children. These views are defined as "a set of value systems that encompass attitudes toward the parent-child relationship, the meanings assigned to it, and expectations and beliefs about child education and parenting, which set the direction for child education or parenting" (Kang

et al., 1991). Such views may affect individuals even before they become parents, prompting them to pay close attention to the prenatal environment and participate in various activities after deciding to have a child. Kim et al. (2000) stated that parental views on children refer to “the emotional, rational, volitional, and physical characteristics or qualities that a woman, as a mother, holds toward her child.” Because mothers directly experience pregnancy and childbirth, these tendencies may be more pronounced in mothers than in fathers.

This study examined cognitive, artistic, physical, and positive thinking activities, showing that mothers made diverse efforts to support holistic development and reinterpreted Korea’s traditional “taegyo” practice from a modern perspective. Parents with positive beliefs about their children were more likely to be actively involved both before and after birth; therefore, mothers’ parenting behavior was included as an influencing variable. This finding is consistent with those of previous studies (Choi, 2015; Park & Park, 2016) and supports Siegel and McGillicuddy-De Lisi’s (2010) study that found that parental beliefs or views about children positively affect child development. Additionally, Ahn et al. (2021) found that more positive maternal views on children are associated with closer infant–mother play interactions.

Activities such as storytelling and singing expose young children to experiences that support early development (Black et al., 2017). For example, Vitale et al. (2021) reported beneficial effects on preterm infants in physiological, autonomic, and neurobehavioral development. The use of maternal sounds, vibrations, music, and sensory protection protocols for premature infants hospitalized in the neonatal intensive care unit may contribute to optimal development. These interventions can be integrated with other treatments, such as Kangaroo Mother Care, infant massage, and gentle handling. Additionally, parents who value social–emotional skills more highly report that their children demonstrate better social competence (Ren & Edwards, 2015).

Mothers’ prenatal and postnatal parenting behavior was significant only for infants’ social development, consistent with theoretical perspectives emphasizing the relationship between maternal parenting and social–emotional development within the context of environmental and parenting influences on child development. This result supports the argument that primary caregiver interaction patterns are crucial for a child’s development and form the basis

for future social–emotional development and interpersonal relationships (Fonagy et al., 2002; Grossmann et al., 2005; Music, 2011). There is also a possibility of emotional attunement and early bonding mechanisms such as attachment. For example, Ainsworth et al. (1978) reported that maternal parenting characteristics significantly affect the child, indicating a close interaction between the mother, as the primary caregiver, and the child. Moreover, these findings may be considered valid because, for infants aged 4–5 months, individual differences in areas such as language are not yet apparent, and social development can provide a foundation for other developmental domains.

Policy implications

Expanding prenatal education to emotional and relational domains. This study identified mothers' prenatal parenting activities as influential variables for child development, emphasizing the importance of the prenatal environment. Although academic research on the prenatal period exists in the medical and public health fields, the topics addressed differ. The “Nutri Plus Program,” operated by public health centers, is a representative practical effort. This program targets pregnant women and children up to age 6 from households with incomes below 80% of the median who have nutritional risk factors. It offers monthly nutrition education and counseling, as well as six types of supplementary food packages. However, because the program's target population is limited and its services primarily address physical health, additional services focusing on psychological and emotional well-being are needed.

Promoting father involvement-inclusive parenting leave policies. During early childhood, daily interactions with the mother form the basis for development in other domains, and establishing a stable relationship with the primary caregiver is critical. However, placing all parenting responsibilities on the mother may negatively affect the child. Thus, it is important to encourage fathers to use child-rearing support systems. For example, beginning in 2025, parental leave may be extended from a maximum of one year per individual to a combined total of up to three years if both spouses take at least three months each (Ministry of Employment and Labor, 2025). When men and women alternate their leave, the support amount or duration increases, which encourages men's participation. Both

mothers and fathers should be involved in parenting to support the child's holistic development and to share parenting responsibilities.

Integrating prenatal-postnatal parenting programs within community family centers.

As mentioned previously, the period from conception to age 2 years is critical for child growth. Because pregnancy and childbirth are experienced only by women, fathers may have limited involvement and empathy during this time. Supporting caregivers' openness to parenting programs benefits children's growth and development. Additionally, increased attention to gender equity education strengthens the capacity to promote child development and provide necessary family support. Shared caregiving that includes fathers and other significant individuals benefits both mothers and children. Although programs such as "Parenting Education by Life Stage" offered by family centers provide tailored content for prospective parents, parents of infants and toddlers, and parents of school-age children, they primarily focus on the postnatal period. Therefore, supplementing these programs with additional prenatal content would be an accessible way to address this gap.

Conclusion

This study found that mothers' prenatal physical and emotional activities, as well as fathers' postnatal involvement in parenting, were positively associated with infants' social and cognitive development. Infants' age in months was the strongest predictor of development, and female infants demonstrated higher levels of social and cognitive development than male infants. Mothers' prenatal and postnatal behaviors were especially influential for social development, whereas fathers' postnatal involvement was significant for both social and cognitive outcomes.

Unlike previous studies on mother-child interaction, which have primarily focused on toddlers or young children, this study examined infants aged 4-5 months. While most existing research concentrated on postnatal parenting and mothers, this study addressed both mothers' and fathers' prenatal and postnatal involvement in parenting. Further, instead of evaluating

overall child development, the analysis focused on social and cognitive development, which may be particularly important during this period, to clarify developmental differences. The study used data collected nationwide under the supervision of a reputable national research institute, supporting the generalizability of the findings.

However, because of the nature of secondary data, there are limitations in the use of variables. Infant development assessments relied on mothers' responses as primary caregivers. Future research should incorporate observational measures beyond maternal self-reports and apply a dyadic approach. Extending the age range to include older infants and adopting longitudinal designs that track developmental trajectories over time are also necessary. These approaches may provide a more comprehensive understanding of how both maternal and paternal involvement affect children's growth across different developmental stages.

Nonetheless, this study is significant as an exploratory analysis because it comprehensively examined subjects, periods, and variables that previous research has often overlooked. The findings highlight the importance of developing policies and programs that support both mothers' and fathers' involvement in prenatal and postnatal parenting, such as expanding prenatal education to include emotional and relational domains, promoting father-inclusive parenting leave policies, and integrating prenatal–postnatal parenting programs within community family centers. Human development depends not only on individual characteristics but also on interactions with family, schools, communities, and society. Family-friendly environments that emphasize family-centered early intervention support families in providing nurturing care.

References

- Ahn, Y. S., Kim, K. R., & Lee, S. Y. (2021). Beliefs about infants of mothers rearing 18~24 months old infants and their practices. *Korean Journal of Childcare and Education*, 17(4), 1-27. <https://doi.org/10.14698/jkcce.2021.17.04.001>
- Ainsworth, M., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment*.

Erlbaum Inc. Publishers.

- Barker, D. J. (1998). In utero programming of chronic disease. *Clinical Science*, 95(2), 115-128.
- Black, M. M., Walker, S. P., Fernald, L. C., Andersen, C. T., DiGirolamo, A. M., Lu, C., McCoy, D. C., Fink, G., Shawar, Y. R., Shiffman, J., & Devercelli, A. E. (2017). Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 77-90. [https://doi.org/10.1016/S0140-6736\(16\)31389-7](https://doi.org/10.1016/S0140-6736(16)31389-7)
- Bornstein, M. H., Tamis-LeMonda, C. S., Pascual, L., Haynes, M. O., Painter, K. M., Galperin, C. Z., & Pecheux, M. G. (1996). Ideas about parenting in Argentina, France, and the United States. *International Journal of Behavioral Development*, 19(2), 347-367.
- Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., Perez-Escamilla, R., Rao, N., Ip, P., Fernald, L. C., & MacMillan, H. (2017). Nurturing care: Promoting early childhood development. *The Lancet*, 389(10064), 91-102.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Cabrera, N. J., Volling, B. L., & Barr, R. (2018). Fathers are parents, too! Widening the lens on parenting for children's development. *Child Development Perspectives*, 12(3), 1-6. <https://doi.org/10.1111/cdep.12275>
- Chen, X., Liu, M., & Li, D. (2000). Parental warmth, control, and indulgence and their relations to adjustment in Chinese children: A longitudinal study. *Journal of Family Psychology*, 14(3), 401-419.
- Choi, S. N. (2015). Mother's various psychological characteristics and infant temperament, nurturing behavior, effect on infant development: The mediating effects of nurturing behavior. *Journal of the Korea Academia-Industrial Cooperation Society*, 16(8), 5160-5171. <http://dx.doi.org/10.5762/KAIS.2015.16.8.5160>
- Choi, Y. K., Cho, S. I., Park, J. A., Bae, Y. J., Jung, Y. K., Lee, K. J., & Kim, Y. M. (2024). A study on the tracking of the development of COVID-19 generation children(I). Korea Institute of Child Care and Education.
- Ermisch, J. (2008). Origins of social immobility and inequality: Parenting and early child

- development. *National Institute Economic Review*, 205(1), 62-71.
- Fonagy, P., Gergely G., Jurist E. L., & Target, M. (2002). *Affect regulation, mentalization, and the development of the self*. Other Press.
- Frewen, A. R., Chew, E., Carter, M., Chunn, C. J., & Jotanovic, D. (2015). A cross-cultural exploration of parental involvement and child-rearing beliefs in Asian cultures. *Early Years*, 35(1), 36-49. <http://dx.doi.org/10.1080/09575146.2014.956294>
- Grossmann, K. E., Grossmann, K., & Waters, E. (2005). *Attachment from infancy to adulthood: The major longitudinal studies*. Guilford Press.
- Guy-Evans, O. (2025). *Bronfenbrenner's ecological systems theory*. Simply Psychology. <https://www.simplypsychology.org/bronfenbrenner.html>
- Irwin, L. G., Siddiqi, A., & Hertzman, G. (2007). *Early child development: A powerful equalizer*. Human Early Learning Partnership (HELP).
- Jeon, M. H. (2017, May 22). "Does it help to solve math problems as prenatal education? No clear evidence; listening to music is more effective." The JoongAng Daily. <https://www.joongang.co.kr/article/21593630>
- Joo, J. H. (2012). *Relationship between father parenting involvement and social emotional development of two years old infants*. Graduate School of Kyungwon University.
- Jung, H. J. (2019). *Analysis of the current status and effectiveness of essential medical and health care services for mothers and infants*. Korea University Industry-Academic Cooperation Foundation.
- Kang, S. J., Kim, D. H., Oh, K. A., Lee, E. S., & Chung, C. H. (1991). A study on traditional Korean mothers' views of children and changes. *Journal of Korean Home Management*, 10, 39-58.
- Kim, M. S., Hu, Y., & Wang, W. (2019). A longitudinal analysis of factors affecting language development in infants. *Journal of the Korea Contents Association*, 19(3), 457-465. <http://dx.doi.org/10.5392/JKCA.2019.19.03.457>
- Kim, Y. H., Lee, J. H., Park, S. H., Bang, M. R., Park, S. Y., & Lee, J. A. (2000). Motherhood and role confidence in the immediate postpartum period. *Women's Health Nursing*, 6(2), 291-304.
- Lamb, M. E. (2004). *The role of the father in child development* (4th ed.). John Wiley & Sons,

Inc.

- Leaper, C. (2002). *Parenting girls and boys*. Lawrence Erlbaum Associates.
- Lee, J. W., & Gook, Y. J. (2024, November 26). "The kid next door got into med school: The pressure weighing on Gangnam teens." *The Segye Daily*.
<https://n.news.naver.com/mnews/hotissue/article/022/0003989972?cid=2002138&from=kakao>
- Ministry of Employment and Labor. (2025). *Korea policy briefing*.
<https://www.korea.kr/multi/visualNewsView.do?newsId=148938182>
- Moon, J. Y. (2024, February 23). "Which country ranks first worldwide in child-rearing costs?" *The Chosun Daily*. <https://n.news.naver.com/article/023/0003818365>
- Music, G. (2011). *Nurturing natures: Attachment and children's emotional, socio cultural, and brain development*. Psychology Press.
- Olson, M. E., Dickema, D., Elliott, B. A., & Renier, C. M. (2010). Impact of income and income inequality on infant health outcomes in the United States. *Pediatrics*, 126(6), 1165-1173.
- Park, S. R., & Park, H. J. (2016). The effects of maternal parenting stress trajectory on affective parenting and socioemotional development of preschooler: Differences between employed and unemployed mothers. *Korean Journal of Child Studies*, 37(5), 33-52.
- Park, S. Y., & Seo, S. J. (2005). Mother-infant interaction styles associated with infant development. *Korean Journal of Child Studies*, 26(5), 15-30.
- Ren, L., & Edwards, C. P. (2015). Pathways of influence: Chinese parents' expectations, parenting styles, and child social competence. *Early Child Development and Care*, 185(4), 614-630. <http://dx.doi.org/10.1080/03004430.2014.944908>
- Richter, L. M., Daelmans, B., Lombardi, J., Heymann, J., Boo, F. L., Behrman, J. R., Lu, C., Lucas, J. E., Perez-Escamilla, R., Dua, T., & Bhutta, Z. A. (2017). Investing in the foundation of sustainable development: Pathways to scale up for early childhood development. *The Lancet*, 389(10064), 103-118.
- Roh, H. M., & Park, I. J. (1999). Relationship between fathers' childrearing behavior and competencies of young children. *Korean Journal of Child Studies*, 20, 231-245.

- Ryu, J. E., Shin, A. S., Kim, K. H., & Song, M. J. (2016). Structural relations among infants' temperament, fathers' parenting participation, and infants' social and emotional behavior development. *Journal of Korea Academia-Industrial Cooperation Society*, 17(9), 279-291. <http://dx.doi.org/10.5762/KAIS.2016.17.9.279>
- Satoh, K., & Miyake, K. (1978). What aspects of parental behavior lead to the child's positive cognitive development during years prior to and soon after school entrance? *Research and Clinical Center for Child Development Annual Report*, 2, 15-30.
- Shorer, M., & Leibovich, L. (2022). Young children's emotional stress reactions during the COVID-19 outbreak and their associations with parental emotion regulation and parental playfulness. *Early Child Development and Care*, 192(6), 861-871.
- Siegel, I., & McGillicuddy-DeLisi, A. (2010). *Parental belief systems: The psychological consequences for children*. Erlbaum.
- Statistics Korea. (2025a). *OECD total fertility rate*. Statistics Korea.
- Statistics Korea. (2025b). *Private education expenditure survey*. Statistics Korea.
- The Korea Institute of Child Care and Education (2024). The Korean Early Childhood Education & Care Panel Study Wave 1. The Korea Institute of Child Care and Education.
- Vitale, F. M., Chirico, G., & Lentini, C. (2021). Sensory stimulation in the NICU environment: Devices, systems, and procedures to protect and stimulate premature babies. *Children*, 8(334), 1-18. <https://doi.org/10.3390/children8050334>
- Vygotsky, L. S. (1987). *The collected works of LS Vygotsky: Problems of the theory and history of psychology*. Springer Science & Business Media.
- Yang, H. Y., & Park, H. W. (2011). Relations between parenting-related variables and mother-infant interactive behaviors. *Journal of the Korean Home Economics Association*, 49(3), 99-111.
- Zhou, Q., Eisenberg, N., Wang, Y., & Reiser, M. (2004). Chinese children's effortful control and dispositional anger/frustration: Relations to parenting styles and children's social functioning. *Developmental Psychology*, 40(3), 352-366.