

**The K-Sisters: The Impact of Younger Brothers on Educational Attainment of
Sisters in South Korea**

By

KIM, Haeun

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

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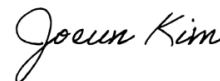
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The K-Sisters:
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Haeun Kim

Thesis

ABSTRACT

This paper examines the impact of younger brothers on the educational attainment of sisters in South Korea, with a focus on higher education completion. The study employs a fixed-effect model to analyze whether the presence of younger brothers disproportionately affects sisters' likelihood of completing college. The results reveal a significant gender gap in college attainment, with females across all birth cohorts less likely to complete higher education compared to males. The gender disparity was most pronounced in the 1950-1959 cohort, although it narrowed in later cohorts. However, the interaction between having a younger brother and being female was not statistically significant, indicating that the presence of younger brothers does not further exacerbate the gender gap.

Keywords : Gender disparity, younger brothers, educational attainment, higher education, sibling composition, South Korea, cohort analysis, KLIPS

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I. Introduction

Family dynamics, particularly the roles and impacts of siblings, play a pivotal role in shaping educational outcomes. The family environment, sibling interactions, and resource distribution among children can profoundly influence an individual's educational attainment and trajectory. The differences in educational outcomes due to the composition of siblings hold significant consequences for social mobility, the intergenerational transmission of inequality, and the overall growth of human capital within society.

This study hypothesizes that younger brothers negatively influence sisters' educational attainment and examines whether this influence varies across birth cohorts and regional differences. This study builds on the existing literature on sibship and socioeconomic outcomes. Wänström and Wegmann (2017) and Lersch (2019) demonstrate that additional siblings diminish the wealth of individuals. Esposito (2020) underscores the significance of birth order by examining its impact on educational outcomes and socioeconomic opportunities in Mexico. Exploring the effect of sibling dynamics in social classes, Jacob (2010) revealed that working-class daughters face an increased likelihood of not graduating compared to their counterparts in the service class, particularly when there are older brothers in the family.

This study contributes to the existing literature in three key aspects. First, it provides insight into the relevance of hierarchy and son preference in East Asian countries, particularly in setting the geographical location in Korea, a factor often overlooked in previous research. While previous studies have predominantly explored sibship configurations and educational opportunities in Western contexts, characterized by greater egalitarianism, this paper explores the distinct cultural

contexts shaping family dynamics in Eastern societies. Drawing on Parish and Willis's (1993) works, this research aims to provide potential mechanisms through which these dynamics influence educational opportunities by examining family resource transfer among siblings,

Second, this study uses data from the Korea Labor and Income Survey (KLIPS) to observe variations and changes among cohorts. The use of cohort data is particularly crucial in understanding Korea's context, where cohorts have undergone distinct cultural, political, and economic development driven by the country's rapid economic development. Observing shifts within cohorts is essential to comprehensively understand the nuanced impact of these changes on educational outcomes.

Finally, the study investigates regional variations in the context of the deeply ingrained son preference culture that exists in Korea, particularly in the Gyeongsang region, which is marked by its patriarchal values. This study offers an examination of how regional variation contributes to different educational experiences.

The remainder of this paper is organized as follows. Section 2 describes the background and narrative context of educational attainment for men and women in Korea, and the cultural context. Section 3 presents the data and empirical framework. Section 4 presents the main results of the study. In Section 5, potential mechanisms are discussed. Finally, Section 6 concludes the paper and summarizes its contributions and implications.

II. Background

The educational achievement of individuals is influenced by intra-family determinants, such as sibship, where parents strategically allocate educational resources based on economic considerations to optimize their distribution (Becker, 1991). Another factor to consider is the child's gender, as parental strategies differ according to the child's gender. According to Brinton (1993), there is a notable difference in how parents evaluate the potential of their sons and daughters in the market, particularly in East Asian countries. In these countries, women receive fewer educational opportunities than men do, as they are perceived to have lower returns on education.

This study examines two specific conditions of sibling configurations: the presence of a younger brother and the gender effect. Prior research has demonstrated that children born later in the family tend to have lower levels of educational attainment and other socioeconomic outcomes such as income and labor force participation (Black, 2005). This is because the family's economic status determines the amount of resources allocated to the children, and unless the family's income improves, younger siblings tend to have fewer resources than older siblings do. In Asian cultures where Confucianism is prevalent, this can be explained as a concept of seniority. It is important to recognize that the concept of seniority does not extend to females in these countries. Men and women are subjected to different gender norms, wherein the eldest son is responsible for "carrying on the family line" as the authority is passed down from father to son. On the other hand, the eldest daughter assumes the responsibility of the mother. This cultural context has been responsible for the mixed results of sibship configurations in previous studies. In Western countries, sibship configuration and gender have little or no effect on individuals' educational outcomes (Butcher & Case, 1994; Houser & Kuo, 1998), whereas Asian countries show different results. Ding et al.

(2020) highlighted the positive impact of an unmarried sister on a brother's educational journey dating back to the Qing Dynasty in China. The cultural norm that puts elderly sisters at a disadvantage continues to persist, even during periods of industrialization. In Hong Kong, income earned by employed daughters has historically been allocated to funding the education of younger brothers (Salaff, 1976). This highlights the family's desire for upward social mobility through the education of their sons at the expense of their daughters' labor. A similar finding is observed in modern Vietnam as well, as Vu and Tran (2021) find that a higher proportion of boys in a family is associated with lower average educational attainment for children.

As in these Asian countries, preference for sons has persisted across generations in South Korea. Significant regional variations in sex ratios have been observed in Korea. The imbalanced sex ratios are especially pronounced in North and South Gyeongsang Province (Gyeongbuk and Gyeongnam) and in the major cities of Daegu, Busan, and Ulsan in southeastern Korea (Hwang, Lee, & Lee, 2019). This manifestation of son preference can be considered a legacy of the region's deeply rooted conservative and patriarchal beliefs (Chun and Das Gupta, 2009). South Korea experienced rapid economic growth in the mid-20th century, accompanied by social and economic shifts that changed its family structures. The industrialization period promoted educational values for both genders, recognizing the importance of education. Moreover, changes in social norms and policy reforms have accelerated these transformations. For instance, extensive literacy campaigns were executed, resulting in a substantial increase in the country's literacy rate, from 55% in 1945 to 88% in 1970. The nation also introduced policies that promoted universal enrollment in primary and middle schools in 1965 and 1985, respectively. Family planning policies were implemented during this period. In the 1960s, birth control programs were rolled out as the nation was still grappling with poverty. By 1981, the government had introduced a one-child policy, which was

embodied by the slogan 'one well-raised daughter out-envies ten sons.' Such changes shaped family norms and values. For instance, as mandatory education was extended, parental aspirations regarding their children's educational attainment likely increased, potentially leading more parents to prioritize quality over quantity of children. Previous research on Korean parental educational investment and trade-offs highlights the importance of family background characteristics including the mother's education and region (Lee, 2007)

III. Empirical Strategy and Data

The data used in this study were obtained from the Korea Labor Institute Panel Study 2018, which provides longitudinal information from a nationally representative sample of 23,971 individuals. This dataset is the largest of its kind and includes information on variables such as place of birth, place of residence around the age of 14, age, gender, ordinal position, sibling information, and education level. The study focused specifically on respondents born between 1950 and 1970, and the final sample consisted of 4,853 observations, with 2,240 male respondents and 2,613 female respondents. To ensure the accuracy of the results, the data were limited to respondents who provided sufficient information on their education level and whose birthplace and childhood residence were within South Korea.

The fixed-effect model employed below assesses the impact of the presence of a younger brother on the educational attainment of the sibling;

$$\ln(\text{EduYear}_i) = \beta_0 + \beta_1 \text{YoungerBro}_i + \beta_2 \text{Gender}_i + \beta_3 \text{YoungerBro}_i \times \text{Gender}_i + X_i \Gamma + \eta_j + \epsilon_i \dots (1)$$

The dependent variable for statistical analysis, *EduYear_i*, is the natural logarithm of educational attainment, measured by the years of schooling. Individual-level variables include *Gender* (2=female) and a dummy variable *YoungerBro*, indicating whether one has a younger brother. X_i indicates the vector of other characteristics, such as the ordinal position, and measures for one's background include the father's and mother's education. However, the survey only asked about the level of parents' education and not the final years completed. Other family level variables, such as childhood residence, sibship size, and male-dominant composition, were included. Respondents were also asked to assess their families' socioeconomic status around the age of 14. Although this is a subjective assessment, it provides information on the family's income level. η_j represents fixed effect for the place of birth. Lastly, the term ϵ is the error term.

To assess the effect of the region in which individuals were raised around the age of 14 years on the educational attainment of girls, particularly in the presence of a younger brother, the regression equation was adjusted as follows:

$$\ln(\text{EduYear}_i) = \beta_0 + \beta_1 \text{YoungerBro}_i + \beta_2 \text{Gender}_i + \beta_3 \text{YoungerBro}_i \times \text{Gender}_i + \beta_4 \text{Region}_i + \beta_5 \text{YoungerBro}_i \times \text{Region}_i \times \text{Gender}_i + X_i \Gamma + \eta_j + \epsilon_i \dots (2)$$

The term *Region* indicates 16 provinces in Korea while other terms indicate the same concept as in Equation (1).

Table 1. Descriptive Statistics for Individual-Level and Family-level Variables

Summary	
N	4,853
Individual level	
Birth cohort	
1950-1959	1,725 (35.5%)
1960-1969	1,650 (34.0%)
1970-1979	1,478 (30.5%)
Younger brother	0.56 (0.50)
Years of education	11.98 (3.38)
Female, younger brother	11.25 (3.41)
Male, younger brother	12.10 (3.30)
Ordinal position of birth	2.67 (1.68)
Family level	
Father's education ^a	1.38 (1.15)
Mother's education ^a	1.07 (1.00)
Family SES ^b	2.35 (0.67)
Childhood residence	
Seoul	669 (13.8%)
Busan	309 (6.4%)
Daegu	224 (4.6%)
Daejeon	83 (1.7%)
Incheon	105 (2.2%)
Gwangju	119 (2.5%)
Ulsan	49 (1.0%)
Gyeonggi	507 (10.4%)
Gangwon	324 (6.7%)
Chungbuk	252 (5.2%)
Chungnam	375 (7.7%)
Jeonbuk	397 (8.2%)
Jeonnam	487 (10.0%)
Gyeongbuk	525 (10.8%)
Gyeongnam	372 (7.7%)
Jeju	56 (1.2%)
Sibship size	5.45 (1.81)
Male-dominant composition ^c	0.36 (0.48)

0 = No schooling, 1 = Elementary school, 2 = Middle school, 3 = High school, 4 = Above college

1 = Below average, 2 = Somewhat below average, 3 = Average, 4 = Somewhat above average, 5 = Above average

1 = family has more sons than daughters, 0 = family has no more sons than daughters.

Table 1 presents descriptive statistics for the individual- and family-level variables in the sample. In our sample, 35.5% belonged to the birth cohorts of the 1950s (1950-1959), while 34.0% were from the 1960s, and 30.5% were from the 1970s. The average number of years of schooling for those included in the analysis was 11.98, reflecting an increase in educational attainment compared to previous generations, as shown by the lower average years of schooling for fathers (1.38) and mothers (1.07), which indicates they typically did not progress beyond elementary school. Males with younger brother had slightly more education (12.10 years) compared to females (11.25 years).

Additionally, 79.0% of the sample reported having younger male siblings, highlighting the prevalence of larger family structures during this period. The mean value of sibship size was 5.45, with a standard deviation of 1.81, indicating considerable variation in family size among the respondents. Furthermore, 36% of the individuals came from families where there were more boys than girls, reflecting a male dominance in family composition. The largest number of respondents came from Seoul (13.8%) suggesting a pattern of urban concentration in line with Korea's rapid industrialization and urbanization during the latter half of the 20th century.

IV. Results

Table 2. Regression result for birth cohorts

	Total	Birth Cohort 1950-1959	Birth Cohort 1960-1969	Birth Cohort 1970-1979
Younger brother	0.031 *** (0.010)	0.034 (0.026)	0.035 ** (0.018)	0.014 (0.014)
Gender				
Female	-0.086 *** (0.014)	-0.175 *** (0.030)	-0.061 *** (0.021)	-0.037 ** (0.015)
Younger brother # Gender				
1#Female	-0.048 *** (0.014)	-0.020 (0.032)	-0.043 ** (0.021)	0.001 (0.016)
Father's education				
1	0.085 *** (0.013)	0.072 *** (0.022)	0.071 *** (0.020)	0.036 (0.023)
2	0.119 *** (0.017)	0.131 *** (0.037)	0.106 *** (0.025)	0.058 ** (0.025)
3	0.142 *** (0.019)	0.169 *** (0.045)	0.108 *** (0.028)	0.096 *** (0.026)
4	0.197 *** (0.025)	0.227 *** (0.057)	0.156 *** (0.037)	0.122 *** (0.031)
Mother's education				
1	0.101 *** (0.012)	0.110 *** (0.022)	0.080 *** (0.018)	0.040 ** (0.019)
2	0.105 *** (0.017)	0.166 *** (0.042)	0.097 *** (0.025)	0.052 ** (0.022)
3	0.106 *** (0.021)	0.175 *** (0.056)	0.131 *** (0.032)	0.060 ** (0.024)
4	0.131 *** (0.037)	0.259 ** (0.102)	0.181 ** (0.073)	0.104 *** (0.036)
Number of observations	4767	1680	1630	1457
Adjusted R-squared	0.45	0.34	0.29	0.22

*** p<.01, ** p<.05, * p<.1

The regression results indicate that across both educational outcomes—years of schooling and the attainment of higher education—females consistently exhibit lower educational outcomes compared to their male counterparts. This gender disparity is most pronounced in the earlier birth cohort of 1950-1959, where females have significantly fewer years of education and are markedly less likely to attain higher education relative to males. The negative coefficients for females in these models underscore the substantial barriers that women faced in accessing educational opportunities during this period.

However, there is evidence that this gender gap has narrowed over time. In the later birth cohorts (1960-1969 and 1970-1979), the magnitude of the negative effect associated with being female decreases, though it remains statistically significant. This trend suggests that educational opportunities for females improved across these successive cohorts, reflecting broader societal changes such as the expansion of educational access and the increasing emphasis on gender equality in education. Nonetheless, even in the most recent cohort, females still trail behind males in terms of educational attainment, indicating that while progress has been made, full parity has not yet been achieved.

The interaction between having a younger brother and being female further compounds the challenges that women face in achieving educational success. The presence of a younger brother appears to exacerbate the negative impact on females' educational outcomes, as evidenced by the negative and statistically significant coefficients for this interaction term. This effect is particularly strong in the 1960-1969 cohort for educational years, where females with younger brothers have even fewer years of schooling compared to their male counterparts. Similarly, in the 1950-1959 cohort, the likelihood of attaining higher education is further diminished for females who have younger brothers.

These findings suggest that traditional family dynamics and gender roles may have played a role in limiting educational opportunities for females, particularly in households where the presence of a younger brother may have reinforced expectations for females to prioritize family responsibilities over their own educational aspirations. The fact that this interaction effect is most pronounced in earlier cohorts aligns with historical contexts in which gender roles were more rigid, and educational resources within families may have been more likely to favor male children, particularly younger brothers.

Table 3. Regression result for region

	Total	Birth Cohort 1950-1959	Birth Cohort 1960-1969	Birth Cohort 1970-1979
Younger brother # Childhood residence # Gender				
1 # Busan # Female	-0.043 (0.066)	0.065 (0.166)	-0.063 (0.102)	0.003 (0.068)
1 # Daegu # Female	-0.027 (0.075)	0.084 (0.182)	0.020 (0.126)	-0.060 (0.083)
1 # Daejeon # Female	0.081 (0.110)	0.245 (0.309)	0.026 (0.185)	0.095 (0.105)
1 # Incheon # Female	0.017 (0.105)	-0.053 (0.282)	0.026 (0.188)	0.086 (0.095)
1 # Gwangju # Female	-0.038 (0.095)	-0.005 (0.265)	0.079 (0.152)	-0.095 (0.090)
1 # Ulsan # Female	-0.186 (0.141)		-0.066 (0.229)	-0.040 (0.137)
1 # Gyeonggi # Female	0.041 (0.056)	0.176 (0.143)	0.025 (0.090)	0.016 (0.059)
1 # Gangwon # Female	0.000 (0.066)	0.064 (0.155)	0.084 (0.102)	0.017 (0.091)
1 # Chungbuk # Female	0.009 (0.071)	0.055 (0.165)	0.096 (0.116)	0.006 (0.077)
1 # Chungnam # Female	0.078 (0.061)	0.138 (0.145)	0.119 (0.098)	0.004 (0.074)
1 # Jeonbuk # Female	0.057 (0.061)	0.172 (0.149)	0.103 (0.093)	0.065 (0.071)
1 # Jeonnam # Female	-0.078 (0.059)	0.024 (0.139)	-0.139 (0.089)	0.007 (0.069)
1 # Gyeongbuk # Female	-0.063 (0.056)	-0.039 (0.132)	-0.073 (0.091)	0.078 (0.067)
1 # Gyeongnam # Female	-0.031 (0.062)	0.051 (0.146)	-0.054 (0.092)	0.044 (0.079)

1 # Jeju # Female	-0.210 (0.141)		-0.131 (0.218)	-0.086 (0.186)
Number of observations	4767	1680	1630	1457
Adjusted R-squared	0.46	0.33	0.29	0.21

*** p<.01, ** p<.05, * p<.1

To formally examine the relationship between the younger brother effect and gender among the regions in Korea, Table 3 presents the regression results of Eq. (2) The years of education achieved by females in these regions varied. When examining the impact of younger brothers on females within these regions, no significant effects were noted. However, the most substantial decrease was identified in Jeju, with a coefficient of -0.210 for the entire sample. This trend persisted across the cohorts.

V. Discussion

One possible explanation for the changes across cohort is that the perception of children as economic security has shifted. Sons were traditionally viewed as having a higher status in the labor market than daughters, and were perceived as permanent members of the family who could provide support to their elderly parents in times of need. However, the introduction of mandatory schooling may have influenced parental attitudes toward retirement planning. The belief that daughters are also responsible for supporting their parents has improved the position of women in the labor market and within the family system. Although women's position in the post-industrial labor market is still lower than that of men, it has improved significantly since the mid-1900s. Gender discriminatory practices in the labor market have also been slowly improving, and employment opportunities for women have expanded. Additionally, while the Confucian patriarchy still guides the Korean family system, it has weakened significantly. Married women

have more frequent interactions with their biological families, which provides them with more opportunities to support their elderly parents. This change in the status of women may have contributed to an increase in the belief that daughters are also responsible for supporting their parents.

The negative influence of the younger brother on their sister's education could be that they exit school early to enter the workforce. In doing so, they may contribute additional income to the household, which can be allocated to funding the education of their younger brothers. Their actions may have been motivated by the values of Confucian familism and filial piety, which establish an environment characterized by external pressures for collective representation (Lew, 2011) In this context, the success of male siblings is perceived as a means of social mobility for the family, as exemplified by narratives from the 1960s and 1970s. During this period, self-sacrificing female factory workers supported their entire families, including brothers pursuing higher education, using their modest wages.

VI. Conclusion

This paper aimed to analyze the impact of having younger brothers on the educational attainment of sisters in South Korea, with a focus on whether the presence of younger brothers disproportionately affects their likelihood of completing higher education. To explore this, the fixed-effect model was employed, using data from the Korea Labor and Income Panel Study (KLIPS) as the primary source of analysis. The study also examined cohort-specific effects to account for shifts in societal and cultural norms over time.

The results revealed that females demonstrate lower educational attainment compared to their male counterparts across all cohorts, with the most pronounced gender disparity observed in the 1950-1959 birth cohort. Although the gender gap in educational attainment narrowed in later cohorts, it remained statistically significant, with women still less likely to achieve higher education than men.

However, the interaction estimates between having a younger brother and being female did not produce statistically significant results. This suggests that contrary to prior assumptions about sibling composition diverting resources away from daughters, the presence of younger brothers does not exacerbate the gender disparity in educational attainment at the college level. The findings indicate that broader societal and gender norms, rather than sibling dynamics alone, play a more critical role in shaping educational outcomes for women in South Korea.

This research contributes to the existing literature on gender and education by providing a clearer understanding of how sibling composition and gender interact in the South Korean context. It affirms previous findings that gender plays a significant role in educational attainment, but it also challenges the notion that sibling gender composition has a direct, negative effect on educational opportunities for females.

The limitations of this study include its inability to directly capture the mechanisms through which family resources are allocated between siblings, as well as its focus on higher education without considering earlier stages of education. Future research involving a larger sample size could provide more robust results and potentially reveal more significant variations across different cohorts or regions. Additionally, examining the effects of sibling gender composition on other educational outcomes, such as academic performance or vocational

training, could provide further insights into the long-term impacts of gender and sibling dynamics.

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