How Does Birth Order Affect Occupational Outcomes?

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Abstract

Birth order has long been regarded as a significant determinant of both cognitive and non-cognitive abilities, which subsequently influences occupational outcomes. This paper explores the impact of birth order on occupation through its influence on cognitive and non-cognitive abilities. The findings of this paper indicate that birth order does not determine eligibility for managerial positions, but the findings show that later-born children are more likely to be employed. Regarding cognitive and non-cognitive abilities, first-born children exhibit greater optimism compared to later-born siblings, while later-born children, particularly fifth-born children, demonstrate superior social and cognitive abilities. Furthermore, it explores the effects of birth order on educational attainment and parental care, noting that younger siblings typically achieve higher education levels and receive more parental care than their older siblings.

Key words: Birth order, Non-cognitive ability, Cognitive ability, Occupational Outcome

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1. Introduction

Despite growing up in the same family, siblings often take very different paths in life. Some of them become leaders in the workplace, but others do not. What factors would lead to huge occupational differences between siblings?

Greiff et al. (2019) found that as a leader supervises more employees, the role of both cognitive and noncognitive ability becomes more critical. Additionally, research by Lindqvist and Vestman (2011) suggests that success in the job market is more strongly linked to cognitive abilities, but having a better non-cognitive abilities, like perseverance and social skills, will lower the chances of unemployment. Another study by Black et al. (2018) found that birth order might play a role in determining who becomes a leader in his or her workplace.

If a person's personality is largely determined at birth, does that mean his or her career achievements are also largely predetermined at birth? This research aims to explore whether birth order influences career choices by shaping personalities and cognitive abilities. By understanding how birth order impacts personality development and cognitive abilities, insights can be gained to better understand who is more likely to become a leader in the workplace.

This study focuses on birth order effects, but it also examines other family-related effects: family size and gender. The basic idea of the birth order effect originates from the family size

effect. The concept of the family size effect stems from Anastasi (1956) “Resource Dilution Theory” and Becker and Lewis (1973) “Quantity-Quality Trade-Off Hypothesis.” Both theories emphasize that, under the assumption of finite parental resources, a large family size will dilute the resources available for each child in the family. That is there is a trade-off between the number of children and the quality of various social and economic outcomes for them.

As the “Resource Dilution Theory” suggests, the resources allocated to each child decrease as family size increases. However, this theory does not explain why resource allocation among children is unequal. Expanding on the “Resource Dilution Theory”, Booth and Kee (2006) controlled for family size to focus specifically on birth order effects. They found that resource shares per child decrease as a family grows. This phenomenon aligns with the theory: when the first child is born, they enjoy all the family's resources; however, as younger siblings are born, there is always at least one older sibling with whom to compete for resources.

This theory provides a possible explanation for how differences in lifetime resource allocation can occur between siblings. According to this theory, we should find a clear pattern that those of lower birth order will have less lifetime resources allocated to them from their parents. The imbalance is created from a higher resource share being allocated to older siblings before the birth of the younger siblings. Therefore, it is possible the older siblings

may outperform their younger siblings as a result of the higher lifetime resources they have been given.

However, since my research focuses on China, it is important to highlight an additional dynamic that might be present: male-bias. In the context of China, Oliveira (2019) and Lei et al. (2017) found that the average schooling level of females decrease as family size increases (as predicted by Resource Dilution Theory), but, they also found that females receive less education if they have male siblings instead of female siblings, indicating a male-bias in education-related resource allocation.

Additionally, a preference for male children may have an effect on family size. For instance, gender preference can lead to larger family sizes: families desiring a boy may continue to have children until a son is born, often resulting in more girls than boys. Even though family size is controlled in the regressions I conduct later, it is important to note that the families who are likely to become larger solely in order to get a male child may have a stronger degree of male-bias in their resource-allocation patterns. Consequently, resource allocation is also impacted by this gender effect.

This research utilizes data from the Chinese Family Panel Survey (CFPS) to investigate the birth order effect on cognitive and non-cognitive abilities and to analyze further the relationship between birth order and occupational outcomes. According to the regression results, first-born children are found to be more optimistic than later-born children, while

fifth-born children exhibit better social and cognitive abilities than first-borns. In terms of employment, children born later tend to have advantages in the job market. However, despite first-born children being more optimistic—a trait considered important for CEOs (Kaplan and Sorensen, 2016)—no significant difference was observed in the likelihood of becoming managers across different birth orders. This research also introduces a new index to capture the gender composition and family size within families. Additionally, in extending the research, I explore the relationship between birth order, education, and parental care using children's data from the CFPS. The results indicate that higher birth order children, especially those with a birth order of five, typically achieve higher educational levels and receive more care and less strict parenting in their youth.

2. Literature review

According to Anastasi (1956), the "siblings resource dilution hypothesis" suggests that an increase in the number of siblings and shorter birth intervals would reduce the resources available to each child, leading to diminished opportunities. Blake (1989) observed a strong negative correlation between the number of siblings and educational attainment in the United States, noting that verbal ability and years of schooling were particularly impacted.

Apart from the family size effects, birth order also plays a significant role on influencing the cognitive abilities. Booth and Kee (2006) constructed a new birth order index that effectively purges family size from birth order and used it to test if siblings are assigned equal shares in the family's educational resources. Ceteris paribus, they find that the shares

are decreasing with birth order. The younger children in the family are deemed to have a weaker cognitive ability. The confluence theory, based on the work of Zajonc and Markus (1975), maintains that earlier-born siblings are advantaged because the average family intellectual environment declines with each successive birth as children are less intellectually developed than adults. That is, whereas first-borns exclusively receive intellectual stimulation from their parents during their initial years of life, later-borns must also interact with their older siblings, which hampers their development relative to first-borns. The resource dilution theory formulated by Blake (1989) makes a similar prediction about the relationship between birth order and cognitive development, but stresses the access to household resources. As the size of the family grows, the share of parental attention and resources each later child receives is smaller since it must be distributed among all children. In support of this resource mechanism, Black, Grönqvist and Öckert (2018) found that parents spent less time discussing school work with later-born children. In my paper, I have set cognitive ability as a main interest variable in my regression model. Also, in an extension of the research, I assume the birth order will affect the educational attainment and parental caring.

Except for the fact that cognitive ability varies between siblings, non-cognitive ability also affected by the birth order. Sulloway (1996) posited a theory that focuses on interactions between siblings and argues that children sort themselves into distinct ‘family niches’ in order to successfully compete with one another for parental resources. First-born develop traits, such as conscientiousness, that allow them to preserve their dominant status in the sibling hierarchy, whereas younger siblings try to differentiate themselves from their siblings

by being unconventional and more sociable. Black, Grönqvist and Öckert (2018) provide empirical evidence that birth order is correlated with different personality traits and that first-born children are more likely to choose occupations requiring leadership ability and conscientiousness. In my thesis, I use the model from Black, Grönqvist and Öckert (2018) to study the birth order effect on the choice of occupation and non-cognitive trait.

However, the birth order effects in developing countries and in developed countries seems to be opposite. Monique, De Haan Erik Plug, José Roser(2014) find that the negative relationship between birth order and human capital may not hold in the context of a developing country. They speculate high poverty rates, low levels of parental education, and high teenage pregnancy rates are related explanations. Poverty seems a likely driver behind the birth order divide between developing and developed countries. Because I use the CFPS data from China, I assume higher birth order will have advantage in many aspects due to the poverty and also the birth cohort effect.

Gender effect has an indispensable role in my research. The gender structure of the siblings also has an important effect on individual educational level. Scholars such as Oliveira (2019) have studied the effect of gender by controlling for the size of the family and found that a daughter's level of schooling decreases with the number of younger siblings, while a son's schooling increases with the number of younger siblings. What's more, girls' educational choices have been negatively affected by their siblings' gender composition. Specifically, having brothers would be "bad news" for girls because it would decrease the

latter's educational level (Lei et al., 2017). On the other hand, presence of older female siblings can improve younger siblings' educational attainment.

3. Data Sets

The Chinese Family Panel Survey (CFPS), initiated in 2010 by the Institute of Social Science Survey (ISSS) at Peking University, is a biennial longitudinal survey that aims to gather comprehensive data at the individual, family, and community levels across China. This nationally representative survey provides valuable insights into the dynamics of Chinese communities, families, and individuals' lifetimes.

For my research, I have selected the adult data set from the first round of the questionnaire. It includes data on the families that get tracked throughout the survey period. The data in its original form contains biennial values for each of its variables, but all of the variables needed for the regressions in this research can be found in the first round of the questionnaire. The only exception to the above is that I use 2016 values from the Number Series Test score, the Instant Word Recall Test score, and the Delayed Word Recall Test score. The 2016 test score values are known to be more reliable at measuring cognitive ability than the IQ variable from the first round of the questionnaire (which was assessed by the interviewer).

The data set contains 33,598 individuals from 14,607 families. The need for detailed family member information led to the exclusion of families with ambiguous data. Furthermore, families with twins or triplets were omitted. The focus was narrowed to families with 2 to 5 siblings to suit the research objectives, resulting in a refined data set of 12,626 individuals from 8,491 families. The detailed information of birth order and family size is included in the table A3 and table A4 in appendix.

Another appealing aspect of the data is the detailed information on children within families, which includes detailed child demographic data and data capturing parental behaviors, like educational expenditures and time spent with children. However, despite the valuable research potential of utilizing the additional data on parental behavior and child demographics, there was no child older than 15 years old in the 2010 survey, which means that a child will be no older than 25 in the 2020 survey. This poses an issue when measuring occupational outcomes because most of the children are still too young for the 2020 survey to provide useful outcomes data. Hence, I only use the parental care variables from 2010 data to study their relationship with birth order, family size, and gender.

3.1 Outcome Variable: Cognitive Ability and Non-cognitive Ability

3.1.1 Non-Cognitive Abilities

I have extracted all the content related to non-cognitive abilities from the survey questionnaire. Due to data limitations, instead of using the definition of non-cognitive ability

as outlined in Black (2018), I select other relevant variables, such as individuals' optimism, happiness, and social skills.

The study assesses non-cognitive abilities through four specific questions, aimed at understanding various aspects of the respondents' personality. The questions are categorized into three different non-cognitive abilities: Social ability, Well-being, Optimism.
The questions are as follows:

Q1: Do you think you are popular? （social ability）

Q2: Are you happy? （well-being）

Q3: Are you confident about your future?（optimism）

Q4: Is it easy for you to get on well with others?（social ability）

These questions measure participants' self-perception of social interaction and personal well-being, and they are scored on a scale of 1 to 5,

3.1.2 Cognitive Abilities

Cognitive abilities are evaluated through a combination of subjective and objective measures in this data. Subjective assessment of cognitive ability is conducted by researchers at the conclusion of each interview, with scores ranging from 1 to 7. Additionally, two tests are used to assess respondents' mathematical and literacy skills. Starting with the 2012 survey, two additional tests were introduced to objectively evaluate memory and logical IQ. These

tests are adapted from the Woodcock-Johnson III Tests of Achievement, which is a standardized test for IQ in the United States.

For the word test, interviewers present cards to respondents and ask them to read them aloud. There are a total of 34 cards, each printed with a word. The difficulty of the words gradually increases from card 1 to 34, with less common or more challenging words appearing as the test progresses. If a respondent fails to recognize three consecutive words or reaches the 34th word, the questioning terminates. Similarly, for the mathematics test, there are 24 questions arranged from easy to difficult. If a respondent fails to answer three consecutive questions or answers incorrectly, or reaches the 24th question, the questioning terminates. The question number at termination is recorded as the respondent's score.

For the memory test, there are two memory scores which are labeled IWR and DWR. The interviewer reads out 10 common words to the interviewee. After hearing all 10 words, the interviewee immediately is asked to recall the words read by the interviewer. The score obtained from this immediate recall is called immediate word recall (IWR) score. After a delay of several minutes following the immediate memory test, the interviewer asks the interviewee to recall the same 10 words heard earlier. The score obtained from this recall is called delayed word recall (DWR) score. The number series test is a standardized psychometric assessment test that provides the information about a respondent's general ability to reason logically with numbers. In a typical test, a preliminary series of numbers is presented, from which a pattern is inferred. The participant is then required to predict the next

number that follows the pattern. The final score, which ranges from 409 to 584, was calculated by the Rasch model (Wright, 1977). This method is interval-scaled, meaning that the difference between scores, such as the difference between 390 and 400 points, is considered identical to the difference between 500 and 510 points.

In this research, I have chosen not to use the math and word tests as indicators of cognitive ability, as they more accurately reflect education level rather than cognitive capacity. Instead, I utilize the subjective test, which is labeled as IQ, as the cognitive ability variable in my regression analysis. Additionally, I employ the other objective tests to verify the robustness of the regression results.

3.2 Outcome variable: Occupation

In addition to cognitive and non-cognitive abilities, occupation serves as another key variable of interest in this study. Occupation is correlated with both cognitive and non-cognitive abilities, but according to Lindqvist & Vestman (2010), the correlation with non-cognitive abilities might be stronger. From my data set, I extracted the ISCO-88[1] occupational codes of the respondents to construct 5 different categories as follows: top managers, managers, employed individuals, self-employed individuals, and creative occupations[2].

[1] ISCO-88, the International Standard Classification of Occupations, published in 1988, is a system developed by the International Labour Organization (ILO) for classifying various occupations.
[2] For the creative occupations I followed the classification used in Black et al. (2018)The creative occupations ISCO88 codes that include architects, town and traffic planners (2141), writers and creative or performing artists (245), photographers (3131), image and sound recording equipment operators (3132), decorators and commercial designers (3471), radio, television, and other announcers (3472), street, nightclub, and related musicians, singers, and dancers (3473), clowns, magicians, acrobats, and related professionals (3474), and fashion and other models (5210).

Table A2 in the Appendix lists cognitive and non-cognitive abilities across different occupational categories. I utilize a paired t-test to examine differences in the mean scores of cognitive and non-cognitive abilities among various occupational groups. The results indicate that employed individuals exhibit higher cognitive abilities compared to self-employed individuals, followed by unemployed individuals and farmers. However, the analysis of non-cognitive abilities reveals a more complex pattern: employed individuals score higher on well-being measures than self-employed individuals on average, while self-employed individuals are more optimistic than their employed counterparts. Additionally, employed individuals demonstrate higher social abilities than those who are self-employed, although the differences in depression scores are not statistically significant, all the t tests above are at $\alpha = 0.05$ significance level

4.Methodology and Regression Results

In this section, I explain the construction of the family gender composition index and introduce my main regression models and results. My models consider individual-specific variables, which include gender, birth order, and other variables. In terms of family variables, typically most researchers incorporate family fixed effects using family ID to control for any family-specific characteristics within a family. This helps eliminate any remaining association between birth order and family background.

In my baseline regression, I utilize data for adults. However, these individuals have left

their original families and are either entering into or establishing new families. As a result, they do not share the same family ID with their siblings. Consequently, I am unable to directly use family ID to set family fixed effects. Therefore, I extract the most important variables to serve as control variables, including family size, family gender composition, and parental education background. The family gender composition and family size are captured through the construction of an index.

4.1 The Construction of Family Gender Composition Index

The first step in constructing the Family Gender Composition Index is based on the birth order index proposed by Booth, A.L., Kee, H.J.(2009), which is a standardized birth order in each family. As we know, the birth order in each family is a sequence of natural numbers that start from 1, so the expression for the sum of birth order should be $\frac{N(N+1)}{2}$, where N is the total number of the siblings. Then we use the sum divided by N to get the mean of the birth order, which I denote as A:

$$A = \frac{N(N+1)}{2N} = \frac{N+1}{2}.$$

In the next step, I divide the birth order by the mean of the birth order to obtain standardized birth order which I refer to comparable birth order and denote as CB:

$$CB = \frac{B}{A} = \frac{2B}{N+1}.$$

The advantage of the comparable birth order is that it eliminates the family size effect from the birth order.

Next I use the reciprocal comparable birth order as the weight times the gender dummy variable to define the family gender composition index:

$$FGC_j = \sum_i^{N_j} \frac{gender_i}{CB_i},$$

where gender =1 if male, gender =-1 if female, i denotes individuals and j denotes family.The FGC has 60 different value, range from -6.85 to 6.85,which indicates 60 types of family with different family size and gender composition.

4.2 Baseline models

After constructing all control variables, I regress non-cognitive abilities on them. My regression model comprises two groups of variables. The first group includes individual variables such as birth order and gender. Birth order is the primary focus of my study, while the inclusion of gender is essential, particularly in the context of China, where gender effects are significant. The second group consists of family variables, which control for family background. This includes a family gender composition index and the educational years of the parents. Additionally, I include IQ to account for cognitive abilities, as cognitive ability have been shown to correlate with non-cognitive abilities in many empirical researches (Kevin C.Stanek,Deniz S.Ones,2023). I also control for the birth cohort effect, considering

the data spans individuals aged 16 to 82, thereby accommodating generational differences. Here is my baseline model:

$$Y_{ij} = \alpha + \theta \text{gender}_{ij} + \sum_{k=2}^{5} \beta_k (B_{ij} = k) + \sum_{m=2}^{M} \delta_m (YOB_{ij} = m) + FGC_j + \text{Family\_edu}_j + IQ_{ij} + \sum_{k=2}^{5} \gamma_k (\text{gender\_B}_{ij}, B_{ij} = k) + \varepsilon_{ij}, \quad (1)$$

where i denotes individual, j denotes family, Y_{ij} is the variables of interest such as the non-cognitive abilities and non-cognitive abilities, B_{ij} represent birth order, YOB_{ij} is the year of birth. FGC_j is the family gender composition index, Family_edu_j is the family education background, include father and mother's years of education, IQ_{ij} is the cognitive ability, gender_B_{ij} is the interaction term of gender and birth order.

Table1 Baseline Regression for Non-cognitive Abilities

VARIABLES	Social ability	Well-being	Optimism
gender	-0.1237**	-0.0863**	0.0450
	(0.057)	(0.038)	(0.042)
2.birth_order	0.0069	-0.0376	-0.0673*
	(0.051)	(0.035)	(0.038)
3.birth_order	-0.0172	0.0132	-0.0832*
	(0.059)	(0.040)	(0.044)
4.birth_order	-0.0241	0.0056	-0.1850***
	(0.074)	(0.050)	(0.055)
5.birth_order	0.2166*	0.0189	-0.1415*
	(0.112)	(0.076)	(0.084)
1.gender#2.birth_order	0.0039	0.0417	0.0558
	(0.082)	(0.056)	(0.061)
1.gender#3.birth_order	0.0900	0.0382	0.1234*
	(0.090)	(0.061)	(0.067)
1.gender#4.birth_order	-0.0029	-0.0557	0.1015
	(0.109)	(0.074)	(0.081)
1.gender#5.birth_order	-0.3306**	-0.0672	0.1009
	(0.156)	(0.106)	(0.116)
Constant	4.8260***	4.5219***	4.3659***
	(1.460)	(0.991)	(1.091)
Observations	12,627	12,627	12,627
R-squared	0.049	0.048	0.066
Birth cohort effect	YES	YES	YES
FGC	YES	YES	YES
Family_edu FE	YES	YES	YES
IQ	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 1 shows that females exhibit superior social ability and higher levels of happiness compared to males. Furthermore, regarding optimism, it is generally observed that first-born children are more optimistic compared to the later-born. This finding aligns with the mainstream view (Black.et al.,2018), suggesting that first-born children possess superior non-cognitive abilities in terms of optimism. However, for social ability and well-being, we

do not observe significant birth order effects.

I made a slight adjustment to the model by removing the cognitive ability control variables. I then conduct a regression on the cognitive ability tests to study the birth order effect on cognitive abilities. The results are presented in Table 2.

Table2: The Regression Results for Memory and Number Series Tests

VARIABLES	memorize	ns_w
gender	-0.2627*	15.6234***
	(0.157)	(2.190)
2.birth_order	-0.1201	1.6920
	(0.141)	(1.962)
3.birth_order	-0.0188	5.0007**
	(0.160)	(2.224)
4.birth_order	0.0032	2.3029
	(0.200)	(2.779)
5.birth_order	0.2456	7.0898*
	(0.300)	(4.173)
1.gender#2.birth_order	0.3320	-2.7985
	(0.228)	(3.166)
1.gender#3.birth_order	0.1842	-6.9706**
	(0.247)	(3.430)
1.gender#4.birth_order	0.4972*	-0.4401
	(0.295)	(4.096)
1.gender#5.birth_order	0.2730	-1.1257
	(0.419)	(5.830)
Constant	0.8379	406.7568***
	(2.252)	(31.323)
Observations	7,979	7,979
R-squared	0.224	0.193
Birth cohort effect	YES	YES
FGC	YES	YES
Family_edu	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 2 presents the results of regressions for the two cognitive tests: memory tasks and the number series test. The results indicate that females outperform males in memory tasks, but there is no significant birth order effect on memory scores. In contrast, males achieve an average score 15 points higher than females in the number series test, all else being equal. Although there is a reduction of 7 points in the gender advantage when the birth order equals 3, males still outperform females in this test. As for birth order effects, third-born and fifth-born children score 5 and 7 points higher on average than first-born children, respectively. These findings contradict the results of Barclay (2015), Black, Devereux, & Salvanes (2011), and Booth & Kee (2008), which suggest that first-born children exhibit higher cognitive abilities than later-born children. However, they agree with De Haan, M., Plug, E., & Rosero, J., (2014), who suggest a positive correlation of birth order and cognitive ability in developing countries.

Occupational outcomes are regarded as highly correlated with cognitive and non-cognitive abilities. Therefore, I utilize the three non-cognitive ability variables as control variables and incorporate them into Regression Model 1 to study the impact of birth order on occupation.the model 2 is as follows and the outcomes are reported in Table 3:

$$Y_{ij} = \alpha + \theta \text{gender}_{ij} + \sum_{k=2}^{5} \beta_k (B_{ij} = k) + \sum_{m=2}^{M} \delta_m (\text{YOB}_{ij} = m) + \text{FGC}_j + \text{Family\_edu}_j + \text{IQ}_{ij} + \mu_1 \text{social ability}_{ij} + \mu_2 \text{well being}_{ij} + \mu_3 \text{optimism}_{ij} + \varepsilon_{ij}, \quad (2)$$

Table 3: The Regression Results for Occupation

VARIABLES	manager	top_manager	employed	self_employed	creative_occupations
gender	0.8105***	0.6059	0.3545***	0.5917***	1.1399
	(0.136)	(0.592)	(0.066)	(0.090)	(0.757)
2.birth_order	-0.0002	-0.8519	0.0374	0.0367	0.3485
	(0.131)	(0.582)	(0.067)	(0.092)	(0.653)
3.birth_order	0.0443	0.3001	0.1212	0.0468	1.4536*
	(0.176)	(0.609)	(0.085)	(0.117)	(0.817)
4.birth_order	0.3893*	1.1258	0.4611***	0.1302	
	(0.228)	(0.959)	(0.110)	(0.151)	
5.birth_order	0.2856	0.5419	0.6452***	0.2938	0.7888
	(0.353)	(1.454)	(0.162)	(0.213)	(1.671)
Social ability	0.1434***	-0.0306	0.1110***	-0.0088	0.3700
	(0.045)	(0.171)	(0.022)	(0.030)	(0.230)
Well-being	0.0788	0.4876*	0.1446***	-0.0221	-0.0857
	(0.068)	(0.285)	(0.033)	(0.044)	(0.318)
Optimism	0.1472**	0.0533	-0.2516***	0.1091***	-0.0370
	(0.063)	(0.253)	(0.030)	(0.042)	(0.304)
Constant	-5.8176***	-5.0217**	-1.0517	-3.2323***	-7.5854***
	(1.553)	(2.388)	(1.223)	(0.835)	(2.639)
Observations	6,428	1,488	6,992	6,964	1,285
Birth cohort effect	YES	YES	YES	YES	YES
FGC	YES	YES	YES	YES	YES
Family_edu	YES	YES	YES	YES	YES
Cognitive ability FE	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 3 highlights a significant trend in China: males are 80% more likely to assume leadership roles compared to females. Additionally, the data show that males also have higher employment and self-employment rates, which are 35% and 59% greater than those of females, respectively. However, the influence of gender appears to be less significant in attaining top managerial positions and careers in artistic and creative fields.

As for birth order effects, the data indicate that individuals are more inclined to assume leadership roles when they are fourth-born rather than first-born. Similarly, with regard to employment, fourth- or fifth-born individuals are more likely to be employed compared to those born earlier in the birth order. These results diverge with the findings of Black et al. (2018), who observed that first-born children are more likely to hold managerial positions, while later-born children are more likely to pursue creative occupations.

In terms of non-cognitive abilities, individuals with superior social skills and an optimistic attitude are more likely to have managerial positions. This finding echoes the conclusions of Lindqvist and Vestman (2011). However, when it comes to employment, social skills and well-being have positive effects, while optimism shows a negative impact on those who are employed and a positive impact on those who are self-employed.

In my data set, all respondents have an IQ score assessed by the interviewer. I use this IQ score as a proxy for assessing cognitive ability. However, considering the reliability of this variable, I conduct a robustness check using another more objective variable, the 'ns_w' (number series score), instead of the original cognitive ability control. I did not use this number series test score as the original control because only around 8000 people have completed this test.

Table 4 :Robustness Check for the Cognitive Ability

VARIABLES	manager	top_manager	employed	self_employed	creative_occupations
gender	0.8877***	0.8005	0.3666***	0.6235***	215.6079
	(0.191)	(1.279)	(0.086)	(0.120)	(0.000)
2.birth_order	-0.0015	-0.4626	-0.0098	0.1676	187.8422
	(0.187)	(0.997)	(0.088)	(0.122)	(0.000)
3.birth_order	0.1462	1.0544	0.1691	0.0249	702.9593
	(0.231)	(1.433)	(0.109)	(0.154)	(0.000)
4.birth_order	0.1881	2.2437	0.5074***	0.1205	
	(0.304)	(2.043)	(0.139)	(0.196)	
5.birth_order	-0.4528	1.3982	0.9465***	0.1484	419.7242
	(0.586)	(4.095)	(0.203)	(0.284)	(0.000)
Social ability	0.1883***	0.3380	0.0929***	0.0187	19.6128
	(0.063)	(0.320)	(0.028)	(0.039)	(0.000)
Well-being	0.1113	1.3949*	0.1763***	-0.0771	265.3296
	(0.095)	(0.767)	(0.043)	(0.058)	(0.000)
Optimism	0.1962**	0.1167	-0.2571***	0.1160**	-83.1853
	(0.086)	(0.542)	(0.038)	(0.055)	(0.000)
Constant	-11.7473***	-28.8477***	-6.7862***	-2.3319	-2,672.1104
	(1.796)	(13.109)	(1.987)	(1.842)	(0.000)
Observations	3,736	370	4,440	4,245	338
Birth cohort effect	YES	YES	YES	YES	YES
FGC	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In Table 4, I replace the control variable for cognitive ability—from IQ to memory and the number sequence test (ns_w). Compared with the original regression, the new model utilizes these two more objective variables to control for cognitive ability, albeit with fewer observations. The results are almost identical to those of the original regression, indicating that IQ, despite being measured subjectively, remains a reliable control variable in the regression analysis.

5. Mechanism and Extensions

In this section, I will explore the potential pathways through which birth order may influence occupation, dividing them into non-cognitive ability, cognitive ability, and education.

5.1 Non-cognitive Ability

Non-cognitive ability likely plays a significant role in influencing individuals' occupation. Lindqvist and Vestman (2011) find that people with higher non-cognitive ability are less likely to be unemployed. Sulloway (1996) and Black et al. (2018) suggest that first-borns are more likely than later-borns to assume leadership positions due to traits such as conscientiousness, ambition, persistence, and assertiveness. These traits align with execution skills, identified as the second most important shared characteristic of CEOs by Kaplan et al. (2012).

In the previous regression result, we observed that birth order has a certain influence on occupational outcomes. In this chapter, I aim to confirm whether birth order affects occupational outcomes by influencing non-cognitive ability.

To determine whether birth order influences occupational outcomes through a specific non-cognitive ability, we need to introduce interaction terms between birth order and correspondent ability into our regression.

In previous regressions, we found that non-cognitive ability significantly influences employment as a manager or being self-employed, but its impact on attaining top managerial positions and creative occupations is less significant. This could be due to the limited number of observations in the dateset for top managers and creative occupations. Therefore, in subsequent regressions, I excluded these two categories and focus only on the remaining three.From Table 4-6 are the regression results.

Table 5: Regression Result of Occupational Outcomes with Social ability Interaction Term

VARIABLES	manager	employed	self_employed
gender	0.6627***	0.3103**	0.6549***
	(0.241)	(0.121)	(0.169)
2.birth_order	-0.9884	0.6521	-0.4825
	(0.866)	(0.409)	(0.559)
3.birth_order	0.0304	0.3523	0.3125
	(1.050)	(0.477)	(0.635)
4.birth_order	-0.5130	0.9417	0.2636
	(1.328)	(0.584)	(0.780)
5.birth_order	-0.4761	1.9722**	-0.3516
	(2.030)	(0.861)	(1.146)
social ability	0.1021	0.1577***	-0.0299
	(0.070)	(0.036)	(0.049)
well being	0.0793	0.1442***	-0.0207
	(0.068)	(0.033)	(0.044)
optimism	0.1487**	-0.2526***	0.1102***
	(0.063)	(0.030)	(0.042)
1.gender#2.birth_order	0.5525	0.0862	-0.1214
	(0.362)	(0.175)	(0.245)
1.gender#3.birth_order	-0.3873	0.0803	-0.1614
	(0.404)	(0.192)	(0.268)
1.gender#4.birth_order	0.3585	0.1524	0.0245
	(0.498)	(0.232)	(0.328)
1.gender#5.birth_order	0.1028	-0.3003	0.0912
	(0.757)	(0.329)	(0.438)
2.birth_order#c.social ability	0.0752	-0.0805*	0.0718
	(0.097)	(0.048)	(0.065)
3.birth_order#c.social ability	0.0335	-0.0333	-0.0208
	(0.118)	(0.056)	(0.075)
4.birth_order#c.social ability	0.0835	-0.0689	-0.0195
	(0.147)	(0.068)	(0.090)
5.birth_order#c.social ability	0.0853	-0.1401	0.0709
	(0.218)	(0.097)	(0.128)
Constant	-5.3194***	-1.3987	-3.1107***
	(1.628)	(1.246)	(0.897)
Observations	6,428	6,992	6,964
Birth cohort effect	YES	YES	YES
FGC	YES	YES	YES
Family_edu FE	YES	YES	YES
Cognitive ability FE	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Regression Result of Occupation with Well-being Interaction Term

VARIABLES	manager	employed	self_employed
gender	0.6607***	0.3013**	0.6518***
	(0.240)	(0.121)	(0.169)
2.birth_order	-1.0872*	0.0696	-0.5539
	(0.648)	(0.303)	(0.413)
3.birth_order	-0.1156	-0.1751	-0.3205
	(0.790)	(0.354)	(0.479)
4.birth_order	-0.8442	0.4592	0.0887
	(0.977)	(0.418)	(0.562)
5.birth_order	-0.6236	0.9223	0.8235
	(1.426)	(0.598)	(0.765)
social ability	0.1456***	0.1097***	-0.0087
	(0.045)	(0.022)	(0.030)
well being	-0.0339	0.1437***	-0.0895
	(0.104)	(0.053)	(0.070)
optimism	0.1483**	-0.2523***	0.1066**
	(0.063)	(0.030)	(0.042)
1.gender#2.birth_order	0.5619	0.0854	-0.1104
	(0.362)	(0.175)	(0.245)
1.gender#3.birth_order	-0.3865	0.0937	-0.1610
	(0.404)	(0.193)	(0.268)
1.gender#4.birth_order	0.3704	0.1586	0.0353
	(0.498)	(0.232)	(0.328)
1.gender#5.birth_order	0.1129	-0.2498	0.0462
	(0.753)	(0.327)	(0.435)
2.birth_order#c.well being	0.1779	-0.0195	0.1658*
	(0.142)	(0.070)	(0.094)
3.birth_order#c.well being	0.1051	0.0629	0.1190
	(0.176)	(0.083)	(0.110)
4.birth_order#c.well being	0.2521	-0.0224	0.0018
	(0.213)	(0.097)	(0.128)
5.birth_order#c.well being	0.2091	-0.0340	-0.1467
	(0.303)	(0.137)	(0.178)
Constant	-5.2627***	-1.0237	-3.0213***
	(1.589)	(1.240)	(0.866)
Observations	6,428	6,992	6,964
Birth cohort effect	YES	YES	YES
FGC	YES	YES	YES
Family_edu FE	YES	YES	YES
Cognitive ability FE	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression Result of Occupation with Optimism Interaction Term

VARIABLES	manager	employed	self_employed
gender	0.6757***	0.3024**	0.6596***
	(0.240)	(0.121)	(0.169)
2.birth_order	-0.5970	-0.1966	0.1166
	(0.574)	(0.268)	(0.394)
3.birth_order	-0.3652	-0.2521	0.3285
	(0.725)	(0.307)	(0.448)
4.birth_order	-1.5923*	0.2161	0.2033
	(0.941)	(0.364)	(0.538)
5.birth_order	0.5426	1.3237**	1.4570**
	(1.277)	(0.559)	(0.728)
social ability	0.1463***	0.1097***	-0.0092
	(0.045)	(0.022)	(0.030)
well-being	0.0784	0.1447***	-0.0226
	(0.068)	(0.033)	(0.044)
optimism	0.0583	-0.2843***	0.1387**
	(0.094)	(0.049)	(0.069)
1.gender#2.birth_order	0.5435	0.0796	-0.1206
	(0.362)	(0.175)	(0.245)
1.gender#3.birth_order	-0.4108	0.0770	-0.1745
	(0.405)	(0.193)	(0.268)
1.gender#4.birth_order	0.3360	0.1586	0.0280
	(0.500)	(0.232)	(0.328)
1.gender#5.birth_order	0.0382	-0.2311	0.0830
	(0.751)	(0.328)	(0.435)
2.birth_order#c.optimism	0.0633	0.0500	-0.0024
	(0.129)	(0.064)	(0.091)
3.birth_order#c.optimism	0.1723	0.0878	-0.0450
	(0.166)	(0.074)	(0.105)
4.birth_order#c.optimism	0.4467**	0.0413	-0.0245
	(0.207)	(0.088)	(0.124)
5.birth_order#c.optimism	-0.0636	-0.1443	-0.3157*
	(0.282)	(0.134)	(0.173)
Constant	-5.3113***	-0.8787	-3.3787***
	(1.590)	(1.231)	(0.869)
Observations	6,428	6,992	6,964
Birth cohort effect	YES	YES	YES
FGC	YES	YES	YES
Family_edu FE	YES	YES	YES
Cognitive ability FE	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

For Table 5, in column 2, we observe that although social ability has a positive effect on becoming employed, the interaction term between birth order and social ability is not significant. Therefore, we cannot conclude that social ability serves as a channel for the birth order effect.

For Table 6, upon adding the interaction term, we find that the birth order effect becomes insignificant, and the interaction term is also not significant. Thus, we can conclude that well-being is not a channel through which birth order influences occupation.

In Table 7, in the first column, we note that when birth order is equal to 4, the likelihood of becoming a manager is lower compared to the first-born child. However, when the interaction term shows a higher optimism score, the fourth-born child's likelihood of becoming a manager increases by 40%. In the third column, we observe that if fifth-born children are more optimistic, their likelihood of becoming self-employed decreases, despite their already high propensity for self-employment.

Based on the results I have obtained, we can infer that although non-cognitive abilities have impact on occupation, they are not the pathways through which birth order affects occupation. That is, we did not see strong significance in the interaction terms.

5.2 Cognitive Ability

In addition to non-cognitive ability, cognitive ability may also serve as a channel for the

birth order effect. Several studies have suggested a negative correlation between birth order and IQ, as well as educational achievements (Black et al., 2005; Booth and Kee, 2009; De Haan, 2010). Given this correlation and in view of on Lindqvist and Vestman's (2011) conclusion that cognitive ability is more crucial for achieving success in the labor market, it is reasonable to consider cognitive ability as a potential channel for the birth order effect.

Table 2 shows that the birth order affects the number series test score with the third-born and fifth-born child outperforming the first-born child on average. Next I use the number series score to test whether the cognitive ability severs a channel for the birth order.

Table 8: Regression with Cognitive Ability Interaction Term

VARIABLES	manager	top_manager	employed	self_employed	creative_occupations
gender	0.8063***	-0.0798	0.3400***	0.6291***	-0.4014
	(0.189)	(1.042)	(0.085)	(0.120)	(1.207)
2.birth_order	-1.7011	4.4547	-1.0599	1.2249	-24.2700
	(2.772)	(12.179)	(1.094)	(1.495)	(18.114)
3.birth_order	0.0891	-19.8672	0.0340	-1.0077	-17.4683
	(3.089)	(25.825)	(1.253)	(1.846)	(18.808)
4.birth_order	-1.9770	-0.9546	2.5002*	2.0433	
	(4.004)	(27.325)	(1.374)	(1.961)	
5.birth_order	3.7591	-1,455.9387	2.9405	-4.8730	-21.9531
	(6.659)	(123,536.74)	(2.177)	(4.109)	(43.712)
Social ability	0.1948***	0.2179	0.0981***	0.0163	0.0469
	(0.062)	(0.251)	(0.028)	(0.038)	(0.345)
Well-being	0.1209	0.7689	0.1857***	-0.0794	0.5684
	(0.094)	(0.523)	(0.043)	(0.058)	(0.650)
Optimism	0.1765**	0.1287	-0.2571***	0.1218**	-0.3735
	(0.085)	(0.407)	(0.038)	(0.054)	(0.436)
ns_w	0.0107***	0.0277*	0.0097***	0.0049**	-0.0133
	(0.004)	(0.017)	(0.002)	(0.002)	(0.021)
2.birth_order#c.ns_w	0.0034	-0.0096	0.0021	-0.0021	0.0501
	(0.005)	(0.023)	(0.002)	(0.003)	(0.035)
3.birth_order#c.ns_w	0.0002	0.0371	0.0003	0.0020	0.0411
	(0.006)	(0.048)	(0.002)	(0.004)	(0.037)
4.birth_order#c.ns_w	0.0043	0.0039	-0.0040	-0.0038	
	(0.008)	(0.052)	(0.003)	(0.004)	
5.birth_order#c.ns_w	-0.0080	2.7525	-0.0039	0.0098	0.0415
	(0.013)	(234.181)	(0.004)	(0.008)	(0.087)
Constant	-13.1864***	-23.6604**	-5.7827***	-3.5503**	-0.8214
	(2.175)	(9.834)	(1.823)	(1.807)	(11.084)
Observations	3,799	610	4,440	4,281	493
Birth cohort effect	YES	YES	YES	YES	YES
FGC	YES	YES	YES	YES	YES
Family_edu FE	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

From Table 8, we can see that although the number series score has a positive impact on various occupations, the interaction term is not significant. Thus, we cannot conclude that birth order influences occupation through its effect on cognitive ability. There may be other pathways involved.

In this section, we investigate whether birth order affects employment through its influence on non-cognitive and cognitive abilities. To do so, we introduce interaction terms between birth order and each of these abilities into our regression models. However, the results from Table 8 indicate that while birth order has a significant effect on occupation outcomes, this effect is not mediated through either non-cognitive or cognitive abilities. This suggests that other channels may be at play in explaining the relationship between birth order and employment.

5.3 Extension of the Research

In my Extension Research, I use the adult data and child data from CFPS 2010 baseline survey to study the birth order effect on the educational attainment and parental caring.

5.3.1 Educational attainment

Educational attainment is strongly associated with employment outcomes. While birth order may not directly affect employment through its influence on cognitive ability, it could potentially have an indirect impact on occupational attainment through educational attainment. Therefore, I first investigate the relationship between birth order and educational

attainment. Subsequently, I regress birth order and education level on employment to assess whether educational attainment serves as a channel through which birth order influences occupational outcomes.

I add the years of education variable into model 1 to construct the model 3:

$$Y_{ij} = \alpha + \theta gender_{ij} + \sum_{k=2}^{5} \beta_k (B_{ij} = k) + \sum_{m=2}^{M} \delta_m (YOB_{ij} = m) + FGC_j + Family\_edu_j + IQ_{ij} + \sum_{k=2}^{5} \gamma_k (gender\_B_{ij}, B_{ij} = k) + \sum_{n=0}^{22} \delta_n (YOE_{ij} = n) + \varepsilon_{ij} . \quad (3)$$

Table 9: The Regression Result on Years of Education

VARIABLES	Years of education	employed	employed
gender	1.1178***	0.6670***	0.5926***
	(0.170)	(0.136)	(0.141)
2.birth_order	-0.3373**	0.0056	0.0753
	(0.151)	(0.129)	(0.136)
3.birth_order	-0.2106	0.1480	0.1987
	(0.172)	(0.148)	(0.156)
4.birth_order	0.6108***	0.5487***	0.4758**
	(0.215)	(0.187)	(0.195)
5.birth_order	1.4317***	1.2340***	0.9877***
	(0.322)	(0.263)	(0.277)
1.gender#2.birth_order	0.3614	0.0775	-0.0019
	(0.244)	(0.197)	(0.206)
1.gender#3.birth_order	0.6014**	0.0146	-0.1661
	(0.265)	(0.216)	(0.225)
1.gender#4.birth_order	0.1686	-0.0208	-0.0896
	(0.316)	(0.255)	(0.265)
1.gender#5.birth_order	-0.9880**	-0.7423**	-0.5409
	(0.450)	(0.359)	(0.374)
Number series test	0.0323***	0.0095***	0.0036***
	(0.001)	(0.001)	(0.001)
Years of education			0.2344***
			(0.011)
Constant	-12.8639***	-6.8279***	-5.4151***
	(2.444)	(1.246)	(1.293)
Observations	7,979	7,680	7,680
R-squared	0.390		
Birth cohort effect	YES	YES	YES
FGC	YES	YES	YES
Family_edu FE	YES	YES	YES
cognitive ability FE	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

For the first column, we regress birth order on the years of education. After we control for those variables that may affect the education level, the birth order and gender can still have impact on the education level. From the Table 8, the male receive 1.178 years more education than female on average, and the second-born children have 0.33 years of less education than the first-born children, while the fourth-born and fifth-born children, on average, have 0.68 and 1.43 more years of education than the first-born, respectively. When the birth order equal 3, males are more likely to be employed than females, and when the birth order equal 5, females have advantage in employment.

For the second and third columns, we observe that the coefficient for birth order 4 and birth order 5, years of education are significant, which shows educational attainment is a channel for birth order to affect the employment.

5.3.2 Parental care

According to Blake's resource dilution theory, birth order effect originates in parental resources allocation. It says that as families get bigger, each new child gets less attention and resources from parents because they have to be shared among more kids. Black, Grönqvist, and Öckert (2018) support this idea. They found that parents spent less time helping later-born kids with their schoolwork. In my research, I assess parental care by three sets of questions, and I categorize the three sets of questions into three variables: parents' strictness level, parents' frequency of helping with homework, and parents' company time.

For the strictness level I use a set of questions in the survey to measure the strictness level of the parents. The variable are as follows:

wf602——talk about school

wf603——require to finish homework

wf604——frequency check homework

wf605——frequency stop watch TV

wf606——frequency of stopping child from watch specific TV channel

The score ranks from 1-5, 1 means highest frequency, 5 means never do it, so the total score of strictness rank from 5-25,the smaller the number is the stricter the parents are.

The frequency of helping with homework, measures the weekly hours family member spend on tutoring homework of the child.

The Parent's company time is based on 3 different questions: it records the frequency of the corresponding behavior in a month, which includes the frequency of reading to child, the frequency of buying books for child, and the frequency of taking child to play outside.I present a novel model to estimate the impact. In this model, utilizing children's data where siblings share the same family ID, I incorporate the family ID as a control for family fixed effects. Additionally, I refrain from using the year of birth variable to account for cohort effects. Instead, I employ age to control for birth cohort effects since I exclusively utilize data from the 2010s, where age should play the same role as the year of birth variable. Below is the regression model:

$$Y_{ij} = \alpha + \theta gender_{ij} + \sum_{k=2}^{5} \beta_k (B_{ij} = k) + \sum_{m=2}^{M} \delta_m (age_{ij} = m) + \tau + \varepsilon_{ij}. \quad (4)$$

The outcome variable, denoted as Y_{ij}, alternatively includes strict level of parents, the time parents use to help with the homework and parents' company time. B_{ij} is the birth order, age_{ij} is the age of children, τ is the family fixed effect.

Table 10: The Regression Results on the Parental Caring

VARIABLES	Strict	Homework	Parents_company
gender	-1.2945	-0.3299	0.0690
	(1.237)	(0.283)	(0.144)
birth_order2	0.5948	-0.0969	-0.1683
	(1.746)	(0.400)	(0.204)
birth_order3	7.0033**	0.2738	-0.2898
	(3.006)	(0.689)	(0.351)
birth_order4	10.6342**	0.4648	0.1691
	(4.976)	(1.140)	(0.580)
birth_order5	15.8906**	1.2711	2.3895***
	(7.445)	(1.705)	(0.868)
1.age	2.2832	0.4366	0.1405
	(2.440)	(0.559)	(0.284)
2.age	4.3133*	-0.0519	0.1558
	(2.480)	(0.568)	(0.289)
3.age	5.3313*	0.7588	28.1793***
	(2.941)	(0.674)	(0.343)
7.age	102.7882***	5.1313***	-0.0408
	(3.330)	(0.763)	(0.388)
11.age	92.4585***	3.2863***	0.2732
	(3.787)	(0.868)	(0.442)
15.age	88.8794***	1.9686*	0.2203
	(4.939)	(1.131)	(0.576)
Constant	-30.4585**	3.7137	-24.2732***
	(12.709)	(2.911)	(1.482)
Observations	1,678	1,678	1,678
R-squared	0.986	0.814	0.996
Family FE	YES	YES	YES
Birth Cohort FE	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

From Table 11 we can see that birth order will have effect on the strict level of parents and Parental company time. There is a significant pattern that with increase of the birth order, the strict level will gradually decrease. In other words, parents tend to treat the first-born child stricter than later-borns. This aligns with the results of Hotz & Pantano (2015), that the fifth-born child will receive more parental company than the first-born.

6. Conclusion

In this paper, I have delved into the intricate relationship between birth order and various life outcomes, including cognitive ability, non-cognitive ability, and occupational outcomes. Through regression analysis, three key empirical conclusions emerge:

Firstly, birth order significantly influences cognitive abilities, with later-born children, particularly those in the third and fifth positions, exhibiting higher cognitive ability compared to their firstborn counterparts. Secondly, birth order influences non-cognitive abilities, with fifth-born children showing better social skills and firstborns displaying higher levels of optimism.Thirdly, while birth order does not suggest managerial roles, it does play a role in the likelihood of employment, with the fourth and fifth-born children demonstrating higher likelihood of employment.

Overall, these findings suggest that birth order does not predetermine leadership roles but does correlate with employment probabilities, with later-born individuals being more likely to secure employment. Additionally, firstborns tend to exhibit greater optimism, whereas later-borns, particularly fifth-borns, demonstrate enhanced social and cognitive abilities. Interestingly, these patterns contrast with mainstream studies in developed countries, where birth order typically exhibits a negative relationship with cognitive abilities and occupational outcomes. Drawing from De Haan et al's (2014) insights, this discrepancy may be attributed to financial constraints, particularly prevalent in underdeveloped countries like China in the last century.

Furthermore, post-birth environmental factors, such as varying parental treatment based on birth order, emerge as significant contributors to these patterns. Consistent with Hotz and Pantano's (2015) findings on parental behavior, my research indicates that parents typically adopt stricter parenting approaches towards first-born children while being less strict with younger siblings. Additionally, they tend to invest more time and attention in the upbringing of later-born children.

However, this study faces several limitations. Firstly, the reliance on self-reported non-cognitive ability variables may introduce measurement biases. Secondly, the saturation issue within the regression model, compounded by limited observations, may hinder the accurate reflection of birth order impacts. For instance, in the dataset, there are fewer than 40 top-managers, but the classification variables exceed this number. Finally, causal inferences are constrained by potential omitted variables and simultaneity issues, particularly concerning non-cognitive ability and occupational outcomes. For example, it is challenging to ascertain the causality behind the observation that optimistic individuals are more likely to become managers. It is plausible that individuals become optimistic as they ascend to managerial positions, rather than optimism predisposing them to such roles.

In conclusion, while this study sheds light on the interplay between birth order and life outcomes, further research addressing the limitations just described is warranted in order to deepen our understanding of this complex phenomenon.

Appendix:Supplementary Tables

TableA1:Descriptive statistics

Variable	Mean	SD
Age	43.819	13.127
Gender	0.469	0.499
Years of education	7.564	4.421
Father's year of education	4.428	4.48
Mother's year of education	2.375	3.706
Birth order	2.175	1.12
Sibling number	3.452	1.082
Social ability	8.06	1.47
Happiness	3.838	1.011
Optimism	3.684	1.115
Depression	27.062	3.735
Manager	0.035	0.184
Top manager	0.002	0.043
Creative occupation	0.002	0.047
Employed	0.23	0.421
Self employed	0.07	0.256
Number of families		8,491
Number of observations		12,627

Table A2. Average non-cognitive and cognitive abilities, by occupational status

	Non-cognitive ability				Cognitive ability
	well-being	optimism	Social ability	Not depression	
Employed	4.001	3.779	8.271	27.611	5.416
[n=2872]	(0.927)	(1.045)	(1.349)	(3.119)	(1.052)
whereof:					
- Top managers	4.304	3.87	8.552	26.826	5.870
[n=23]	(0.822)	(0.815)	(1.344)	(3.762)	(0.869)
- Managers	4.155	4.011	8.542	27.949	5.726
[n=354]	(0.818)	(0.897)	(1.209)	(2.416)	(1.016)
- Creative occupations	4.238	3.952	8.714	27.667	6.095
[n=21]	(0.768)	(0.921)	(1.056)	(2.708)	(0.831)
Self-employed	3.927	3.943	8.173	27.631	5.223
[n=924]	(0.948)	(1.011)	(1.385)	(2.939)	(1.044)
whereof:					
- Top managers	4.333	4.667	8.500	27.667	5.833
[n=6]	(0.816)	(0.516)	(1.761)	(3.386)	(0.983)
- Managers	4.143	4.414	8.643	27.143	5.571
[n=70]	(0.905)	(0.985)	(1.330)	(3.527)	(1.057)
- Creative occupations	3.000	5.000	9.500	29	5.000
[n=2]	(0.000)	(0.000)	(0.707)	(0.000)	(0.000)
Not employed	3.859	3.607	8.023	26.933	4.881
[n=5247]	(1.019)	(1.153)	(1.509)	(3.874)	(1.232)
Farmer	3.793	3.764	7.973	26.944	4.699
[n=3229]	(1.017)	(1.093)	(1.496)	(3.765)	(1.202)
Observations	12,272	12,272	12,272	12,272	12,272

Note: Table 2 is constructed based on cleaned data. For each column, it presents the mean value and standard deviation. Non-cognitive ability is assessed using questions ranked from 1 to 5. Social ability is the sum of two questions, resulting in a range from 2 to 10. The absence of depression is measured as the sum of six questions, ranging from 5 to 30. Cognitive ability is ranked from 1 to 7.

Table A3: Descriptive statistics for Family size and Birth order

Family Size	Birth Order					
	1	2	3	4	5	Total
2	1,650	1,573	0	0	0	3,223
3	1,229	1,180	1,101	0	0	3,510
4	820	858	812	751	0	3,241
5	553	543	547	511	498	2,652
Total	4,252	4,154	2,460	1,262	498	12,626

Table A4: Descriptive statistics for Occupations by Birth order and Family size

	Family size				Birth order				
	2	3	4	5	1	2	3	4	5
Top_manager	10	11	4	4	14	5	6	3	1
Manager	147	127	92	58	150	147	67	44	16
Employed	994	849	614	415	979	997	494	288	114
Self_employed	276	265	208	174	289	310	173	104	47
Creative_occupation	9	8	1	5	6	10	6	0	1

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