

The influence of sibling structure on adolescent mental health: From the perspective of economics

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Abstract: Based on the data of the 2013-2014 China Education Panel Survey (CEPS), with multiple regression (OLS) and propensity score matching (PSM) regression methods, this paper analyzes the effects of sibling structure on adolescent mental health from the theoretical level. Results show that firstly, the only child will have an impact on the mental health development of adolescents. Second, there are gender differences in the impact of being the only child on the mental health development of adolescents, parents are more inclined to boys in resource allocation. The conclusion is that it is of great significance for non-only-child families to rationally allocate "economic resources" and "non-economic resources" in the family, and to improve the discrimination of girls in family education and emotional investment.

1. Introduction

Forming a healthy and mature personality is one of the core goals of education, and teenagers and children are the key groups in education. Focusing on the mental health of teenagers is the needs of the development of The Times and the requirements of national policies. In recent years, the problem of adolescent mental health has gradually become the focus of social attention, such as "autism", "depression", "suicide" and other related problems occur frequently. According to data released by the National Health Commission of the PRC in 2018, about 30 million Chinese children under the age of 17 suffer from various emotional disorders, learning and behavior problems caused by psychological pressure. According to the World Health Organization, mental disorders will increase by more than 50 percent in the next 20 years, and will become one of the major causes of illness, disability and death among children worldwide. What's more, mental health inequality is the most fundamental inequality in human society [1]. The mental health of teenagers not only affects their current learning and life, but also has a lasting impact on their physical and mental health in adulthood. It has become the common goal of researchers in various disciplines to understand the mental health status of adolescents and children, clarify its influence mechanism and put forward effective countermeasures.

For a long time, relevant literature has found that the development of adolescent mental health is mainly affected by the family and school environment. Family is the most important socialization place for teenagers, and family life experience is crucial to the growth and future development of children. Family structure is closely related to the healthy development of teenagers. In the process of family structure change, children will encounter psychological difficulties and challenges in parent-child attachment, psychological jealousy, parental bias, and sibling competition, which will further lead to psychological adjustment and behavioral problems[2]. Based on relevant studies, the concept of family structure mainly includes the following three types: (1) Family population size as a family structure, that is, a family of four may have three situations: two husband and wife raising two children together, two elderly people living with two children, or a middle-aged person living with one child living with two elderly people; (2) Family living arrangement as a family structure, that is, parents and children live together, only mother and children live, only father and children live, and parents do not live with children; (3) the number of minors as family structure or sibling structure, that is, whether it is a one-child family, the number of minor children and the ranking of minor children. According to relevant literature, family background factors such as family size and parents' living arrangement are frequently mentioned as the most critical factors affecting adolescent mental health.

2. Literature review

Structuralism and relationalism are two mainstream perspectives for understanding social phenomena and mechanisms of action, and are also suitable for analyzing the stratification of individual physical and mental health. Social causality theory believes that there is a phenomenon of "status syndrome" in physical and mental health, that is, the lower the social and economic status, the worse the physical and mental health of an individual[3]. The higher the socioeconomic status of the individual is, the more opportunities are to obtain economic and social resources, the stronger the ability to deal with negative events in life is, the less psychological pressure is, and thus the better the mental health status[4]. The interpersonal network view holds that social relationships are a key factor in an individual's physical and mental health. Among them, Yao Yuan and Zhang Shun summarized the mechanism of the influence of interpersonal network on individual physical and mental health from the perspectives of social support theory, social norm theory and resource access theory[5]. How does compatriot structure affect teenagers' mental health? The influence mechanism of adolescent and child mental health is similar to the above analysis. Scholars in different fields have put forward a variety of theoretical explanations. After combing the relevant literature, it is found that the explanations are mainly from two perspectives. First, under the condition of limited resources, the family resource decision-making theory with the goal of maximizing benefits, namely "resource dilution theory"; The other is the influence of the relationship between compatriots on the development of individual mental health, namely the "communication and interaction theory"[6].

2.1 Resource scarcity theory

In the field of economics, family structure, represented by the number and structure of siblings, has a significant impact on adolescent behavior development. Anastasi, a foreign scholar, believes that the increase in the number of sibs and the shortening of Sibling spacing will reduce parents' input in each child's resources, namely the Sibling resource dilution hypothesis[7]. According to the "quantit-quality equilibrium theory" proposed by Becker, with a certain amount of public education input, fertility decline and family size reduction can release family credit constraints, help the limited educational resources in families to cluster to a small number of school-age children, and effectively improve the children's college enrollment rate and average education years[8]. Blake

proposed a similar "resource dilution theory", which holds that under the given conditions of co-resident educational resources, the increase in the number of siblings will definitely dilute a single child's access to educational resources, which will further affect individual educational achievement, and there will be an educational crowding effect among siblings[9]. The resources given by parents to their children include not only material resources (economic resources), but also cultural resources[10], emotional resources[11] (non-economic resources). The mechanism of emotional resource dilution is similar to that of material resource dilution: Parents in one-child families give all their care to their children, while in multi-child families, parents have to "share rain and dew" with their children, emotional resources are diluted, and non-one-child children get relatively less emotional resources.

2.2 Communication and interaction theory

According to The Ecological systems Theory and family-systems Theory, the interaction and connection between Family systems will have a significant impact on children's social and emotional development. Tenikue found that for minor children from non-one-child families, on the one hand, there is a phenomenon of "dilution of family resources", but on the other hand, there is also a "scale effect" of shared parental resources and a "feedback effect" among multiple children[12]. In other words, there is a feedback effect in two aspects of the interaction between older children, residential resources and children. Studies in sociology and psychology have confirmed that children of different birth order play different roles in psychological theory and each plays a certain role in the interaction between siblings. Qian takes Chinese rural children as research objects and finds that older children can obtain "educational benefits" in the process of tutoring younger children, thus improving their education level[13]. Zhao Dongmei and Liao Hongling found that the elder children learn to communicate with their younger brothers and sisters in the process of imparts knowledge, thus improving their mental health level, while the younger children can gain social interaction experience in advance for their future peers through learning and imitating their older brothers and sisters, thus promoting their psychological development[14].

-The only child will have an impact on the mental health development of adolescents (Hypothesis 1).

Existing studies abroad have examined gender differences in mental health by examining sibling structure. However, in the special reality of China, we have reason to believe that there are some gender differences in this effect. China has long been influenced by the traditional culture of "son preference", "married daughters, spilled water", that is, carrying on the family line, old-age security, providing labor force, strengthening family power, etc. Based on the analysis from the perspective of "cost-benefit", parents are more inclined to girls in resource allocation, compared with girls, Boys contribute more to the family than girls do. In addition, in the education of children, parents also have differences in the way boys and girls are educated. The difference in family treatment will emphasize the gender social roles of children, for example, boys are more aggressive and brave, while girls are more cautious and patient. Chandola, Tiwari, a foreign scholar, concluded through data analysis that older children are lower in "social ability", "self-confidence" and "ambition", and the probability of older children suffering from mental illness is higher than that of women [15]. In families of only daughters, especially in cities, only daughters are spoiled by parents and elders, and only daughters will show docile, well-behaved, withdrawn and other characteristics, while in families of other than only daughters, girls not only have to deal with the relationship between brothers and sisters, but also help their parents do housework, so they have a higher ability to work life, social adaptation and difficulties than only daughters. This suggests that girls are more likely to be influenced by the structure of their compatriots.

There are gender differences in the impact of being the only child on the mental health development of adolescents (Hypothesis 2).

3. Data source and model construction

3.1 Data introduction

This paper uses the baseline data of "China Education Panel Survey (CEPS)" of the China Survey and Data Center of Renmin University of China for the academic year 2013-2014. The survey adopts the multi-stage probability-to-scale (PPS) sampling method, taking the first grade of junior middle school (Grade 7) and the third grade of junior middle school (Grade 9) as the starting point, and taking the average education level of the population and the proportion of floating population as stratified variables, 28 county-level units (counties, districts and cities) are randomly selected as the investigation points. The execution of the survey was based on schools. 112 schools and 438 classes were randomly selected from the selected county-level units for investigation. All the students in the selected classes were sampled. The baseline sample size was 19,487 students. After data processing and deletion of missing values, the final sample size included in the analysis was 18,940.

3.2 Model construction and variable selection

In order to investigate the influence of only child and sibling structure on adolescent mental health development and gender differences, this paper constructs the formula (1) OLS regression model of only child and mental health, and the formula (2) OLS regression model of sibling structure and mental health, respectively, as follows:

$$\ln_xl_i = \alpha_1 + \beta_1 \text{only_}d_i + X_i' \gamma_1 + \mu_i' \quad (1)$$

$$\ln_xl_i = \alpha_2 + \beta_2 \text{tongbao_}d_i + X_i' \gamma_2 + \mu_i' \quad (2)$$

Where, xl represents the development level of adolescent mental health, α_1 and α_2 represent the effect of $\text{only_}d$ and $\text{tongbao_}d$ dependent variables, respectively. X and μ represent control variables and random perturbation terms, respectively. The details are as follows:

Explained variables: Reference to existing research and questionnaire content setting: "Mental health" According to the question "Have you felt the following in the past seven days?" in the CEPS questionnaire, including: depression, depression, unhappiness, sadness, life is meaningless. This paper uses negative assignment, assigning values 1-5 to "always", "often", "sometimes", "rarely" and "never" in order to sum up the above five questions to represent the change level of adolescent mental health. A larger value of the allocation indicates a better psychological state.

Core explanatory variables: this paper chooses whether the only child and sibling structure as the core explanatory variables. Among the questions in the questionnaire, "How many brothers do you have, how many sisters do you have, how many brothers do you have, how many sisters do you have", if the answer is 0, it is defined as no brother (or no sister, or no brother, or no sister), if the answer is greater than 0, it is defined as having an older brother (or sister, or brother, or sister).

The control variables were the basic characteristics of individual students, parents and families, including age, gender, household registration, grade, number of friends and academic performance in the characteristics of students; Parental characteristics include: mother's education level, father's education level, parents' relationship; Family characteristics include variables such as family economic status, and the living conditions of parents and children.

4. Empirical results and regression diagnosis

Table 1: Influence of only child or not on adolescent mental health

	(1)	(2)	(3)	(4)	(5)
Variables	Mental health	Mental health	Mental health	Mental health	Mental health
	Full sample	Full sample	Full sample	Boys	Girls
1= not an only child; 0= only	0.410 *** (0.0611)	0.268 *** (0.0636)	0.173 ** (0.0733)	0.0928 (0.104)	0.275 *** (0.103)
Age		0.301 *** (0.0433)	0.157 *** (0.0450)	0.130 ** (0.0648)	0.188 *** (0.0619)
Gender		0.304 *** (0.0635)	0.287 *** (0.0636)		
Number of good friends		0.0124 *** (0.00250)	0.0120 *** (0.00254)	0.00688 ** (0.00307)	0.0286 *** (0.00385)
Academic record (logarithm)		2.293 *** (0.263)	2.100 *** (0.266)	1.860 *** (0.351)	2.525 *** (0.399)
Grade		0.169 (0.109)	0.438 *** (0.111)	0.439 *** (0.160)	0.396 *** (0.152)
Fatherhood education			0.0338 (0.0398)	0.0368 (0.0588)	0.0322 (0.0532)
Mother education			0.111 *** (0.0392)	0.0803 (0.0573)	0.139 *** (0.0529)
Parental relationship			1.426 *** (0.0969)	1.319 *** (0.140)	1.544 *** (0.132)
Medium (ref: Poverty)			0.596 *** (0.0803)	0.649 *** (0.118)	0.528 *** (0.108)
Affluence (see: poverty)			0.682 *** (0.155)	0.732 *** (0.221)	0.642 *** (0.214)
Only mother to live with (See: Both parents live together)			0.121 (0.110)	0.240 (0.156)	0.0165 (0.153)
Only father to live with (See: Both parents live together)			0.105 (0.176)	0.0632 (0.230)	0.321 (0.274)
Neither parent lives in the same house (See: Both parents live together)			0.473 *** (0.106)	0.538 *** (0.155)	0.399 *** (0.144)
Domicile			0.191 *** (0.0731)	0.109 (0.106)	0.287 *** (0.100)
Central (ref: Eastern)			0.278 *** (0.0791)	0.251 ** (0.117)	0.319 *** (0.106)
Western (ref: Eastern)			0.729 *** (0.0791)	0.673 *** (0.116)	0.799 *** (0.108)
Constant term	19.80 *** (0.0478)	14.18 *** (1.310)	11.28 *** (1.340)	12.41 *** (1.807)	9.635 *** (1.963)
Sample size	18794	17459	16742	8420	8322
R-squared	0.002	0.023	0.054	0.043	0.071

In order to enhance the scientific and reliability of the empirical results, the method of gradually adding control variables on the basis of the core explanatory variables was fitted with regression for many times to analyze the impact of sibling structure on adolescent mental health. First of all, in

model 1, only whether the key core variable is the only child is introduced, and the correlation between the explanatory variable and the explained variable is investigated. Secondly, Model 2 adds individual basic characteristic dimension variables on the basis of model 1; Finally, Model 3 adds the characteristics dimension variables of parents and family on the basis of model 2, and the detailed results are shown in Table 1.

As can be seen from Table 1, columns (1), (2) and (3) respectively show the stepwise regression results of the impact of being the only child or not on adolescent mental health. The estimated coefficients of whether or not the only child passed the significance test at the statistical level of 1% or 5%, and the sign is negative, indicating that non-only child families have a negative impact on the mental health of their children, that is, the mental health level of non-only child is worse than that of the only child (Hypothesis 1). The only child gets all the love of parents, but in non-only child families, children's attention from parents is "diluted" by siblings, and the positive impact of sibling interaction fails to offset the negative impact of "dilution". Columns (4) and (5) show regression results of the effects of being an only child on boys' and girls' mental health, respectively. In (4), the estimated coefficient of whether the child is an only child does not pass the significance test, indicating that non-only-child families have no impact on the mental health of their children, that is, there is no significant difference in the mental health level of non-only-child children compared with the only child. In (5), the estimated coefficients of whether an only child is an only child all pass the significance test at the 1% statistical level, and the sign is negative, and its estimated value is greater than the estimated value in column (3) (estimated coefficient of mixed samples), indicating that non-only child families have a negative impact on girls' mental health, that is, the mental health level of non-only children is worse than that of only children. The degree of negative impact is more serious. To sum up, there are gender differences in the impact of non-only-child families on the mental health of their children, and the negative impact on girls is more serious. The possible reason is that, on the one hand, under the influence of the traditional Chinese culture of "son preference", parents of non-only-child families not only pay attention to the economic resources investment in boys, but also invest more non-economic resources, such as emotional investment and cultural investment. On the other hand, from the perspective of "cost-benefit" of economics, since the return of investing in boys is greater than that of girls, parents are more inclined to boys in resource allocation (Hypothesis 2).

5. Conclusion

Based on the theories of psychology, sociology and economics, the author discusses the impact of sibling structure on the development of adolescent mental health and its microscopic mechanism. With the base period data of China Education Panel Survey (CEPS) for the 2013-2014 academic year, the author uses empirical method to systematically investigate the relationship between the two, and draws the following conclusions: First, The only child will have an impact on the mental health development of adolescents. Scend, there are gender differences in the impact of being the only child on the mental health development of adolescents, parents are more inclined to boys in resource allocation.

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