

Birth Order and Chinese Adolescent Mental Health within the Context of the Three-Child Policy: The Roles of Parenting Styles and Parental Company

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Purpose: The implementation of the three-child policy brings about changes to family structures and resource distributions. However, little research has explored the effects of birth order on adolescent mental health in this context. This study aims to bridge the gap by investigating the relationship between birth order and mental health and discovering the underlying factors.

Patients and Methods: In this cross-sectional study, 3581 adolescents from 42 schools across 17 cities in China were recruited. Data on mental health (the adapted Chinese version of the Strengths and Difficulties Questionnaire, SDQ), parenting styles (the Parenting Styles Scale), birth order, duration of parental company, and demographic characteristics were assessed. Hierarchical multiple regression analysis analyzes the relationships among these factors.

Results: Compared with only-child adolescents, first-borns had higher scores of total SDQ ($\beta = 0.74, p < 0.01$), emotional symptoms ($\beta = 0.22, p < 0.05$), conduct symptoms ($\beta = 0.18, p < 0.01$), and peer relationship symptoms ($\beta = 0.29, p < 0.001$). They experienced less emotionally warm ($\beta = -0.54, p < 0.001$) and trust-encouraged ($\beta = -0.34, p < 0.01$) parenting styles, with shorter durations of parental company ($\beta = -0.26, p < 0.001$). Middle-born adolescents had higher peer relationship symptoms scores and more neglectful parenting styles. Last-born adolescents were more likely to receive spoiled parenting styles.

Conclusion: This study elucidates the effects of birth order on adolescent mental health in the three-child policy era, revealing that parenting styles vary by birth order. First-borns may experience suboptimal parenting styles and shorter parental company, increasing mental health risks. Middle-borns may encounter neglectful parenting styles, while last-borns experience spoiled parenting styles. These findings emphasize the need for tailored support from parents and schools to address each child's unique needs and foster better psychological development. Limitations include reliance on self-reported data and the cross-sectional design that restricts causal inference. Future research should adopt longitudinal designs and explore cultural and regional variations.

Keywords: birth order, parenting style, adolescent mental health, duration of parental company, Chinese adolescents

Introduction

The implementation of the three-child policy, which permits each couple to have up to three children in one family,¹ represents a pivotal shift in demographic strategy in China. As a crucial component of the national initiative to mitigate the economic and healthcare burdens of an aging society, this policy not only marks the end of a three-decade-long era of strict enforcement of the one-child policy,² but also triggers profound changes in family dynamics, reshaping traditional family structures and resource allocation patterns.³ Drawing on the Resource Dilution Theory, which posits that limited parental resources are divided among multiple children,⁴ the transition to multi-child families under the three-child policy



poses unique challenges for adolescents. Adolescents, at a critical stage of psychological development, are particularly vulnerable to these changes. In such families, parents are confronted with the complex tasks of balancing the needs of children with varying birth orders, potentially giving rise to emotional instability and adjustment issues among adolescents as the duration of parental company, attention, and other resources becomes scarcer.⁵ Therefore, the current study endeavors to fill the theoretical and practical gaps by investigating the effects of birth order, various types of parenting styles, and the duration of parental company on adolescent mental health outcomes in the context of the three-child policy to contribute to the refinement of parenting practices and the enhancement of children's overall well-being.

Birth Order and Adolescent Mental Health

The rising mental health challenges among Chinese adolescents have emerged as a critical public health concern, drawing significant attention. The general prevalence of mental disorders among children and adolescents in China stands at approximately 17.5%,⁶ and nearly one in five individuals may experience such issues over their lifetimes.⁷ These psychological problems not only disrupt academic performance,⁸ strain social relationships,⁹ but also have long-term implications for their well-being in adulthood.¹⁰ Consequently, identifying risk and protective factors related to adolescent mental health is of great importance for effective prevention and intervention among Chinese adolescents.

Previous research focusing on the relationship between birth order and mental health outcomes has yielded inconsistent results.¹¹ In Western contexts, a population-based longitudinal study in the UK demonstrated that later-born children were associated with higher risks of suicide attempts and psychiatric disorders.¹² Similarly, findings from Sweden indicated that last-born adolescents may have an increased risk of mental health issues.¹³ Conversely, research conducted in the US suggested that last-born and only-child adolescents exhibited higher levels of happiness compared to their first- and middle-borns.¹⁴ However, the generalizability of these Western-based findings to populations with different sociocultural contexts, such as China, remains uncertain. China's sociocultural characteristics, deeply influenced by Confucian values, place great emphasis on the hierarchical relationship between siblings, with older siblings expected to defer to younger ones. In Chinese families, first-born children initially enjoy exclusive access to parental resources during their early years,¹⁵ which could enhance self-esteem and contribute to healthier mental states.¹⁶ However, they may also face increased mental health risks due to higher levels of parental expectations.¹⁷ In addition, middle-born children often struggle with role ambiguity and receive relatively less parental attention,¹⁸ increasing their vulnerability to psychological disorders. In contrast, last-born adolescents typically benefit from intensified parental investment and emotional support from their siblings, potentially promoting better mental health states.¹⁹ Additionally, only-child adolescents may experience less emotional distress and fewer conduct problems, compared to those with siblings.²⁰

Despite these hypothesized dynamics, empirical research on the effects of birth order on adolescent mental health in China, especially in the context of the three-child policy, remains scarce. This study aims to fill this research gap by exploring the relationship between birth order and adolescent mental health to contribute to the theoretical and practical understanding of the interplay between changes in family structures and adolescent mental health in a unique cultural and policy setting.

Birth Order, Parenting Styles, and Adolescent Mental Health

Parenting styles, a cornerstone in child development research, refer to the consistent attitudes, goals, and emotional environment that parents cultivate during childrearing.²¹ As a fundamental determinant of adolescent emotional development, parenting styles could exert a far-reaching influence on their psychological well-being.²² A widely recognized five-category model classifies parenting styles into authoritarian, emotionally warm, trust-encouraged, spoiled, and neglectful types.²³ Among these styles, parents who adopt emotionally warm and trust-encouraged parenting styles are willing to foster an atmosphere rich in affection, trust, and acceptance. Parents adopting these styles actively demonstrate support through both verbal affirmations and actions, which has been associated with a lower prevalence of adolescent psychological disorders.²⁴ In contrast, authoritarian parenting styles, characterized by low warmth, high control, and rigid discipline, often disregard children's emotional needs.²⁵ This harsh approach has been linked to increased internalizing symptoms.²⁶ Spoiled parenting styles, involving high warmth and low strictness, and neglectful parenting styles, defined by minimal warmth and involvement, typically lead to adverse developmental outcomes for children and adolescents.²⁷

Overall, compared with children raised under positive parenting styles (ie, emotionally warm and trust-encouraged), those experiencing authoritarian, spoiled, and neglectful parenting styles are more prone to develop negative emotions in life, thereby endangering their mental health.

In multi-child families, parenting styles are intricately shaped by birth order, parental expectations, resource allocation, and generational experiences, in line with the Resource Dilution Theory. For instance, first-born children typically experience stricter authoritarian approaches compared to only-child or last-born adolescents,²⁸ as parents may impose higher standards for responsibility and achievement on them, aiming to set an example for younger siblings.²⁹ Conversely, last-born children benefit from parents' accumulated child-rearing experience, often receive more optimal approaches.³⁰ However, this leniency may increase their vulnerability to psychological issues and risk-taking behaviors.³¹ Middle-born children, caught in the interplay between parental expectations and sibling dynamics,³² would receive less parental attention and recognition, leading to lower self-esteem stability and heightened emotional stress during adolescence.³³ In contrast, only-child adolescents tend to experience emotionally warm and trust-encouraged parenting styles, which help them bolster emotional resilience, thus contributing to better mental health.³⁴

Notably, during the transition period of the implementation of the three-child policy in China, the landscape of parenting styles in multi-child families is undergoing rapid transformation. However, empirical research exploring the differences in parenting styles adopted by parents for each child and the effects of parenting styles on adolescent mental health outcomes remains scarce.

Birth Order, Duration of Parental Company, and Adolescent Mental Health

The Resource Dilution Theory provides a foundational framework for understanding the dynamics within multi-child families. It posits that with the addition of each child, there is a proportional dilution in family resources, particularly parental attention and quality time,³⁵ which are integral to individuals' well-being.³⁶ In multi-child families, the arrival of younger siblings results in a significant reallocation of the duration of parental company for each child.³⁷ For example, first-born adolescents initially enjoy a period of undivided parental attention during their early years,³⁸ which nurtures a sense of security and confidence. However, as the family expands, their share of parental company diminishes.³⁹ Furthermore, younger siblings, owing to their developmental needs, demand intensive parental interaction.⁴⁰ This increased focus on younger children may inadvertently marginalize the emotional needs of older adolescents, potentially giving rise to feelings of neglect or inadequacy. In contrast, only-child adolescents benefit from exclusive parental investment, shielded from resource dilution,⁴¹ allowing parents to dedicate ample time to understanding and meeting their needs,⁴² fostering the development of emotional resilience.⁴³ Although previous studies have provided theoretical and empirical evidence supporting the relationship between birth order, duration of parental company, and mental health outcomes, there remains a research gap, especially in the context of China's three-child policy.

The Present Study

Based on empirical research, there is a documented relationship between birth order, parenting styles, duration of parental company, and adolescent mental health outcomes. However, China's unique cultural and policy context, shaped by the long-standing one-child policy and further transformed by the subsequent three-child policy, has rendered distinct psychological differences among only-child, first-born, middle-born, and last-born children. Moreover, few studies have delved into the variations in parenting styles and duration of parental company based on birth order, as well as their comprehensive effects on adolescent mental health.

To address these gaps, the current study conducted a large-scale cross-sectional survey of Chinese adolescents with three objectives. First, by analyzing scores of the Strengths and Difficulties Questionnaire (SDQ), it systematically compares mental health outcomes of adolescents across different birth orders, parenting styles, and duration of parental company. Second, this study investigated the effects of birth order on parenting styles and duration of parental company. Third, this study delves into the intricate interplay among birth order, parenting styles, and the duration of parental company to elucidate the complex mechanisms through which these factors jointly influence adolescent mental health under the three-child policy in China. By achieving these objectives, the study aims to make contributions to both the

theoretical understanding of family-related factors in adolescent mental health and the development of practical parenting and mental health intervention strategies.

Materials and Methods

Study Design and Setting

This study employed a cross-sectional survey design, conducted from April to May 2022. A multi-stage stratified random sampling method was utilized to enhance the representativeness of the sample. The sampling process began with stratifying the target population based on key criteria: geographic regions and urbanization levels to capture the heterogeneity within the Chinese adolescent population, considering the diverse socioeconomic and cultural contexts across the country, which allowed us to account for regional variations in family structures, cultural norms, and socioeconomic conditions, all of which may influence the relationships between birth order, parenting styles, duration of parental company and adolescent mental health.

Subsequently, 17 cities were randomly selected from seven provinces (Jiangsu, Zhejiang, Fujian, Henan, Sichuan, Yunnan, and Xinjiang provinces). This selection ensured coverage of the eastern, central, and western regions, which vary significantly in terms of economic development levels. Within these 17 cities, 42 primary junior high schools were randomly chosen. The sample size allocation within each region was proportional to the local student population, ensuring that regions with larger student populations were adequately represented. To further diversify the sample, both urban and rural schools were included in the selection.

Participants and Data Collection

Inclusion criteria for participants were as follows: (I) enrollment in grades 3–9; (II) ability to independently complete questionnaires. Individuals with diagnosed mental illnesses that could impair their comprehension of the survey questions were excluded from this study. This exclusion criterion was implemented to ensure the validity and reliability of the collected data.

Trained research assistants, following standardized protocols and conducting face-to-face data collection, were recruited from Nantong University and underwent rigorous training in investigation techniques and research ethics at the School of Public Health. Before the data collection, the research assistants explained the purposes and confidentiality measures of the study to school administrators and teachers, and all potential participants received a detailed briefing on the objectives, significance, privacy protection measures, and consent procedures of this study. Respondents were requested to complete the self-administered questionnaire independently within 20 minutes. Eligible students received age-appropriate assent forms, and parental consent letters were obtained for participants under 16 years old.

All participants and their parents provided written informed consent before the study commenced. Completed questionnaires were collected immediately by trained interviewers on site to ensure data integrity and confidentiality. Ethical approval for this study was granted by the Ethics Committee of Nantong University. In total, 3581 valid questionnaires were collected, resulting in a high response rate of 97.98%.

Measures

Birth Order

Participants reported their birth order through caregiver-assisted questionnaires. Based on standardized classifications,¹⁷ each child was classified into one of four categories: only-child (no siblings), first-born (having only younger siblings), middle-born (having both older and younger siblings), and last-born (having only older siblings), which aligns with previous research on birth order and adolescent development.⁴⁴

Duration of Parental Company

The duration of parental company was measured using a single-item measure: “How much time do your parents spend with you every day in your life during the past week?” This item was scored on a four-point Likert scale, ranging from 1 “<1 hour”, 2 “1–2 hours”, 3 “2–4 hours”, to 4 “>4 hours”, with higher scores indicating longer duration of parental

company. In prior studies, single-item measures have been used to assess parental involvement (“During the past 30 days, how often did your parents understand your problems”),⁴⁵ supporting their empirical validity.

Parenting Styles

The Parenting Style Scale, developed by Yihua Gong,⁴⁶ was employed to measure types of parenting styles. This scale has demonstrated robust psychometric properties in Chinese adolescent populations, with an internal consistency reliability of $\alpha = 0.87$ in previous studies.⁴⁷ The scale comprises five theoretically grounded dimensions, including authoritarian (eg, “My parents demand absolute obedience”), emotionally warm (eg, “My parents comfort me when I’m upset”), trust encouraged (eg, “My parents encourage me to make independent decisions”), spoiled (eg, “My parents rarely criticize my mistakes”), and neglectful (eg, “My parents seem unaware of my daily activities”) parenting styles. All 21 items were scored on a 5-point Likert scale (1= strongly disagree to 5=strongly agree), where higher subscale scores indicate a more typical manifestation of the corresponding parenting style. In the current study, the Cronbach’s alpha for this scale was 0.903, indicating excellent internal consistency reliability.

Mental Health

Mental health was measured using the adapted version of the Strengths and Difficulties Questionnaire (SDQ).⁴⁸ The SDQ scale assesses the severity of emotional symptoms, conduct problems, hyperactivity, peer relationship problems, and prosocial behavior on a 3-point Likert scale, ranging from 0 “not true” to 2 “certainly true”. A total difficulties score was calculated by generating scores for the five subscales, resulting in a range from 0 to 40. Higher scores, except for the prosocial behavior scale, indicate more severe mental health problems. Based on established criteria, individuals with a total score of ≥ 17 are classified as experiencing significant difficulties.⁴⁹ Previous research has reported high levels of internal consistency ($\alpha = 0.927$) for the SDQ scale in Chinese adolescents.⁵⁰ In the current study, the Cronbach’s alpha for this scale was 0.876, suggesting good internal consistency reliability.

Control Variables

Several control variables were included in the analysis, such as age, gender (coded as: 1=boy, 2=girl), family income levels, and parents’ educational levels (coded as: 1= junior high school graduate, 2= senior high school graduate, 3= junior college graduate, 4= bachelor’s degree and above). Family income level was measured using the Economic Stress Questionnaire,⁵¹ which consists of 4 items on a five-point Likert scale. Higher scores on this scale indicate lower levels of family income. The scale demonstrated good internal consistency reliability in this study, with a Cronbach’s alpha coefficient of 0.869 for the family income measure.

Common Method Bias

Given that the data were collected through self-reported questions, we implemented anonymous responses and Harman’s single-factor test to address potential common method bias.⁵² The results revealed 19 factors with the root of the measured eigenvalue greater than 1, and the first factor explained only 12.48% of the variance, well below the commonly accepted 40% threshold, indicating that significant common method variance was not present in this study.

Data Analysis

Statistical analyses were performed using Stata 17.0 software, allowing us to conduct a variety of analyses accurately and efficiently. Initially, descriptive statistics were used to summarize the demographic variables, including age, gender, family income levels, and parenting characteristics. For continuous variables, means (M) and standard deviations (SDs) were reported, while for categorical variables, frequencies (n) and percentages (%) were presented (Table 1). Additionally, bar charts were used for visual comparisons of the Strengths and Difficulties Questionnaire (SDQ) total scores and subscale scores across different birth orders (Figure 1) and durations of parental company (Figure 2). Subsequently, multiple linear regression analyses were employed to examine the following relationships: (1) The relationship between different birth orders (only-child, first-borns, middle-borns, and last-borns as the independent variables), and parenting styles (dependent variables) (Models 1–5) and duration of parental company (dependent variables) (Model 6) (Table 2); (2) The independent effects of different birth orders, parenting styles and durations of

Table 1 Basic Characteristics of Participants

Variables	Overall (n=3581)		Only-Child (n=1501, 41.92%)		First-Born (n=1098, 30.66%)		Middle-Born (n=834, 23.29%)		Last-Born (n=148, 4.13%)		Test
	n	%	n	%	n	%	n	%	n	%	
Age (years), mean \pm SD	11.97 \pm 1.86		12.15 \pm 1.93		11.92 \pm 1.83		11.81 \pm 1.80		11.36 \pm 1.46		F=12.46***
Gender											$\chi^2=45.84$ ***
Boys	1864	52.05	830	55.30	491	44.72	442	53.00	101	68.24	
Girls	1717	47.95	671	44.70	607	55.28	392	47.00	47	31.76	
Mother's educational level											$\chi^2=292.43$ ***
Primary school graduate or less	438	12.44	110	7.45	117	10.84	163	19.88	48	33.1	
Junior high school graduate	1200	34.09	406	27.51	372	34.48	359	43.78	63	43.45	
Senior high school graduate	1001	28.44	466	31.57	320	29.66	193	23.54	22	15.17	
Junior college graduate	469	13.32	261	17.68	143	13.25	60	7.32	5	3.45	
Bachelor's degree and above	412	11.70	233	15.79	127	11.77	45	5.49	7	4.83	
Father's educational level											$\chi^2=240.70$ ***
Primary school graduate or less	312	8.89	81	5.51	87	8.09	111	13.55	33	22.76	
Junior high school graduate	1153	32.86	380	25.85	357	33.21	345	42.12	71	48.97	
Senior high school graduate	1048	29.87	482	32.79	301	28.00	241	29.43	24	16.55	
Junior college graduate	523	14.90	265	18.03	182	16.93	69	8.42	7	4.83	
Bachelor's degree and above	473	13.48	262	17.82	148	13.77	53	6.47	10	6.90	
Duration of parental company											$\chi^2=34.30$ ***
Less than 1 hour	723	21.47	245	17.35	244	23.44	193	24.74	41	30.37	
1~2 hours	1007	29.90	422	29.89	309	29.68	240	30.77	36	26.67	
2~4 hours	731	21.70	339	24.01	225	21.61	144	18.46	23	17.04	
More than 4 hours	907	26.93	406	28.75	263	25.26	203	26.03	35	25.93	
Parenting styles											
Authoritarian	16.19 \pm 4.83		15.98 \pm 4.86		16.29 \pm 4.75		16.36 \pm 4.83		16.53 \pm 5.16		F=1.72
Emotionally warm	15.92 \pm 3.83		16.31 \pm 3.74		15.70 \pm 3.89		15.54 \pm 3.91		15.73 \pm 3.59		F=9.33***
Trust-encouraged	12.15 \pm 3.09		12.38 \pm 3.03		12.02 \pm 3.12		11.88 \pm 3.12		12.14 \pm 3.07		F=5.59***
Spoiled	6.09 \pm 2.45		5.93 \pm 2.41		6.10 \pm 2.44		6.29 \pm 2.48		6.46 \pm 2.64		F=5.01**
Neglectful	5.25 \pm 2.58		5.08 \pm 2.47		5.23 \pm 2.56		5.57 \pm 2.73		5.47 \pm 2.73		F=6.86***
Family income	17.48 \pm 3.69		17.54 \pm 3.88		17.48 \pm 3.57		17.50 \pm 3.41		16.70 \pm 3.94		F=2.38

Notes: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Mental Health Outcomes (SDQ Score)

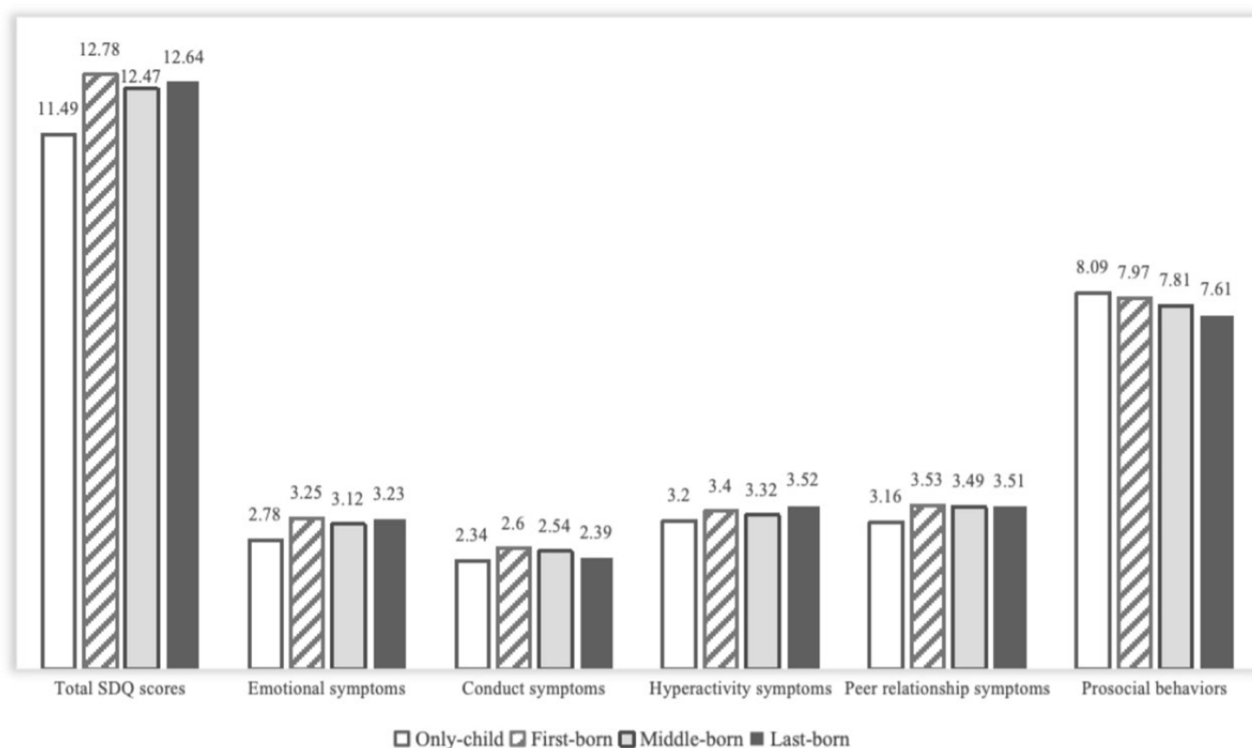


Figure 1 SDQ scores across different birth orders.

Note: Higher scores represented more severe problems, except for prosocial behaviors.

parental company on SDQ scores and subscales (Table 3) among adolescents. In all regression models, age, gender, family income levels, and parents' education levels were controlled as covariates. All statistical tests were two-tailed, with a significance level of $\alpha = 0.05$.

Results

Basic Characteristics of Participants

The study sample comprises 3581 Chinese adolescents, with a mean age of 11.97 years ($SD=1.86$). Among them, 1864 participants (52.05%) were boys (Table 1). In terms of birth order, 1501 adolescents (41.92%) were only-child, 1098 (30.66%) were first-borns, 834 (23.29%) were middle-borns, and 148 (4.13%) were last-borns. Regarding parental education levels, over 87% of mothers and 91% of fathers had attained at least junior high school education. Statistically significant differences were observed in relation to parenting styles (including emotionally warm, trust-encouraged, spoiled, and neglectful) and durations of parental company between different birth orders ($P<0.05$).

SDQ Scores Across Different Birth Orders and Durations of Parental Company

As depicted in Figure 1, significant differences in Strengths and Difficulties Questionnaire (SDQ) scores were observed among adolescents with different birth orders. Compared to only-child, middle-born, and last-born adolescents, first-born children exhibited the highest total SDQ scores ($M = 12.78$) and the highest scores of emotional symptoms ($M=3.25$), conduct symptoms ($M=2.60$), and peer relationship symptoms ($M = 3.53$), suggesting that first-born children may face more mental health issues within the sample. Moreover, last-born adolescents had the highest scores of hyperactivity symptoms ($M = 3.52$) and the lowest scores of prosocial behaviors ($M = 7.61$). Additionally, Figure 2 further revealed the relationship between the duration of parental company and SDQ scores. Adolescents with less than 1 hour of daily parental company might have the highest scores of total SDQ ($M = 14.23$), emotional symptoms ($M = 3.85$), conduct

Duration of Parental company

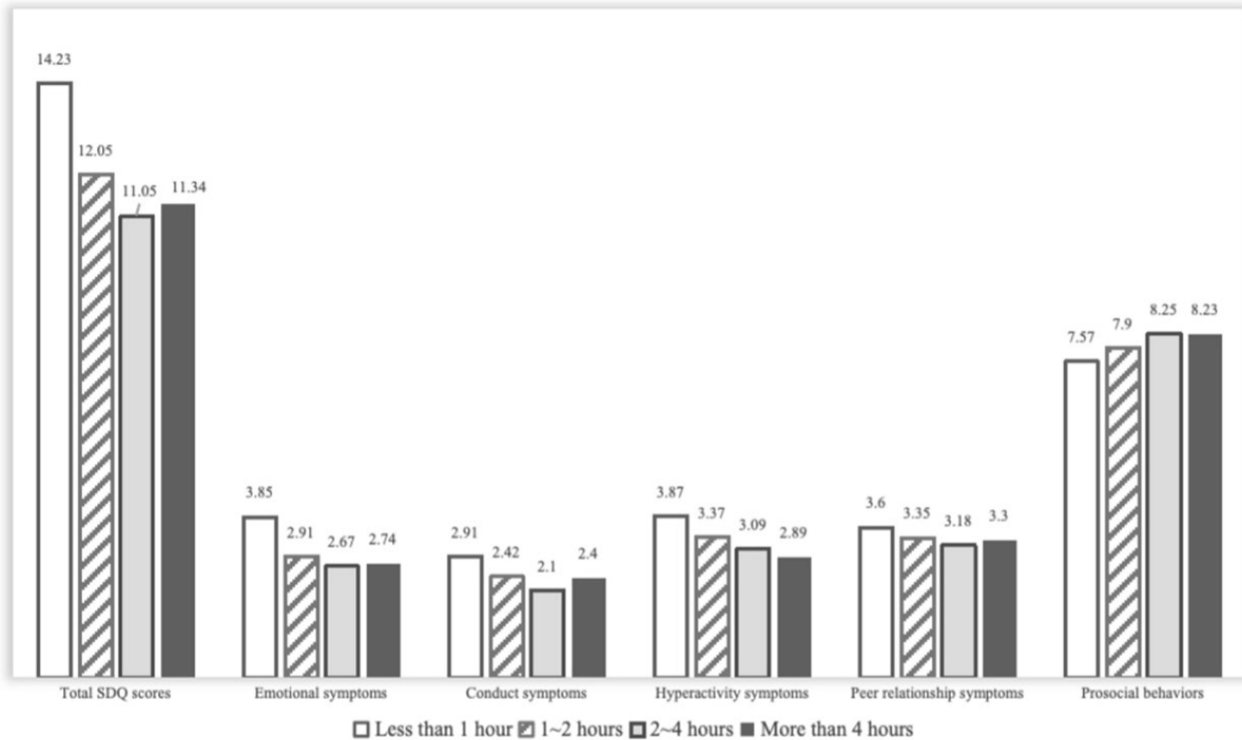


Figure 2 SDQ scores across different duration of parental company.
Note: Higher scores represented more severe problems, except for prosocial behaviors.

symptoms ($M = 2.91$), hyperactivity symptoms ($M = 3.87$), and peer relationship symptoms ($M = 3.6$), along with the lowest scores of prosocial behaviors ($M = 7.57$) (Figure 2), highlighting the effects of shorter duration of parental company on poorer mental health outcomes.

The Relationship Between Birth Order, Parenting Styles, and Durations of Parental Company

This study employed multiple linear regression models to examine the relationship between birth order and parenting styles, and the duration of parental company. After controlling for covariates (eg, age, gender, parents' educational levels, and family income levels), birth order was treated as the independent variable, and different parenting styles (Model 1-Model 5) and duration of parental company (Model 6) were served as the dependent variables (see Table 3). Model 1 showed compared to boys, girls are less likely to experience authoritarian parenting styles ($\beta = -0.63$, 95% CI [-0.95, -0.31]). Models 2 and 3 focused on emotionally warm and trust-encouraged parenting styles, respectively. Compared to only-child adolescents, born first-born (emotionally warm: $\beta = -0.54$, 95% CI [-0.84, -0.24]) (trust-encouraged: $\beta = -0.34$, 95% CI [-0.58, -0.09]) and middle-born adolescents (emotionally warm: $\beta = -0.58$, 95% CI [-0.92, -0.24]) (trust-encouraged: $\beta = -0.35$, 95% CI [-0.62, -0.08]) are less likely to receive both positive parenting styles. Model 4 indicated that last-born adolescents are more prone to suffer from spoiled parenting styles ($\beta = 0.28$, 95% CI [0.14, 0.71]). Model 5 showed that middle-born ($\beta = 0.40$, 95% CI [0.17, 0.63]) and older adolescents ($\beta = 0.11$, 95% CI [0.07, 0.16]) were more likely to endure neglectful parenting styles. Model 6, with the duration of parental company as the dependent variable, revealed that first-born ($\beta = -0.26$, 95% CI [-0.41, -0.11]) and middle-born adolescents ($\beta = -0.19$, 95% CI [-0.36, -0.03]) spent less time with their parents compared to only-child adolescents, suggesting potential disparities in parental company based on birth order.

Table 2 The Relationship Between Birth Order and Parenting Styles and Parental Company

Variables	Model 1 (Authoritarian)		Model 2 (Emotionally warm)		Model 3 (Trust-Encouraged)		Model 4 (Spoiled)		Model 5 (Neglectful)		Model 6 (Duration of Parental Company)	
	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(Z)$	95% CI
Birth order (Control group: Only-child)												
First-born	0.33(1.74)	-0.04, 0.71	-0.54(-3.50)***	-0.84, -0.24	-0.34(-2.73)**	-0.58, -0.09	0.19(1.93)	-0.00, 0.38	0.16(1.52)	-0.05, 0.36	-0.26(-3.48)***	-0.41, -0.11
Middle-born	0.36(1.66)	-0.07, 0.78	-0.58(-3.36)**	-0.92, -0.24	-0.35(-2.52)*	-0.62, -0.08	0.25(2.26)	0.03, 0.46	0.40(3.45)**	0.17, 0.63	-0.19(-2.26)*	-0.36, -0.03
Last-born	0.29(0.69)	-0.54, 1.12	-0.32(-0.95)	-0.99, 0.34	-0.10(-0.37)	-0.63, 0.43	0.28(1.31)*	-0.14, 0.71	0.27(1.17)	-0.18, 0.87	-0.31(-1.79)	-0.65, 0.03
Control variables												
Age	0.08(1.86)	-0.00, 0.17	-0.11(-3.19)**	-0.18, -0.04	-0.15(-5.61)***	-0.21, -0.10	-0.01(-0.62)	-0.06, 0.03	0.11(4.72)***	0.07, 0.16	-0.13(-7.26)***	-0.16, -0.09
Gender (Control group: Boys)												
Girls	-0.63(-3.89)***	-0.95, -0.31	-0.01(-0.06)	-0.26, 0.25	-0.00(-0.03)	-0.21, 0.20	-0.31(-3.67)***	-0.47, -0.14	-0.10(-1.17)	-0.27, 0.07	0.15(2.33)*	0.02, 0.27
Mother's educational level	0.02(0.22)	-0.18, 0.22	0.20(2.42)*	0.04, 0.35	0.13(2.03)*	0.00, 0.26	-0.02(-0.46)	-0.12, 0.08	-0.11(-1.99)*	-0.22, -0.00	0.13(3.22)**	0.05, 0.21
Father's educational level	-0.07(-0.71)	-0.27, 0.13	0.12(1.48)	-0.04, 0.28	0.12(1.92)	-0.00, 0.25	-0.12(-2.31)*	-0.22, -0.02	-0.05(-0.95)	-0.16, 0.05	0.11(2.72)**	0.03, 0.19
Family income levels	-0.22(-9.89)***	-0.26, -0.17	0.07(3.84)***	0.03, 0.10	0.06(4.44)***	0.03, 0.09	-0.08(-7.32)***	-0.10, -0.06	-0.05(-4.46)***	-0.08, -0.03	0.03(3.49)***	0.01, 0.05
F/LR chi2(8)	16.07***		10.79***		13.23***		13.13***		10.88***		177.06***	

Notes: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 3 The Relationship Between Birth Order, Parenting Styles, Duration of Parental Company, and SDQ Scores

Variables	Total SDQ Score ^a		Emotional Symptoms ^a		Conduct Symptoms ^a		Hyperactivity Symptoms ^a		Peer Relationship Symptoms ^a		Prosocial Behaviors ^b	
	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI	$\beta(t)$	95% CI
Birth order (Control group: Only-child)												
First-born	0.74(3.44)**	0.32, 1.16	0.22(2.38)*	0.04, 0.41	0.18(2.64)**	0.05, 0.31	0.05(0.56)	-0.12, 0.21	0.29(4.25)***	0.15, 0.42	-0.04(-0.58)	-0.20, 0.11
Middle-born	0.11(0.46)	-0.36, 0.58	0.05(0.43)	-0.16, 0.25	0.04(0.51)	-0.11, 0.19	-0.16(-1.64)	-0.34, 0.03	0.18(2.40)*	0.03, 0.33	-0.06(-0.72)	-0.23, 0.11
Last-born	-0.01(-0.03)	-0.95, 0.92	0.17(0.80)	-0.24, 0.58	-0.17(-1.15)	-0.47, 0.12	-0.01(-0.06)	-0.38, 0.36	0.00(0.01)	-0.29, 0.30	-0.20(-1.17)	-0.54, 0.14
Duration of parental company (Control group: Less than 1 hour)												
1-2 hours	-0.65(-2.50)*	-1.15, -0.14	-0.38(-3.37)**	-0.61, -0.16	-0.17(-2.05)*	-0.33, -0.01	-0.02(-0.17)	-0.22, 0.18	-0.08(-0.95)	-0.24, 0.08	-0.03(-0.34)	-0.21, 0.15
2-4 hours	-0.90(-3.16)**	-1.45, -0.34	-0.40(-3.17)**	-0.64, -0.15	-0.32(-3.58)***	-0.50, -0.15	-0.03(-0.31)	-0.25, 0.19	-0.15(-1.64)	-0.32, 0.03	0.12(1.19)	-0.08, 0.32
More than 4 hours	-0.35(-1.27)	-0.89, 0.19	-0.25(-2.07)*	-0.49, -0.01	0.02(0.19)	-0.15, 0.19	-0.09(-0.84)	-0.30, 0.12	-0.02(-0.28)	-0.19, 0.14	0.04(0.39)	-0.16, 0.23
Parenting style												
Authoritarian	0.21(9.45)***	0.17, 0.25	0.10(9.92)***	0.08, 0.12	0.03(4.61)***	0.02, 0.05	0.06(6.68)***	0.04, 0.08	0.02(3.14)*	0.01, 0.04	0.03(4.19)***	0.02, 0.05
Emotionally warm	-0.22(-6.59)***	-0.29, -0.16	0.07(-4.70)***	-0.10, -0.04	-0.06(-5.39)***	-0.08, -0.04	-0.07(-5.09)***	-0.09, -0.04	-0.03(-2.56)*	-0.05, -0.01	0.06(5.11)***	0.04, 0.09
Trust-encouraged	-0.18(-4.24)***	-0.27, -0.10	-0.07(-3.53)***	-0.10, -0.03	-0.04(-3.12)**	-0.07, -0.02	-0.06(-3.41)**	-0.09, -0.02	-0.02(-1.14)	-0.04, 0.01	0.09(5.88)***	0.06, 0.12
Spoiled	0.25(5.55)***	0.16, 0.34	0.07(3.72)***	0.03, 0.11	0.05(3.56)***	0.02, 0.08	0.07(3.99)***	0.04, 0.11	0.05(3.87)***	0.03, 0.08	-0.04(-2.51)*	-0.07, -0.01
Neglectful	0.40(9.79)***	0.32, 0.48	0.14(7.73)***	0.10, 0.18	0.10(7.65)***	0.08, 0.13	0.10(6.05)***	0.07, 0.13	0.07(5.05)***	0.04, 0.09	-0.09(-6.17)***	-0.12, -0.06
Adj-R ²	0.31		0.23		0.18		0.21		0.10		0.15	
F	75.49***		51.22***		36.90***		46.18***		19.83***		30.80	

Notes: ^arepresents higher scores describing more severe problems, and ^brepresents lower scores describing more severe problems. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

The Relationship Between Birth Order, Parenting Styles, Duration of Parental Company, and SDQ Scores

This study further used multiple linear regression models to assess the combined effects of birth order, parenting styles, and the duration of parental company (the independent variables) on adolescent mental health, as measured by the total and each subscale of SDQ scores (the dependent variables) (Table 3). After controlling for covariates, first-born adolescents exhibited significantly higher SDQ total scale scores ($\beta = 0.74$, 95% CI [0.32, 1.16]) and subscales for emotional symptoms ($\beta = 0.22$, 95% CI [0.04, 0.41]), conduct symptoms ($\beta = 0.18$, 95% CI [0.05, 0.31]), and peer relationship symptoms ($\beta = 0.29$, 95% CI [0.15, 0.42]), compared to the only-child. Additionally, longer durations of parental company were significantly related to lower SDQ total scores and reduced emotional symptoms and conduct symptoms. Finally, emotionally warm and trust-encouraged parenting styles were linked to lower total SDQ scores and decreased scores of emotional, conduct, hyperactivity, and peer relationship disorders and increased prosocial behaviors scores. Conversely, authoritarian, spoiled, and neglectful parenting styles are related to higher scores of emotional, conduct, hyperactivity, and peer relationship disorders and lower prosocial behavior scores.

Discussion

This large-scale study stands out as the first to elucidate the potential mechanisms linking birth order and mental health outcomes among Chinese adolescents, emphasizing the significant roles of parenting styles and the duration of parental company and revealing three key findings. Firstly, first-born adolescents exhibited poorer mental health outcomes, particularly in terms of emotional symptoms, conduct behaviors, and peer relationship issues, compared to only-child, middle-born, and last-born adolescents. Second, adolescents of different birth orders have experienced distinct parenting styles, with first-born and middle-born adolescents often experiencing less positive parenting styles (characterized as emotionally warm and trust-encouraged) and shorter durations of parental company, while middle-born adolescents faced more neglectful parenting styles, and last-born adolescents tended to experience spoiled parenting styles. Thirdly, this study suggested that longer durations of parental company and optimal parenting styles may be correlated with fewer mental health disorders, including emotional, conduct, hyperactivity, peer relationship, and prosocial symptoms, whereas shorter durations of parental company and negative parenting styles may be linked to exacerbated psychological issues. These findings could deepen our understanding of the crucial effects of birth order on adolescent mental health states, emphasizing the role of parents' practices (ie, parenting styles and duration of parental company) within the unique dynamics of Chinese families after the implementation of the three-child policy.

Birth Order and Adolescent Mental Health

Firstly, the main contribution of this study lies in clarifying the intricate relationship between birth order and adolescent mental health. In the context of evolving family structures, first-born adolescents are more likely to exhibit adverse mental health outcomes, including emotional and conduct symptoms, as well as peer relationship disorders, when compared to only-child, middle-born, and last-born adolescents, underscoring the imperative of prioritizing the mental health of first-born individuals during the transition period. Several underlying mechanisms may explain these findings. First-borns, initially accustomed to the roles of only-child adolescents, often encounter difficulties in coping with sibling rivalry, which could precipitate maladaptive behaviors and psychological distress, such as feelings of jealousy and heightened stress levels.⁵³ Second, first-born adolescents sometimes take on parental roles, such as caregiving and academic guidance for younger siblings. Such responsibilities may deplete their emotional resources and impose role-overload burdens, particularly when they lack appropriate coping strategies.⁵⁴

On the contrary, this protective role assumed by first-born adolescents would substantially enhance the sense of belonging among younger siblings, thereby contributing to better mental health of later-born adolescents.⁵⁵ Moreover, the warm and supportive interactions among siblings could instill a sense of security for the younger children, positively improving their overall well-being. In addition, middle-born adolescents, however, face unique psychological challenges. They must navigate the dual demands of emulating their older siblings while simultaneously fulfilling mentoring responsibilities towards their younger counterparts, which can exacerbate psychological strain and pose risks to their

mental health.⁵⁶ Lastly, for only-child adolescents, without the challenges of sibling rivalry or the burden of assumed parental roles, they may develop a more secure self-identity, experience lower levels of stress and anxiety, allowing them to potentially reduce the likelihood of developing certain mental health issues compared to their counterparts with siblings.⁵⁷

Birth Order, Parenting Styles, and Adolescent Mental Health

Another meaningful finding of this study is that parents tend to employ diverse parenting styles for adolescents of different birth orders, which in turn exerts a profound influence on adolescent mental health. Empirical evidence suggests that emotionally warm and trust-encouraged parenting styles may be related to enhanced psychological well-being, while authoritarian, spoiled, and neglectful styles may be correlated with detrimental mental health outcomes.

Rooted in traditional Chinese norms that emphasize filial piety and obedience, children are expected to adhere strictly to parental directives.⁵⁸ In multi-child families, first-born adolescents often bear disproportionately high parental expectations and are confronted with sudden demands for autonomy. Authoritarian parenting styles, manifest as rigid rules and punitive disciplinary measures, not only restrict adolescent self-expression but also increase the vulnerability to behavioral issues and mental health deterioration.⁵⁹ As China undergoes significant shifts in family planning policies, the reconstruing of family dynamics presents new challenges for parents in striking a balance in caring for children.³⁰ This predicament often leaves middle-born adolescents in a position of relative neglect, as they receive less parental attention compared to their older and younger siblings, subsequently impeding their ability to seek parental support when needed, thereby bringing about adverse psychological states. Besides, younger siblings demonstrate elevated risks from excessive parental indulgence, potentially hindering social competency development and increasing prosocial behavior deficits.⁶⁰ These findings highlighted that by recognizing and adapting to the unique psychological needs linked to various birth orders, parents could play a pivotal role in promoting positive mental health outcomes for their children.

Birth Order, Duration of Parental Company, and Adolescent Mental Health

Lastly, this study further revealed a relationship between birth order, the duration of parental company, and adolescent mental health outcomes. As the first study to examine this relationship in the Chinese context, our findings discovered that first-born children probably experience the shortest duration of parental company, which could be theoretically elucidated by the Resource Dilution Theory.⁶¹ It posits that within families with finite resources, an increase in the number of offspring inevitably results in a proportional reduction in the average time and attention each child receives from parents. Consequently, parents may struggle to allocate sufficient attention to first-born adolescents while simultaneously catering to the needs of younger siblings, creating an inherent disparity in resource allocation that places older children at a disadvantage.⁶²

In addition, longer durations of parental company appear to serve as a protective factor against the higher risks of mental health disorders among adolescents.⁶³ Prolonged interaction between parents and children increases opportunities for positive parent-adolescent engagement, which in turn fosters an environment conducive to the open disclosure of personal concerns⁶⁴ and then effectively alleviates psychological distress.⁶⁵ Moreover, continuous parental company may also act as a buffer against various adjustment challenges, such as adapting to the arrival of new siblings, thereby maintaining optimal psychological states.⁶⁶

Implications

The current study has theoretical and practical implications. From a theoretical point of view, the study significantly enriches the theoretical understanding of birth order, parental practices, and adolescent mental health research. By elucidating the intricate relationship between birth order, parenting styles, duration of parental company, and adolescent mental health, it challenges traditional assumptions and contradicts some generalized Western-based theories. These findings highlight the necessity of context-specific models, refining the Resource Dilution Theory within China's three-child policy context. These theoretical advancements offer a more comprehensive framework for analyzing family structure dynamics, laying a solid foundation for future research.

Moreover, these findings have substantial practical implications for various stakeholders, including parents, educators, and policymakers. For parents, the study emphasizes the importance of adopting differentiated yet equitable parenting strategies. Parents should strive to treat children of all birth orders with warmth, fairness, and respect, avoiding over-expectations for first-borns, over-neglect for middle-born, or over-indulgence of last-borns. For first-borns, who are more prone to mental health issues, parents should allocate dedicated one-on-one time through regular activities like monthly outings, fostering emotional connection, and reducing stress. Setting clear boundaries for last-borns helps prevent overindulgence, while middle-borns benefit from increased parental attention to mitigate feelings of neglect. Educators can integrate birth-order-informed content into mental health counseling programs. Organizing separate group sessions for first-born and middle-born students provides a supportive environment to address their unique psychological challenges. Policymakers can leverage these insights to create family-friendly policies, such as offering financial incentives for families with first-borns to access mental health services or establishing community-based parenting training programs tailored to multi-child households. These evidence-based applications hold great promise for enhancing the mental health of Chinese adolescents.

Strengths and Limitations

The present study exhibits several strengths. First, it represents the first large population-based survey that compares mental health status via Strengths and Difficulties Questionnaire (SDQ) scores among only-child, first-born, middle-born, and last-born Chinese adolescents after the implementation of the three-child policy. Second, through multiple linear regression analyses, this study systematically examines the effects of birth order on various parenting styles and the duration of parental company. Third, the proposed pathways that link birth order to mental health through parenting practices offer novel insights into mitigating mental health risks, particularly for first-born adolescents, who may be more vulnerable. Collectively, these findings address a critical gap in understanding the dynamics of family structure in the context of China's evolving fertility policy and offer evidence-based recommendations for preventing negative parenting practices and adolescent mental health disorders.

This study has several limitations. First, the reliance on cross-sectional data constrains the ability to draw causal inferences regarding the longitudinal effects of birth order on mental health and the temporal variations in parenting practices. Future research should employ longitudinal designs to investigate these dynamic relationships. Second, the assessment of the duration of parental company was based on a single-item measure reported by adolescents; utilizing validated multi-item scales is recommended to enhance reliability. Third, we acknowledge that the sample was limited to students from seven provinces and may not fully capture the diversity of the entire Chinese adolescent population. Future research could expand the sampling scope to include more regions to further enhance generalizability. Additionally, mediating factors such as family dynamics and sibling relationships warrant further exploration to provide a more comprehensive understanding of the findings. Last, it is suggested that adolescent self and identity play a create role in their mental health. Future research could examine how different dimensions of self-construal are related to adolescent mental health in their region.⁶⁷

Conclusion

Overall, only-child adolescents are more likely to experience better mental health and positive parenting styles characterized by emotionally warm and trust-encouraging. In comparison, first-born and middle-born children may suffer from poorer mental health, including emotional, conduct, and peer relationship disorders, and negative parenting styles, such as authoritarian and neglectful, along with shorter duration of parental company. Last-born adolescents are more often subjected to spoiled parenting styles. Therefore, parents, especially those in multi-child families, should pay closer attention to the mental health disorders of first-born adolescents after younger siblings are born by providing them with additional warmth and encouragement to improve their well-being. Furthermore, parents need to treat each child fairly and avoid neglecting middle-born adolescents, as this can help parents ease feelings of marginalization and disappointment, as well as avoid over-spoiling last-born adolescents. Finally, parents should refrain from excessive spoiling and ensure that equal affection is extended to all children in the family.

Data Sharing Statement

Data will be made available on request from the corresponding author.

Ethics Approval and Informed Consent

The Ethics Committee of Nantong University provided ethical approval for this study. Informed consent was obtained from all participants and their parents. This study was performed following the Declaration of Helsinki.

Acknowledgments

The authors thank the respondents and research assistants for participating in this survey. We also thank the reviewers for their valuable comments and suggestions.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published, have agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

Funding

This work was supported by the “Postgraduate Research& Practice Innovation Program of Jiangsu Province” [grant: KYCX24_3543]. The grant agency wasn’t involved in the study’s design, collection, analysis, and interpretation of data, and writing or revising the manuscript.

Disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported.

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