ORIGINAL RESEARCH

Family Dynamics and Functioning of Adolescents from Two-Child and One-Child Families in China

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Background: To promote the balanced development with the population, China has phased out a one-child policy in 2016, and a two-child policy was launched, which has led to dramatic changes in family structure. The transition could be a huge challenge for adolescents who are in a period of psychological vulnerability.

Purpose: This study explored the differences and predictors of family dynamics and functioning between two-child and one-child families in the context of China's two-child policy.

Methods: We used the Self-rating scale of Systemic Family Dynamics (SSFD) and Family Assessment Device-General Functioning (FAD-GF) to investigate the family dynamics, family functioning, and family structure and status of 3289 adolescents under the background of China's two-child policy.

Results: Results revealed that the mean scores for family atmosphere, personalization, disease concept, overall family dynamics, and family functioning health rate of the one-child families were higher than those of the two-child families. Parental marital status, mother's education, annual household income, and family economic satisfaction in two-child and one-child families was positively correlated with family dynamics and functioning, but not significantly associated with living style, parental age and employment. Family financial satisfaction, parental marital status, and distress in the family were predictors of family dynamics and functioning, and parental preference was also an important factor in two-child families.

Conclusion: The findings suggest family atmosphere, personality, disease concept, family dynamics, and family functioning of the one-child families were better than those of the two-child families. Unlike one-child families, parental preference is an important predictor of family dynamics and functioning in two child families. This study increases our understanding of adolescents psychological problems during family structure transitions under the background of fertility policy, providing psychologists with more evidence-based evidence and intervention directions.

Keywords: family structure, family dynamics, family functioning, adolescents, two-child families

Background

The family is a complex assemblage based on emotional bonds, and the continuous interaction of family members may determine the direction of family dynamics and functioning.[1,2] Family dynamics is an abstract generalization of interpersonal interaction patterns and psychological processes within a family, while family functioning is an indicator of family structure, organization, and mental health.[3,4] However, different family models are characterized by different family dynamics and functioning.[5] Members of divorced families tend to adopt more extreme forms of logic in their value judgments of family dynamics, among which minor children have lower family functionings in areas such as emotional response, emotional intervention, and behavioral control.[6] The imbalance of family environment has an impact on family happiness, family cohesion, family functioning, and the psychological development of adolescents.[7] Bereaved families tend to have an unbalanced family structure, dysfunctional family and declining family cohesion.[8] Chinese

families may be facing enormous challenges from changes in family members and models due to the implementation of the two-child policy.

In China, the end of the one-child policy is changing the traditional family structures and social support systems.[9] In 1982, to balance the speed of population growth and economic development, the state implemented the one-child policy, which encouraged couples to have only one child.[10,11] Over the 40 years since the implementation of this policy, China's economic development has made great achievements.[12] To promote the balanced development with the population, the one-child policy was phased out in 2016, and the two-child policy was launched; that is couples may now have two children.[13] At present, second children account for 57% of births.[14] It is estimated that by 2030, the second child birth rate will exceed 60%, and the number of two-child families will reach 170 million.[15] There seems to be a big difference in the opinions of parents and adolescent on whether they are ready to have a second child, whether to accept siblings, how to face sibling competition or parental preferences. Gu[16] et al found that the social anxiety of children in grade 4–6 with siblings was significantly higher than that of only children, and depression was positively correlated with the conflict degree of the sibling relationship. From the perspective of systemic family constructivism, changes in the number of family members are a collective process involving the whole family system, which may trigger an imbalance in family relationships.[17,18]

Adolescence is a period of vulnerability for cognitive, behavioural, emotional and physical development.[19] Family structure transition remains an important dimension of heterogeneity in adolescent life, and different family dynamics and functioning could differentially shape adolescent emotional functioning and social development.[20] Research suggests that adolescents in a family model of sibling bullying are associated with negative family dynamics that may have long-term effects on well-being in adulthood.[21] In family therapy for nonsuicidal self-injury (NSSI), imbalanced family cohesion and dynamics were found to be associated with the duration, periodicity, frequency, and severity of self-injurious behaviours in adolescents.[22–24] However, it has also been suggested that the more siblings the child has, the better his/her family functioning and health-related quality of life will be, and that the most robust protective factor in family structure is having siblings.[25,26] In particular, there are different views on the results of social agreeableness, personality adaptability, and emotional stability of adolescents in the one-child and non-one child families classification study.[27]

Despite recent increased interest in the effectiveness of family dynamics and functioning in family members' psychological problems or family therapy, few studies have assessed the effect of family structure transitions on family dynamics and functioning from adolescents' perspective.[28,29] In the context of China's two-child policy, the breaking of traditional family structure may bring unknown challenges to two-child families. Through this representative group of adolescents, we explore the effect of changes in family structure on family dynamics and functioning.

Methods
Study Design
This study was designed as a large, multicentre, cross-sectional survey. The sample size of the study was calculated using PASS version 21.0.3 (NCSS LLC, Utah, USA), a sample size and power analysis software. According to the literature on the family dynamics and functioning of adolescents,[30,31] the significance level (α) was 0.05, the confidence level (1-α) was 0.95, the allowable error (δ) was 1, and the standard deviation (σ) was 12.The total population of middle school students in Shanghai in 2019 was 610,400,[32] and the calculated sample size was 556. The nonresponse rate was set at 10%, and the calculated sample size was 618. The questionnaire pass rate was set at 90%, and the calculated sample size was 686. According to the second-child family rate of 35.7% in this region in 2019,[32] the minimum overall sample size was 1922.

Participants and Randomization Procedure
Eleven middle schools in different regions were randomly selected from 826 middle schools in Shanghai by a stratified sampling method from October 1, 2020 to March 31, 2021.[33] It was stratified based on different grades, numbered with natural numbers by class, and randomly sampled by SPSS version 26.0 (SPSS, Inc., Chicago, IL, USA). The following inclusion criteria were employed: (1) 13 years old ≤ age ≤19 years old; (2) the ability of reading and comprehension skills at junior high school level or above; (3) no history of severe hearing, visual, and intellectual impairment in the student's health record; and (4) both participants and guardians agreed to participate in the survey and signed the

informed consent form. The following exclusion criteria were employed: (1) severe limb disability, extracranial trauma or surgical history; (2) have a brain disease or intellectual disability; and (3) participants or guardians who refused to the informed consent form, or withdrew halfway. This survey is based on a non-remunerable and voluntary approach. A total of 3547 informed consent forms were distributed prior to the survey, and 3371 individuals agreed to participate (95.04%). The survey was conducted with a paper questionnaire for students after class, and child psychologists and school psychotherapists gave unified guidance to the respondents and checked the completion. A total of 3289 valid questionnaires were collected, and the attrition rate was 2.43% (n=82). The identifiable information of participants was withheld throughout the survey to protect their privacy.

Measures

Self-Rating Scale of Systemic Family Dynamics (SSFD)

The SSFD scale was developed and revised by Zhao and Kang et al in 2003 based on Heidelberg Family Dynamics Theory.[34] The scale evaluates family dynamics based on 23 items in four dimensions. The four dimensions include: (1) family atmosphere, which refers to the emotional characteristics of communication within the family. High score indicates "hostile and dull", low score indicates "relaxed and happy"; (2) personalization, which refers to the degree of differentiation of emotions and behaviors among family members. High score indicates low differentiation, unclear self-boundaries, low score indicates high differentiation, self-reliance; (3) system logic, which refers to the logical characteristics of the value judgment of family members. High score indicates a typical "either/or", low score indicates a typical "both. And."; (4) disease concept, which refers to family members' perceptions of self-responsibility for the disease process. High score indicates "complete victim", low score indicates "complete perpetrator". The Cronbach's α coefficient was 0.79, and the remeasuring reliability was 0.84.[35] The scale were scored on a five-point Likert (1 = completely consistent to 5 = completely inconsistent). The final score of each dimension was calculated using the maximum difference normalization method. The higher the overall score, the better the family dynamics in that dimension.

Family Assessment Device-General Functioning (FAD-GF)

The 12-item FAD-GF is a shorter version of the McMaster Family Assessment Device (FAD) by Epstein in 1983.[36,37] It provides self-reported measures of overall family functioning health or pathology. It includes six positively worded statements to describe healthy family functioning, such as we turn to each other for support in times of crisis. Other six are negatively worded statements to describe pathological family functioning, such as we cannot talk to each other about the sadness we feel. Each item of the FAD-GF was found to correlate highly with the six dimensions of the FAD scale.[38] The scale was required to be completed by family members aged 12 and older. Li et al created the Chinese version in 1993. The Cronbach's α coefficient was 0.91, and the remeasuring reliability was 0.85.[39] The scale were scored on a four-point Likert; 1 point: strongly agree; 2 points: agree; 3 points: disagree; 4 points: strongly disagree. The sum of values is divided by 12 to give a total score ranging from 1.0 to 4.0. Lower scale scores indicate better family functioning. The cut-off score is 2, with 2 and above indicating unhealthy family functioning.

Control Variables

We controlled for sociodemographic factors such as grade, age, gender, annual household income (≦$15,000,>$15,000 and ≦$45,000,>$45,000 and ≦$75,000,>$75,000), family economic satisfaction (dissatisfied, average, satisfied), two-child families or not (yes, no), ranking in two-child families (1st, 2nd), parental preference (prefer siblings, no preference, prefer me), way of living (with parents, with grandparents, with parents and grandparents), parental marital status (good, ordinary, frequent quarrels, separation, divorce or widowhood), distress in this family (none, emotional, behavioral, communication, others), father or mother`s age, father or mother`s education (junior high school and below, senior high school, college and above), and father or mother`s employment status (yes, no). Among them, grade and age are continuous variables, and the rest are categorical variables.

Data Analysis

Data were analysed using R Foundation for Statistical Computing (version 4.1.1). We used the mean ± standard deviation to statistically describe continuous data in two groups, and used the t test for intergroup comparisons, with effect size Cohen's d. For classified data in two groups, the frequency (percentage) was used for statistical description, and the χ^2 test was used for intergroup comparison, with effect size w. Spearman correlation analysis was used to evaluate the correlation of family structure with family dynamics and functions in two groups. The independent variables were set the various dimensions of family structure, and the total score of family dynamics and functioning of two groups were the dependent variables. Multiple linear regression analysis was performed to identify predictors of family structure with family dynamics and functioning, and the variance inflation factor (VIF) excluded multicollinearity. The effect size was F and the difference was statistically significant at $p < 0.05$.

Ethics Statement

The protocol for this research was approved by the Research Ethics Committee of the Shanghai Pudong New Area Mental Health Center and Tongji University School of Medicine (No: PDJWLL2019008). All procedures were performed in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Helsinki Declaration of 1975, as revised in 2008. The participants and guardians provided written informed consent to participate in this study.

Results

Demographic Characteristics and Family Structure

The demographic characteristics and family structure among adolescents from the two-child families, the one-child families, and the overall sample are shown in Table 1. A total of 991 (30.13%) of the 3289 participants were from two-child families and 2298 (69.89%) were from one-child families. A total of 520 (52.47%) participants from two-child families and 1110 (48.30%) from one-child families were female. Among adolescents from two-child families, older children accounted for the highest proportion (61.15%), and the proportion of those who believed that their parents

Table 1 Demographic Characteristics and Family Structure Variables of Adolescents from Two-Child and One-Child Families

Variable	Total (n=3289)	Two-Child Families (n=991)	One-Child Families (n=2298)	t /χ^2	p
Grade, (mean ± SD)	8.38±1.62	7.93±1.35	8.58±1.68	10.68[a]	<0.001***
Age in years, (mean ± SD)	14.42±1.70	13.94±1.43	14.62±1.76	10.70[a]	<0.001***
Sex, n (%)				4.72[b]	0.028*
Male	1659 (50.44)	471 (47.53)	1188 (51.70)		
Female	1630 (49.56)	520 (52.47)	1110 (48.30)		
Annual household income, n (%)				24.45[b]	<0.001***
≦$15,000	641 (19.49)	183 (18.47)	458 (19.93)		
>$15,000 and ≦$45,000	1904 (57.89)	536 (54.09)	1368 (59.53)		
>$45,000 and ≦$75,000	447 (13.59)	149 (15.04)	298 (12.97)		
>75,000	297 (9.03)	123 (12.41)	174 (7.57)		
Family economic satisfaction, n (%)				0.09[b]	0.954
Dissatisfied	116 (3.53)	35 (3.53)	81 (3.52)		
Average	1314 (39.95)	392 (39.56)	922 (40.12)		
Satisfied	1859 (56.52)	564 (56.91)	1295 (56.35)		
Two-child families or not, n (%)				NA	NA
Yes	991 (30.13)	NA	NA		
No	2298 (69.87)	NA	NA		
Ranking in two-child families, n (%)				NA	NA
First	NA	606 (61.15)	NA		
Second	NA	385 (38.85)	NA		

(*Continued*)

Table 1 (Continued).

Variable	Total (n=3289)	Two-Child Families (n=991)	One-Child Families (n=2298)	t /χ^2	p
Parental preference, n (%)				NA	NA
Prefer siblings	NA	150 (15.14)	NA		
No preference	NA	764 (77.09)	NA		
Prefer me	NA	77 (7.77)	NA		
Way of living, n (%)				0.12[b]	0.941
With parents	2705 (82.24)	817 (82.44)	1888 (82.16)		
With grandparents	381 (11.58)	112 (11.30)	269 (11.71)		
With parents and grandparents	203 (6.17)	62 (6.26)	141 (6.14)		
Parents' marital status, n (%)				8.68[b]	0.070
Good	2283 (69.41)	700 (70.64)	1583 (68.89)		
Ordinary	614 (18.67)	190 (19.17)	424 (18.45)		
Frequent quarrels	99 (3.01)	34 (3.43)	65 (2.83)		
Separation	57 (1.73)	13 (1.31)	44 (1.91)		
Divorce or widowhood	236 (7.18)	54 (5.45)	182 (7.92)		
Distress in this family, n (%)				16.72[b]	0.002**
None	2038 (61.96)	570 (57.52)	1468 (63.88)		
Emotional	675 (20.52)	213 (21.49)	462 (20.10)		
Behavioral	34 (1.03)	14 (1.41)	20 (0.87)		
Communication	279 (8.48)	106 (10.70)	173 (7.53)		
Others	263 (8.00)	88 (8.88)	175 (7.62)		
Father's age in years, (mean ± SD)	42.95±5.00	42.64±5.28	43.08±4.87	2.31[a]	0.021*
Father's education, n (%)				37.45[b]	<0.001***
Junior high school and below	466 (14.17)	196 (19.78)	270 (11.75)		
Senior high school	1461 (44.42)	422 (42.58)	1039 (45.21)		
College and above	1362 (41.41)	373 (37.64)	989 (43.04)		
Father's employment status, n (%)				3.33[b]	0.068
Yes	2067 (62.85)	646 (65.19)	1421 (61.84)		
No	1222 (37.15)	345 (34.81)	877 (38.16)		
Mother's age in years, (mean ± SD)	40.52±3.99	40.56±4.66	40.50±3.67	−0.34[a]	0.734
Mother's education, n (%)				30.84[b]	<0.001***
Junior high school and below	1672 (50.84)	560 (56.51)	1112 (48.39)		
Senior high school	302 (9.18)	106 (10.70)	196 (8.53)		
College and above	1315 (39.98)	325 (32.80)	990 (43.08)		
Mother's employment status, n (%)				9.26[b]	0.002**
Yes		525 (52.98)	1349 (58.70)		
No	1415 (43.02)	466 (47.02)	949 (41.30)		

Notes: [a]t test, [b]χ2 test;*p< 0.05, **p<0.01, ***p<0.01.
Abbreviation: NA, not applicable.

preferred them was the smallest (7.77%).In addition, most of the participants had an annual family income ranging from $15,000 to $45,000 (57.89%), were satisfied with the family economy (56.52%), lived with their parents (82.24%), and thought that their parents had good marital status (69.41%). Interestingly, the annual family income of two-child families is higher than that of one-child families (χ^2=24.45, p<0.001), while the parents' level of education in one-child families is higher than that in two-child families (χ^2=30.87 to 37.45, p<0.001), and one-child families have less distress than two-child families (χ^2=16.72, p=0.002), and there was a significant difference between groups.

Family Dynamics and Functioning

Figure 1 shows a comparison of the family dynamics and functioning among adolescents from two-child families and one-child families. The mean scores for family atmosphere (68.96±22.20 vs 66.13±23.21), personalization (66.12±22.59
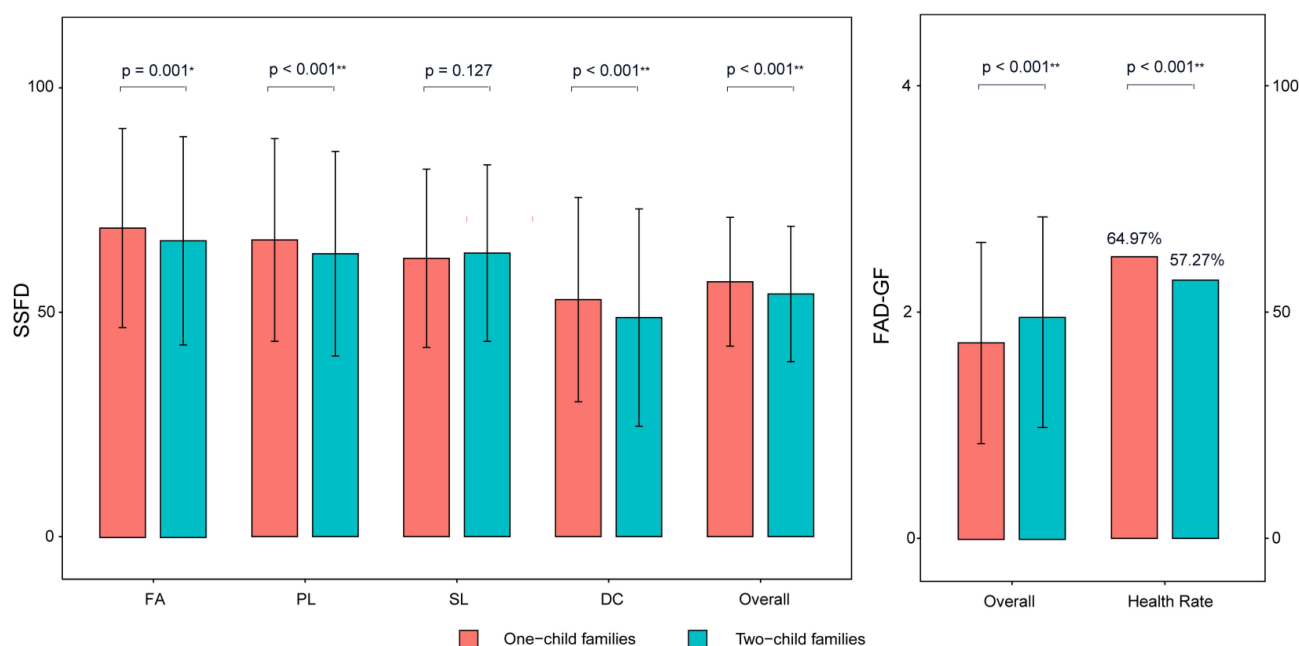
Figure 1 Family dynamics and functioning among adolescents from two-child and one-child families.
Notes: *$p < 0.01$, **$p < 0.001$.
Abbreviations: SSFD, Self-rating scale of Systemic Family Dynamics; FA, Family atmosphere; PL, Personalization; SL, System logic; DC, Disease concept; FAD-GF, Family Assessment Device-General Functioning.

vs.63.03±22.82), disease concept (52.81±22.76 vs.48.80±24.22), and overall family dynamics (56.80±14.34 vs 54.06 ±15.09) of the one-child families were higher than those of the two-child families, and there were significant differences between the two groups (t=3.30 to 4.94, p<0.01). The mean score of system logic of the two-child families was higher than that of the one-child families (63.17±19.66 vs 62.02±19.87), and there was no significant difference (t=−1.53, p=0.127). Furthermore, the mean score for family functioning in the one-child families was lower than that in the two-child families (1.88±0.53 vs 1.95±0.53, t=−3.72, p<0.001), the health rate of family functioning in the one-child families was higher than that in the two-child families (64.97% vs 57.27%, χ^2=17.61, p<0.001), and there were significant differences.

Correlation Analysis

Pearson correlation analysis was conducted on the family structure, family dynamics and functioning among adolescents from two-child and one-child families. As Figure 2 and Table 2 shows, the mother's level of education, annual household income, and family economic satisfaction were positively correlated with the family dynamics of the two groups (r=0.042 to 0.291, *p*<0.01) and negatively correlated with the score of family functioning for two groups (r=−0.364 to −0.076, *p*<0.01). Meanwhile, the marital status of parents was negatively correlated with the family dynamics of the two groups (r=−0.169 to −0.130, *p*<0.01) and positively correlated with the score of family functioning for two groups (r=0.260 to 0.265, *p*<0.01). There was no significant relationship between way of living, parental age and employment, family dynamics and functioning in two-child families (*p*>0.05), but parental preference was positively correlated with family dynamics (r=0.183, *p*<0.01) and negatively correlated with the score for family functioning (r=−0.208, *p*<0.01). System logic was positively correlated with level of parental education in one-child families (r=0.056 to 0.092, *p*<0.01) and negatively correlated with parental employment and marital status (r=−0.073 to −0.041, *p*<0.05), but there was no significant correlation with these aspects in two-child families (*p*>0.05).
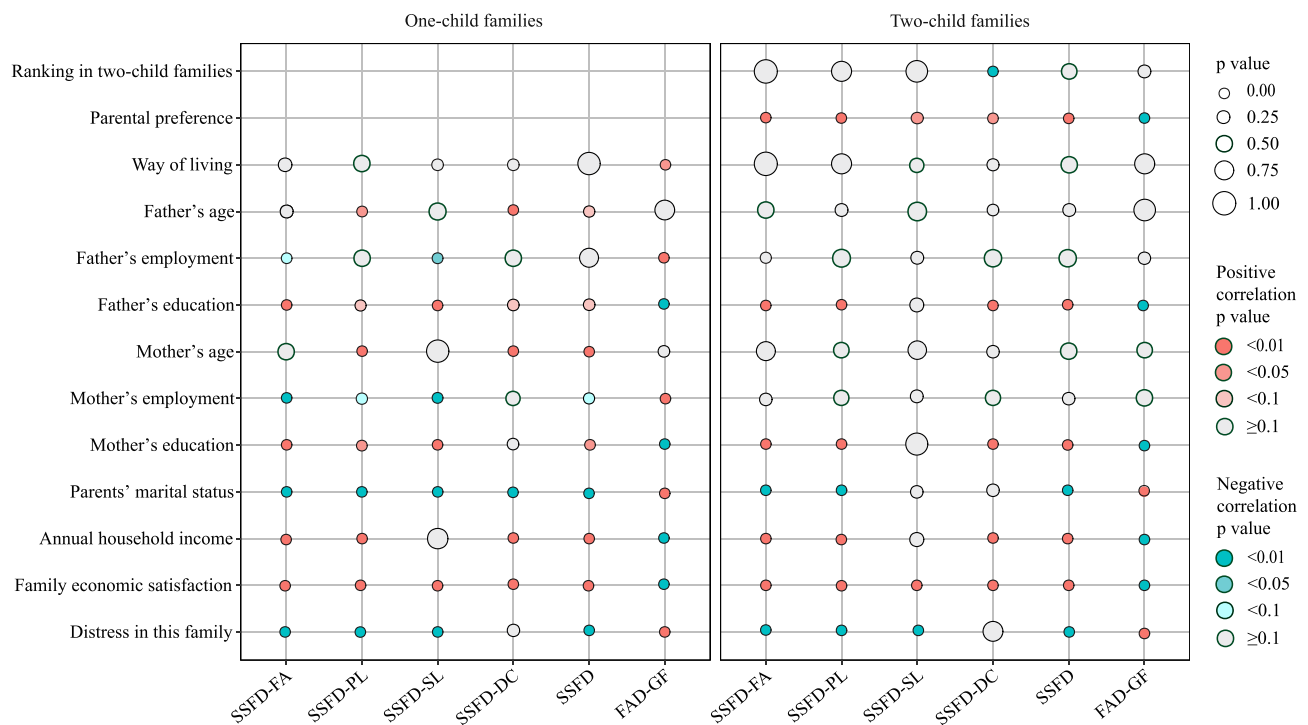
Figure 2 The bubble chart of correlation between family structure with family dynamics and functioning among adolescents from two-child and one-child families.
Abbreviations: SSFD, Self-rating scale of Systemic Family Dynamics; FA, Family atmosphere; PL, Personalization; SL, System logic; DC, Disease concept; FAD-GF, Family Assessment Device-General Functioning.

Hierarchical Regression Analysis

The independent variables was the four models of family structure, including the general family environment, paternal roles, maternal roles, ranking in two-child families and parental preference; the total score of family dynamics and functioning of two-child and one-child families were the dependent variables for hierarchical regression analysis. The results showed that the final regression models for both two-child and one-child families had significant statistical significance (F= 12.302 to 36.784, p<0.001), which can explain the greater influence of independent variables of family structure on family dynamics and functioning. Maternal roles made a significant incremental contribution of variance (0.1% to 0.5%) to the prediction of the score beyond the variance explained by general family environment and paternal roles in one-child families. However, ranking and parental preference made a significant incremental contribution of variance (1.6% to 1.9%) to the prediction of the score beyond the variance explained by other models in two-child families. In the final model, family economic satisfaction, parental marital status, and family distress were significant predictors of family dynamics and functioning in two-child and one-child families (B=−1.562 to 6.156, p<0.05). Parental preference was also a significant influencing factor of family dynamics and functioning in two-child families (B=−0.156 to 4.161, p<0.001)(Table 3).

Discussion

We investigated the family structure, family dynamics and family functioning among adolescents from two-child and one-child families by the SSFD and FAD-GF, and explored the differences and influencing factors of family dynamics and functioning between the two groups. Our study is the first to focus on the family dynamics and functioning in the context of China's two-child policy, which is a new research direction. The findings of this particular group can provide additional insights into family patterns in different contexts. We found that family atmosphere, personality, disease concept, family dynamics, and family functioning of the one-child families were better than those of the two-child families. A study of 229 Danish families showed that family dynamics became less positive with the birth of a second child.[40] White et al found that the number of children in the family was negatively related to family dynamics.[41] Some

Table 2 Correlation Analysis of Family Structure with Family Dynamics and Functioning Among Adolescents from Two-Child and One-Child Families

Variable	One-Child Families						Two-Child Families					
	SSFD-FA	SSFD-PL	SSFD-SL	SSFD-DC	SSFD	FAD-GF	SSFD-FA	SSFD-PL	SSFD-SL	SSFD-DC	SSFD	FAD-GF
Ranking in two-child families							−0.002	−0.005	0.002	−0.082**	−0.027	0.035
Parental preference							0.221***	0.222***	0.067*	0.077*	0.183***	−0.208***
Way of living	−0.020	0.014	−0.033	−0.032	0.002	0.052*	−0.002	−0.007	0.035	−0.043	−0.023	−0.007
Father's age	−0.025	0.042*	−0.011	0.066**	0.038	−0.005	0.021	0.036	0.013	0.043	0.038	−0.003
Father's employment	−0.038	−0.015	−0.044*	0.014	−0.007	0.059**	−0.048	0.012	−0.034	−0.015	−0.017	0.041
Father's education	0.086***	0.036	0.092***	0.038	0.037	−0.091***	0.116***	0.082***	0.030	0.117***	0.114***	−0.102**
Mother's age	0.016	0.077***	0.001	0.096***	0.079***	−0.032	−0.009	0.026	0.013	0.044	0.020	0.025
Mother's employment	−0.051*	−0.038	−0.041*	−0.021	−0.035	0.054**	−0.045	−0.029	0.034	−0.028	−0.051	0.020
Mother's education	0.069**	0.049*	0.056**	0.028	0.042*	−0.087***	0.088**	0.087**	−0.003	0.108**	0.114***	−0.086**
Parents' marital status	−0.283***	−0.138***	−0.073***	−0.087***	−0.169***	0.265***	−0.277***	−0.087**	−0.040	−0.041	−0.130***	0.260***
Annual household income	0.077***	0.071**	0.003	0.104***	0.095***	−0.076***	0.119***	0.100***	0.031	0.091**	0.111***	−0.113***
Family economic satisfaction	0.296**	0.203**	0.101**	0.122**	0.210**	−0.271**	0.387***	0.291***	0.106**	0.149***	0.291***	0.387***
Distress in this family	−0.226***	−0.202***	−0.061**	−0.034	−0.166***	0.197***	−0.247***	−0.203***	−0.087**	−0.006	−0.153***	0.252***

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
Abbreviations: SSFD, Self-rating scale of Systemic Family Dynamics; FA, Family atmosphere; PL, Personalization; SL, System logic; DC, Disease concept; FAD-GF, Family Assessment Device-General Functioning.

Table 3 Hierarchical Multiple Regression Analysis on Family Dynamics and Functioning Among Adolescents from Two-Child and One-Child Families

Variable	One-Child Families						Two-Child Families							
	Family Dynamics (B)			Family Functioning (B)			Family Dynamics (B)				Family Functioning (B)			
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
(Constant)	48.784***	39.873***	35.014***	2.106***	2.216***	2.302***	39.008***	28.081***	31.396***	27.51***	2.439***	2.702***	2.527***	2.672***
Way of living	0.453	0.602	0.659	0.027	0.026	0.026	−0.705	−0.668	−0.833	−1.148*	−0.012	−0.012	−0.006	0.006
Parents' marital status	−1.513***	−1.554***	−1.562***	0.096***	0.096***	0.096***	−1.008*	−1.081*	−1.179**	−1.158*	0.099***	0.100***	0.105***	0.104***
Annual household income	0.904**	0.976**	0.883**	−0.007	−0.002	0.001	1.161*	0.879	0.848	0.787	−0.035*	−0.027	−0.026	−0.024
Family economic satisfaction	4.255***	4.531***	4.506***	−0.205***	−0.202	−0.201***	6.708***	6.665***	6.650***	6.156***	−0.269***	−0.268***	−0.265***	−0.246***
Distress in this family	−1.569***	−1.548***	−1.543***	0.066***	0.067***	0.067***	−1.099	−1.161**	−1.245***	−1.091**	0.072***	0.073***	0.076***	0.071***
Father's age in years		0.159**	−0.012		−0.001***	0.001		0.148	0.263	0.25		−0.003	−0.012**	−0.012**
Father's employment status		1.201	2.362**		−0.005	−0.026		1.198	3.376**	2.975*		−0.028	−0.061	−0.046
Father education		−0.252	−0.516		−0.028	−0.014		1.803**	1.119	1.036		−0.050*	−0.035	−0.031
Mother's age in years			0.329**			−0.005			−0.169*	−0.178			0.013*	0.013**
Mother's employment status			−1.624			0.017			−2.678	−2.473*			0.031	0.023
Mother education			0.188			−0.018			0.983	1.006			−0.023	−0.023
Ranking in two-child families										−1.02				0.042
Parental preference										4.161***				−0.156***
R²	0.084	0.088	0.093	0.148	0.149	0.150	0.105	0.116	0.124	0.141	0.205	0.211	0.218	0.236
ΔR²	0.084	0.004	0.005	0.148	0.001	0.001	0.105	0.011	0.009	0.016	0.205	0.006	0.006	0.019
F	41.777***	27.540***	21.379***	79.401***	50.066***	36.784***	23.180***	16.076***	12.643***	12.302***	50.944***	32.884***	24.770***	23.244***

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

studies have suggested that family structure imbalances can also lead to impaired family functioning, increased risk of overweight/obesity, and depressive symptoms in adolescents.[42,43] This also highlights the findings in natural studies of family patterns under changes in fertility policy, namely that increases in the number of family members contributes to stabilize family life, but also rigidifies family dynamics and functioning, where associations may result from complex relationships among family members, or sibling rivalry, or excessive parental attention or neglect of new members, or increasing family economic pressures.[44]

Simultaneously, we found that parental marital status, mother's level of education, annual household income, and family economic satisfaction in two-child and one-child families were positively correlated with family dynamics and functioning, but not significantly associated with lifestyle, parental age and employment. For two-child families, adolescents who were favoured by their parents scored higher on family dynamics and functioning. A Finnish study involving 49,534 participants showed that families with harmonious parents and older parents showed better family functioning, and that poor family economic conditions may limit children's development and increase the risk of attention deficit and hyperactivity disorder (ADHD).[45] From a sample of 2000 twins, it was found that parental preferences may determine family dynamics, affecting children's cognitive, language, motor, and socioemotional skills, and those preferences will be maintained from birth throughout childhood.[46] However, the results of parental age-related research differed from our finding, which may be due to traditional Chinese family concepts and cross-cultural education methods.[47]

Furthermore, there are different hypotheses for predictive models of family dynamics and functioning. Latino Acculturation and Health Project (LAHP) data showed that parental marital and parent-child conflict predict family dynamics and adolescent aggression.[48] Stuart et al suggested that the family dynamics pathway model has a biphasic relationship with adolescent well-being and cognition of family conflict, and that adolescent age has a moderating effect on the predictive model.[49] Parent-child dyad studies identified family functioning as a predictor of children's behavioural health and quality of life but not with family structural characteristics.[50] For the family model under the special policy background in China, financial satisfaction, parental marital status, and distress in the family were predictors of family dynamics and functioning, and parental preference was also an important factor in two-child families.

The psychopathology and brain mechanisms underlying poor family dynamics and dysfunction due to family structure transition remain unclear. Current family psychopathology studies have suggested that the pathogenesis of eating disorders may be related to parental personality-related family dynamics, which can also negatively impact parenting.[51] A cohort study of brain morphology in 2583 families revealed that poor family functioning reported by mothers in the face of new family members may be associated with a smaller prepubertal hippocampus in children, which may be a neurodevelopmental manifestation of long-term effects in children.[52] These findings may provide revisited research directions for family dynamics and functioning issues in family structure transitions.

Limitations and Future Directions

We also note some limitations. First, due to the limitations imposed by the COVID-19 pandemic, the current sample was limited to adolescents and has not been extended to each member of the two-child families, potentially leading to a bias in the results. Second, we did not extend more measurement tools to assess intra-family attribution or interpersonal models. Third, the survey relied on self-reported measures or lacked control for certain confounding variables. With the repeal of the birth limit policy, future research will further explore the cut-off values for adolescents' mental health and family functioning in multiple-child families, examining the laws of their psychological development with a longitudinal studies. This could lead to better detection of family predictors of mental health problems, providing more insights for child psychologists or family therapists.

Conclusions

The findings of this study suggest that family atmosphere, personality, disease concept, family dynamics, and family functioning of the one-child families were better than those of the two-child families. Unlike one-child families, parental

preference is an important predictor of family dynamics and functioning in two child families. This study increases our understanding of adolescents psychological problems during family structure transitions under the background of fertility policy, providing psychologists with more evidence-based evidence and family intervention directions.

Data Sharing Statement

The raw data supporting the conclusions of this article will be made available by the corresponding authors Manji Hu and Xirong Sun, without undue reservation.

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Disclosure

The authors declare no conflicts of interest in this work.

References

1. Wong RS, Tung KTS, Chow KHT, et al. Exploring the role of family communication time in the association between family dinner frequency and adolescent psychological distress. *Curr Psychol*. 2022;42:13868.
2. Cox MJ, Paley B. Families as systems. *Annu Rev Psychol*. 1997;48:243–267. doi:10.1146/annurev.psych.48.1.243
3. Skelton JA, Van Fossen C, Harry O, Pratt KJ. Family dynamics and pediatric weight management: putting the family into family-based treatment. *Curr Obes Rep*. 2020;9(4):424–441. doi:10.1007/s13679-020-00407-9
4. Pedersen MAM, Kristensen LJ, Sildorf SM, et al. Assessment of family functioning in families with a child diagnosed with type 1 diabetes: validation and clinical relevance of the general functioning subscale of the McMaster family assessment device. *Pediatr Diabetes*. 2019;20 (6):785–793. doi:10.1111/pedi.12866
5. Yang Z, Shang Y, Liang Y, et al. The Quality of Life and Its Relationship With Systemic Family Dynamics and Mental Health in Senior High School Students From Shaanxi, China. *Front Public Health*. 2022;10:833561. doi:10.3389/fpubh.2022.833561
6. Jensen TM, Sanner C. A scoping review of research on well-being across diverse family structures: rethinking approaches for understanding contemporary families. *J Fam Theory Rev*. 2021;13(4):463–495. doi:10.1111/jftr.12437
7. Mcbride MV, Lippold MA. Parenting practices in diverse family structures: examination of adolescents' development and adjustment. *J Res Adolescence*. 2018;28(3):650–664. doi:10.1111/jora.12390
8. Zhang BC, Chen WD. Transition and Adaption: the Maintain Logic in the Family of the Only-child-died Parents——A Study Based on the Social Dynamics. *J Huazhong Normal Univ*. 2013;52(3):19–26.
9. Barrows SP. China's One-Child Policy. *JAMA*. 2016;315(21):2349–2350. doi:10.1001/jama.2016.2192
10. Qian XZ. Implementation of China's population policy. *China Popul Newsl*. 1983;1(1):8–13.
11. Feng W, Gu B, Cai Y. The End of China's One-Child Policy. *Stud Fam Plann Mar*. 2016;47(1):83–86. doi:10.1111/j.1728-4465.2016.00052.x
12. Zeng Y, Hesketh T. The effects of China's universal two-child policy. *Lancet*. 2016;388(10054):1930–1938. doi:10.1016/S0140-6736(16)31405-2
13. Hvistendahl M. Analysis of China's one-child policy *Sparks* uproar. *Science*. 2017;358(6361):283–284. doi:10.1126/science.358.6361.283
14. Yan J, Wang L, Yang Y, et al. The trend of caesarean birth rate changes in China after 'universal two-child policy' era: a population-based study in 2013-2018. *BMC Med*. 2020;18(1):249. doi:10.1186/s12916-020-01714-7
15. Li HT, Xue M, Hellerstein S, et al. Association of China's universal two child policy with changes in births and birth related health factors: national, descriptive comparative study. *BMJ*. 2019;366:l4680. doi:10.1136/bmj.l4680
16. Gu YN. Investigation on the psychological status of the elderly children under the New policy of comprehensive two children. *Psychiatr Danub*. 2019;14:36.
17. Everri M, Fruggeri L, Molinari L. Microtransitions and the dynamics of family functioning. *Integr Psychol Behav Sci*. 2014;48(1):61–78. doi:10.1007/s12124-013-9248-9
18. Kreppner JM, O'Connor TG, Rutter M. Can inattention/overactivity be an institutional deprivation syndrome? *J Abnorm Child Psychol*. 2001;29 (6):513–528. doi:10.1023/A:1012229209190

19. Velemínský M Sr, Dvořáčková O, Samková J, Rost M, Sethi D, Velemínský M Jr. Prevalence of adverse childhood experiences (ACE) in the Czech Republic. *Child Abuse Negl*. 2020;102:104249. doi:10.1016/j.chiabu.2019.104249

20. Wikle JS, Hoagland A. Adolescent interactions with family and emotions during interactions: variation by family structure. *J Fam Psychol*. 2020;34 (5):544–554. doi:10.1037/fam0000625

21. Plamondon A, Bouchard G, Lachance-Grzela M. Family Dynamics and Young Adults' Well-Being: the Mediating Role of Sibling Bullying. *J Interpers Violence*. 2021;36(9–10):Np5362–np5384. doi:10.1177/0886260518800313

22. Halstead RO, Pavkov TW, Hecker LL, Seliner MM. Family dynamics and self-injury behaviors: a correlation analysis. *J Marital Fam Ther Apr*. 2014;40(2):246–259. doi:10.1111/j.1752-0606.2012.00336.x

23. Cakin Memik N, Hunc F, Kalayci S, et al. Assessment of Plasma-Endogenous Opioid Neuropeptide Levels and Psychometric Properties of Non-Suicidal Self-Injury in Adolescents. *Arch Suicide Res*. 2022;1–20.

24. Qian H, Shu C, Feng L, Xiang J, Guo Y, Wang G. Childhood Maltreatment, Stressful Life Events, Cognitive Emotion Regulation Strategies, and Non-suicidal Self-Injury in Adolescents and Young Adults With First-Episode Depressive Disorder: direct and Indirect Pathways. *Front Psychiatry*. 2022;13:838693. doi:10.3389/fpsyt.2022.838693

25. Chan KL, Chen M, Chen Q, Ip P. Can family structure and social support reduce the impact of child victimization on health-related quality of life? *Child Abuse Negl*. 2017;72:66–74. doi:10.1016/j.chiabu.2017.07.014

26. McCloskey LA, Figueredo AJ, Koss MP. The effects of systemic family violence on children's mental health. *Child Dev*. 1995;66(5):1239–1261. doi:10.2307/1131645

27. Xiaosi L, Yulin Z, Zhijun Z. A matched study: arc tbcre any differences in personality traits between the only-children and the chil- dren with siblings. *Shanghai Archives of Psychiatry*. 2001:65.

28. Zhang X, Kong PA. Rural Chinese youth during the transition into adulthood: family dynamics and psychological adjustment. *Int J Psychol*. 2021;56(5):756–765. doi:10.1002/ijop.12749

29. Puffer ES, Healy EF, Green EP, et al. Family Functioning and Mental Health Changes Following a Family Therapy Intervention in Kenya: a Pilot Trial. *J Child Fam Stud*. 2020;29(12):3493–3508. doi:10.1007/s10826-020-01816-z

30. Yang YF, Liang Y, Zhang YH. Revision, reliability and validity evaluation of Self-Rating Scale of Systemic Family Dynamics-students testing version. *Chine J Public Health*. 2016;32(2):167–170.

31. Byles J, Byrne C, Boyle MH, Offord DR. Ontario Child Health Study: reliability and validity of the general functioning subscale of the McMaster Family Assessment Device. *Fam Process*. 1988;27(1):97–104. doi:10.1111/j.1545-5300.1988.00097.x

32. Document O. National bureau of statistics; 2020. Available from: https://data.stats.gov.cn. Accessed May 3, 2022.

33. Broglio K. Randomization in clinical trials: permuted blocks and stratification. *JAMA*. 2018;319(21):2223–2224. doi:10.1001/jama.2018.6360

34. Kang CY, Zhao XD, Xu XF, Yang K, Yang JZ. The Questionnaire of Systemic Family Dynamics: development, Reliability and Validity. *Chine Mental Health J*. 2001;15(2):92–95.

35. Yu L, Zhao XD, Zeng WN, et al. Reliability and validity analysis of the revised version of the Systemic Family Dynamics Self-rating Scale in Guangdong Student Test. *Chine J Health Statistics*. 2014;31(6):979–981.

36. Epstein NB, Baldwin LM, Bishop DS. THE McMaster family assessment device. *J Marital Family Therapy*. 1983;9(2):171–180. doi:10.1111/ j.1752-0606.1983.tb01497.x

37. Miller IW, Epstein NB, Bishop DS, Keitner GI. The McMaster family assessment device: reliability and validity. *J Marital Family Therapy*. 1985;11(4):345–356. doi:10.1111/j.1752-0606.1985.tb00028.x

38. Boterhoven de Haan KL, Hafekost J, Lawrence D, Sawyer MG, Zubrick SR. Reliability and validity of a short version of the general functioning subscale of the McMaster Family Assessment Device. *Fam Process*. 2015;54(1):116–123. doi:10.1111/famp.12113

39. Li R, Xu F, Ji L. Revision of Family Assessment Device(FAD). *China J Health Psychol*. 2013;21(07):996–1000.

40. Hall EO, Wulff T, White MA, Wilson ME. Family dynamics during the third trimester of pregnancy in Denmark. *Int J Nurs Stud*. 1994;31 (1):87–95. doi:10.1016/0020-7489(94)90010-8

41. White MA, Wilson ME, Elander G, Persson B. The Swedish family: transition to parenthood. *Scand J Caring Sci*. 1999;13(3):171–176. doi:10.1111/j.1471-6712.1999.tb00536.x

42. Pratt KJ, Ferriby M, Noria S, Skelton J, Taylor C, Needleman B. Perceived child weight status, family structure and functioning, and support for health behaviors in a sample of bariatric surgery patients. *Fam Syst Health*. 2020;38(3):300–309. doi:10.1037/fsh0000317

43. Barrett AE, Turner RJ. Family structure and mental health: the mediating effects of socioeconomic status, family process, and social stress. *J Health Soc Behav*. 2005;46(2):156–169. doi:10.1177/002214650504600203

44. Bouchard G, Sonier NA. Relationship between sibling bullying, family functioning, and problem solving: a structural equation modeling. *Curr Psychol*. 2021:67.

45. Chudal R, Joelsson P, Gyllenberg D, et al. Parental age and the risk of attention-deficit/hyperactivity disorder: a nationwide, population-based cohort study. *J Am Acad Child Adolesc Psychiatry*. 2015;54(6):487–494.e481. doi:10.1016/j.jaac.2015.03.013

46. Abufhele A, Behrman J, Bravo D. Parental preferences and allocations of investments in children's learning and health within families. *Soc Sci Med*. 2017;194:76–86. doi:10.1016/j.socscimed.2017.09.051

47. Song Y, Malhotra S, Broekhuizen M, Wang Y, Chen BB, Dubas JS. Prosocial Behavior in Young Preschoolers: a Cross-Cultural Study across The Netherlands, India, and China. *J Genet Psychol Mar-May*. 2021;182(3):129–148. doi:10.1080/00221325.2021.1891857

48. Smokowski PR, Rose RA, Bacallao M, Cotter KL, Evans CB. Family dynamics and aggressive behavior in Latino adolescents. *Cultur Divers Ethnic Minor Psychol*. 2017;23(1):81–90. doi:10.1037/cdp0000080

49. Stuart J, Jose PE. The influence of discrepancies between adolescent and parent ratings of family dynamics on the well-being of adolescents. *J Fam Psychol*. 2012;26(6):858–868. doi:10.1037/a0030056

50. Van Fossen CA, Wexler R, Purtell KM, Slesnick N, Taylor C, Pratt KJ. Family functioning screening, referral, and behavioral health utilization in a family medicine setting. *Fam Syst Health*. 2022;40(1):21–34. doi:10.1037/fsh0000652

51. Amianto F, Daga GA, Bertorello A, Fassino S. Exploring personality clusters among parents of ED subjects. Relationship with parents' psychopathology, attachment, and family dynamics. *Compr Psychiatry*. 2013;54(7):797–811. doi:10.1016/j.comppsych.2013.03.005

52. Xerxa Y, Delaney SW, Rescorla LA, et al. Association of poor family functioning from pregnancy onward with preadolescent behavior and subcortical brain development. *JAMA Psychiatry*. 2021;78(1):29–37. doi:10.1001/jamapsychiatry.2020.2862