ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

The Impact of 0-3 Years Old Childcare Services on Infant Development and Family Well-being: An Empirical Study

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Abstract

With the implementation of the three-child policy in China and the increasing demand for family childcare, 0-3 years old childcare services have become a key focus of social and policy attention. This study aims to systematically explore the impact of childcare services on infant development and family well-being, and identify the core influencing path of childcare services. Based on 208 valid questionnaires collected from parents of 0-3 years old infants, this study adopts a five-level Likert scale to measure the research variables, and uses descriptive statistical analysis, reliability and validity test, correlation analysis, difference analysis and mediation effect analysis to conduct empirical research. The results show that childcare services have a significant positive impact on infants' physical, cognitive, social and self-care development, and can effectively alleviate family parenting pressure, improve family relationships and life well-being. The adaptation and habit formation of infants in childcare institutions play a partial mediating role between childcare services and infant development, with a mediating effect ratio of 53.5%. In addition, childcare services have strong universality, and there is no significant difference in the evaluation of service effects among different family types and infant age groups. This study provides empirical evidence for optimizing the supply of childcare services and improving the quality of childcare services in China.

Keywords

0-3 Years Old Childcare Services; Infant Development; Family Well-being; Mediation Effect; Empirical Analysis.

1. Introduction

In recent years, under the background of China's population policy adjustment and the transformation of family parenting concepts, the demand for professional 0-3 years old childcare services has shown a rapid growth trend [1]. With the acceleration of urbanization and the increase of dual-income families, the traditional family parenting model relying on grandparents has been unable to meet the modern family's demand for scientific and professional childcare, and childcare services have gradually become an important part of the public service system [2].

Previous studies have shown that high-quality childcare services can not only promote the physical and mental development of infants, but also effectively alleviate the parenting pressure of families, improve the employment participation rate of parents, especially mothers, and promote the harmony of family relations [3,4]. However, most of the existing studies focus on the supply side of childcare services, and there are few empirical studies on the actual effect of childcare services from the perspective of family demand, especially the lack of in-depth analysis on the influencing path and group differences of childcare services[5].

Based on this, this study takes 208 parents of 0-3 years old infants as the research object, compiles a special questionnaire on the impact of childcare services on infant development and

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

family well-being, and conducts a systematic empirical analysis on the actual effect, influencing path and group differences of childcare services, so as to provide empirical support for the optimization of childcare service supply and the improvement of service quality in China.

2. Research Design and Data Sources

2.1. Questionnaire Design and Variable Measurement

This study compiles a special questionnaire on "The Impact of 0-3 Years Old Childcare Services on Infant Development and Family Well-being", which consists of three modules: demographic information, infant development scale, and family well-being scale, with a total of 52 questions.

The demographic information module includes 10 questions, covering the identity of the respondent, the gender and age of the infant, the length of childcare enrollment, family structure, parental employment status, educational level, type of childcare institution, pre-enrollment care method, and the proportion of childcare expenses in household income, which are used as grouping variables for difference analysis.

The infant development scale includes 16 questions, which are divided into 4 dimensions: physical and motor development, cognitive and language development, social and emotional development, and life self-care development. The family well-being scale includes 20 questions, which are divided into 5 dimensions: parenting pressure relief, family relationship improvement, parental personal development, family economic burden evaluation, and life quality and well-being improvement.

All scale questions adopt a five-level Likert scale measurement method, with A=1 point (completely inconsistent), B=2 points (mostly inconsistent), C=3 points (neutral), D=4 points (mostly consistent), E=5 points (completely consistent). All questions are positively scored, and no reverse conversion is required.

2.2. Data Sources and Sample Characteristics

This study collects questionnaire data through an online questionnaire platform, and a total of 208 valid questionnaires are recovered, with an effective recovery rate of 100%. The sample size meets the optimal requirement of 180-260 samples for social science research, and has good representativeness.

The basic characteristics of the sample are as follows:

Gender of infants: 115 boys (55.29%), 93 girls (44.71%), with a balanced gender ratio;

Age of infants: 56 infants aged 0-1 year (26.92%), 70 infants aged 1-2 years (33.65%), 82 infants aged 2-3 years (39.42%), covering the whole age range of 0-3 years;

Parental employment status: 66 dual-income families (31.73%), 128 families with only one parent employed (61.54%), 14 families with both parents unemployed (6.73%);

Pre-enrollment care methods: 104 cases of parental care (50.00%), 21 cases of grandparental care (10.10%), 57 cases of full-time nanny care (27.40%), 26 cases of mixed care (12.50%).

3. Empirical Analysis Results

3.1. Descriptive Statistical Analysis

This study conducts descriptive statistical analysis on the 9 research dimensions, and calculates the mean, standard deviation, minimum, maximum and recognition rate of each dimension. The results are shown in Table 1.

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Table 1. Descriptive statistical results of each research dimension

Dimension Category	Dimension Name	Number of Items	Mean	Standard Deviation	Minimum	Maximum	Recognition Rate (%)
Infant Development	Physical and Motor Development	4	3.941	0.806	1	5	87.5
Infant Development	Cognitive and Language Development	4	3.906	0.745	1.75	4.75	87.5
Infant Development	Social and Emotional Development	4	3.947	0.78	1	5	87.5
Infant Development	Life Self-care Development	4	3.898	0.782	1	5	87.5
Family Well-being	Parenting Pressure Relief	4	3.892	0.81	1	5	87.5
Family Well-being	Family Relationship Improvement	4	3.922	0.806	1	5	87.5
Family Well-being	Parental Personal Development	4	3.925	0.781	1	5	87.98
Family Well-being	Family Economic Burden Evaluation	4	3.939	0.769	1.25	5	87.5
Family Well-being	Life Quality and Well-being Improvement	4	4.029	0.776	1.33	5	87.98
Total Scale	Overall Evaluation	36	3.929	0.713	1.68	4.52	88.5

The results show that the mean score of all dimensions is between 3.89-4.03, which is significantly higher than the neutral critical value of 3 points, and more than 87% of the parents hold a positive attitude towards childcare services. Among them, the dimension of life quality and well-being improvement has the highest mean score (4.029), indicating that the most intuitive value of childcare services is to liberate parents' time, relieve parenting pressure, and improve the overall life well-being of the family. The mean scores of the four development dimensions of infants are all close to 3.95, with no obvious short board, indicating that the promotion effect of childcare services on infants' physical, cognitive, social and self-care development is comprehensive and balanced.

The mean score comparison of each dimension is shown in Figure 1.Fig. 1 Mean score comparison of each research dimension

3.2. Reliability and Validity Test

Reliability and validity are the core test standards for the quality of questionnaire data. This study uses Cronbach's α coefficient to test the reliability of the scale, and uses KMO test and exploratory factor analysis to test the structural validity of the scale.

3.2.1. Reliability Test

The reliability test standard is: Cronbach's $\alpha \geq 0.8$ is excellent, $0.7 \leq \alpha < 0.8$ is good, and $\alpha < 0.7$ is unqualified. The reliability test results of each dimension and the total scale are shown in Table 2.

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Table 2. Reliability test results of the scale

Dimension Name	Number of Items	Cronbach α Coefficient	Reliability Evaluation
Physical and Motor Development	4	0.954	Excellent
Cognitive and Language Development	4	0.932	Excellent
Social and Emotional Development	4	0.945	Excellent
Life Self-care Development	4	0.936	Excellent
Parenting Pressure Relief	4	0.963	Excellent
Family Relationship Improvement	4	0.952	Excellent
Parental Personal Development	4	0.941	Excellent
Family Economic Burden Evaluation	4	0.937	Excellent
Life Quality and Well-being Improvement	4	0.974	Excellent
Total Scale	36	0.973	Excellent

The results show that the Cronbach α coefficient of all dimensions and the total scale is greater than 0.93, which far exceeds the academic excellent standard, indicating that the internal consistency of the questionnaire items is extremely strong, the measurement results are stable and reliable, and fully meet the academic requirements of graduation thesis and research projects.

3.2.2. Validity Test

This study uses KMO test and Bartlett sphericity test to judge whether the questionnaire is suitable for factor analysis, and then verifies the structural validity of the questionnaire through exploratory factor analysis. The test results are shown in Table 3.

Table 3. KMO and Bartlett sphericity test results

Test Index	Test Result	Evaluation Standard	Conclusion
KMO Value	0.925	KMO≥0.9 is extremely suitable for factor analysis	Extremely suitable for factor analysis
Bartlett Sphericity Test Significance	p<0.001	p<0.05 is significant, suitable for factor analysis	Extremely significant, suitable for factor analysis

The results show that the KMO value of the questionnaire is 0.925, and the Bartlett sphericity test is extremely significant (p<0.001), which meets the preconditions for factor analysis. This study uses principal component analysis and maximum variance rotation to fix and extract 9 common factors, which are completely consistent with the preset 9 dimensions. The results of exploratory factor analysis show that:

The factor loading of all items is greater than 0.6, with no low loading items and no cross-factor confusion;

The cumulative variance interpretation rate of the 9 common factors reaches 72.35%, which exceeds the academic standard of 60%, indicating that the structural validity of the questionnaire is good;

The factor extraction results are completely consistent with the preset dimension division, indicating that the questionnaire item design is reasonable and the dimension division is scientific.

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3.3. Correlation Analysis

This study uses Pearson correlation analysis to explore the correlation between the research dimensions, and the significance level is set at $p<0.05$. The core correlation results are shown in Table 4.

Table 4. Correlation matrix of core research variables

Correlation Pair	Correlation Coefficient r	Significance p	Correlation Strength	Core Conclusion
Childcare Service Quality ↔ Infant Comprehensive Development	0.868	<0.001	Strong Positive Correlation	The higher the quality of childcare services, the better the comprehensive development level of infants
Childcare Service Quality ↔ Infant Adaptation and Habit Formation	0.807	<0.001	Strong Positive Correlation	The higher the quality of childcare services, the better the effect of infant adaptation and habit formation
Infant Adaptation and Habit Formation ↔ Infant Comprehensive Development	0.901	<0.001	Strong Positive Correlation	The better the infant adaptation and habit formation, the higher the comprehensive development level of infants

The results show that all core variables have a significant strong positive correlation ($p<0.001$), and the correlation coefficient is between 0.807-0.901. In addition, the four development dimensions of infants and the five well-being dimensions of families also have a significant strong positive correlation, with the correlation coefficient between 0.75-0.85.

The core conclusions of correlation analysis are as follows:

The four development dimensions of infants are strongly positively correlated, indicating that the physical, cognitive, social and self-care development of infants is mutually supportive and linked, and the development of one dimension will drive the synchronous improvement of other dimensions;

The infant development dimension and family well-being dimension are strongly positively correlated, indicating that the better the infant development, the lower the family parenting pressure, the more harmonious the family relationship, and the higher the life well-being;The five family well-being dimensions are strongly positively correlated, indicating that the relief of parenting pressure will drive the improvement of family relationships, the promotion of parental personal development, and ultimately promote the comprehensive improvement of family life quality and well-being.

3.4. Difference Analysis

This study takes demographic characteristics as the grouping basis, uses independent sample t-test (binary variables) and one-way analysis of variance (multi-category variables) to explore the differences in the evaluation of childcare service effects among different groups, and the significance level is set at $p<0.05$.

3.4.1. Difference Analysis Based on Pre-enrollment Care Methods

This study focuses on comparing the evaluation differences of parents with 4 pre-enrollment care methods, and the core results are as follows:

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No significant difference in overall evaluation: The difference in the mean score of the 9 dimensions among the 4 care methods does not reach a statistically significant level (p>0.05), indicating that no matter which care method is adopted before enrollment, parents' overall evaluation of childcare services is highly positive;

Slight difference in deep recognition rate: The proportion of parents in the grandparental care group who choose "completely consistent" is only 14.29%, which is significantly lower than that in the parental care group (36.54%) and the full-time nanny care group (38.60%), while the proportion of "mostly consistent" is as high as 61.90%, indicating that families with grandparental care have a low deep recognition rate of childcare services and are more inclined to give moderate recognition;

Analysis of difference reasons: Grandparental care is mostly doting and overindulgent, resulting in strong dependence and weak independent ability of infants. After enrollment, infants have more severe separation anxiety and slower adaptation speed, so parents' evaluation of the deep improvement effect of childcare services is more conservative; while parental and full-time nanny care pay more attention to the cultivation of infants' independent ability and social enlightenment, so infants adapt faster and make more obvious progress after enrollment, and parents have a higher proportion of high recognition.

3.4.2. Difference Analysis Based on Parental Employment Status

Comparing the evaluation differences between dual-income families and non-dual-income families, the results show that:

The mean score of the "parenting pressure relief" dimension in dual-income families is slightly higher than that in non-dual-income families (3.92 vs 3.87), but the difference does not reach a statistically significant level (p>0.05);The difference in the mean score of the other 8 dimensions is minimal, with no statistically significant difference (p>0.05).The core conclusion is: no matter whether parents are dual-income or not, the improvement effect of childcare services on infant development and family life has been equally recognized. Childcare services have extremely strong universality, which can not only relieve the parenting pressure of dual-income families, but also provide professional childcare support for non-dual-income families.

3.4.3. Difference Analysis Based on Infant Age

Comparing the evaluation differences of parents of infants in three age groups: 0-1 year old, 1-2 years old, and 2-3 years old, the results show that:

The mean score of parents of infants aged 2-3 years old in each dimension is slightly higher than that of infants aged 0-1 year old, but the difference does not reach a statistically significant level (p>0.05);There is no significant difference in the evaluation of the 9 dimensions among the three age groups (p>0.05).The core conclusion is: childcare services have a significant promotion effect on infants of all ages from 0 to 3 years old, and there is no significant difference in the evaluation of childcare services among parents of infants of different ages, indicating that childcare services have extremely strong adaptability and can cover the whole cycle development needs of infants aged 0-3 years.

3.4.4. Overall Conclusion of Difference Analysis

The difference analysis based on infant gender, enrollment duration, family structure, parental education level, type of childcare institution, and proportion of childcare expenses all show that:The difference in the evaluation of all dimensions does not reach a statistically significant level (p>0.05);Parents of different groups have a highly positive evaluation of childcare services, with no obvious group preference.The overall conclusion of difference analysis is: the effect of childcare services is not significantly affected by factors such as infant gender/age, family structure/employment type, parental education level/income, and institution type. It has

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

extremely strong universality and adaptability, and can widely serve all kinds of families with infants aged 0-3 years.

3.5. Mediation Effect Analysis

To explore the core path of childcare services affecting infant development, this study takes childcare service quality as the independent variable (X), infant comprehensive development as the dependent variable (Y), and infant adaptation and habit formation as the mediating variable (M) to construct a mediation effect model, and uses the Baron & Kenny three-step method to test the mediation effect.

3.5.1. Model Setting and Research Hypothesis

The mediation effect model is shown in Figure 2.

Fig. 2 Mediation effect model of childcare services on infant development

The research hypotheses are as follows:

H1: Childcare service quality has a significant positive predictive effect on infant comprehensive development (total effect is significant);

H2: Childcare service quality has a significant positive predictive effect on infant adaptation and habit formation (X→M path is significant);

H3: Infant adaptation and habit formation has a significant positive predictive effect on infant comprehensive development (M→Y path is significant);

H4: Infant adaptation and habit formation plays a mediating role between childcare service quality and infant comprehensive development.

3.5.2. Mediation Effect Test Results

This study uses linear regression analysis to conduct the three-step test, and the results are shown in Table 5.

Table 5. Mediation effect test results (three-step method)

Regression Model	Predictor Variable	Outcome Variable	Regression Coefficient β	Standard Error SE	t Value	p Value	R^2	Test Conclusion
Model 1 (Total Effect)	Childcare Service Quality	Infant Comprehensive Development	0.768	0.021	36.23	<0.001	0.753	Total effect is significant, H1 is established
Model 2 (X→M)	Childcare Service Quality	Infant Adaptation and Habit Formation	0.726	0.023	31.52	<0.001	0.651	X→M path is significant, H2 is established
Model 3 (X+M→Y)	Childcare Service Quality	Infant Comprehensive Development	0.357	0.028	12.75	<0.001	0.869	X is still significant after controlling M
Model 3 (X+M→Y)	Infant Adaptation and Habit Formation	Infant Comprehensive Development	0.566	0.032	17.69	<0.001	0.869	M→Y path is significant, H3 is established

The core indicators of the mediation effect are calculated as follows:

Total effect: 0.768 (the overall effect of childcare service quality on infant comprehensive development, $p<0.001$, extremely significant);

Direct effect: 0.357 (the direct effect of childcare service quality on infant comprehensive development without mediating variable, $p<0.001$, extremely significant);

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

Mediation effect: 0.411 (calculated by 0.726×0.566, the indirect effect of childcare service quality on infant development through "infant adaptation and habit formation");

Mediation effect ratio: 53.5% (the ratio of mediation effect to total effect, more than half of the effect is realized through the mediating variable);

Mediation type: partial mediation (after controlling the mediating variable, the direct effect of the independent variable is still significant, which meets the judgment standard of partial mediation).

3.5.3. Core Conclusions of Mediation Effect Analysis

The mediation effect is established: Infant adaptation and habit formation plays a partial mediating role between childcare service quality and infant comprehensive development, with a mediation effect ratio of 53.5%, which is the core path of childcare services affecting infant development;

Dual influence paths: The influence of childcare services on infant development is realized through two paths:

Direct path: Childcare services directly promote the improvement of infants' physical, cognitive, social and self-care abilities through professional education and care activities and systematic enlightenment education;

Indirect path: Childcare services first help infants relieve separation anxiety, adapt to the collective environment, and develop regular work and rest and behavior habits, and then further drive the comprehensive improvement of infant development through good adaptation status and behavior habits;

Core value of mediating variable: Whether infants can successfully adapt to the kindergarten environment and develop good behavior habits is the key bridge for childcare services to give full play to their effects, and also the core pre-factor determining the final effect of childcare services.

The regression coefficient calculation formula used in this study is:

$$Y = \beta_0 + \beta_1 X + \varepsilon_1 \quad (1)$$

$$M = \beta_0 + \beta_2 X + \varepsilon_2 \quad (2)$$

$$Y = \beta_0 + \beta_3 X + \beta_4 M + \varepsilon_3 \quad (3)$$

Where:

Y is the dependent variable (infant comprehensive development),

X is the independent variable (childcare service quality),

M is the mediating variable (infant adaptation and habit formation),

β1 is the total effect coefficient,

β2 is the X→M path coefficient,

β3 is the direct effect coefficient,

β4 is the M→Y path coefficient,

E is the random error term.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

4. Conclusion

Based on 208 valid questionnaire data, this study conducts a systematic empirical analysis on the impact of 0-3 years old childcare services on infant development and family well-being, and draws the following core conclusions:

First, childcare services have achieved significant overall effects and have been highly recognized by parents. The mean score of all research dimensions is close to 4 points, and more than 87% of parents hold a positive attitude towards childcare services. Childcare services can not only comprehensively promote the physical, cognitive, social and self-care development of infants, but also effectively alleviate family parenting pressure, improve family relationships and life well-being.

Second, childcare services have extremely strong universality and adaptability. Factors such as infant gender/age, family structure/employment type, parental education level/income, and type of childcare institution have no significant impact on the evaluation of childcare service effects. Childcare services can widely serve all kinds of families with infants aged 0-3 years.

Third, infant adaptation and habit formation is the core bridge for childcare services to play their effects. The mediation effect analysis confirms that infant adaptation and habit formation plays a partial mediating role between childcare services and infant comprehensive development, with a mediation effect ratio of 53.5%. Whether infants can smoothly adapt to the kindergarten environment and develop good behavior habits is the key factor determining the final effect of childcare services.

Fourth, families with grandparental care have a low deep recognition rate of childcare services. The main reason is that the overindulgent care mode of grandparents leads to strong dependence and slow adaptation speed of infants after enrollment. Therefore, targeted adaptation guidance should be provided for such families to improve the service effect.

Based on the above research conclusions, this study puts forward the following practical countermeasures and suggestions:

Strengthen the all-dimensional supply of childcare services to ensure the balanced quality of services. Childcare institutions should simultaneously improve the education and care system for the four development dimensions of infants, design systematic and balanced activity courses, avoid short boards, and comprehensively promote the comprehensive development of infants.

Focus on improving the enrollment adaptation service to open up the core path of childcare services. Childcare institutions should take infant enrollment adaptation and habit formation as the core work, set up special separation anxiety relief courses, regular work and rest training plans, and social ability enlightenment activities to help infants quickly adapt to the collective environment.

Provide personalized adaptation services for families with grandparental care. Childcare institutions should provide targeted guidance for infants cared by grandparents before enrollment, such as setting up progressive enrollment duration, one-to-one emotional comfort, and independent ability training courses, to help infants quickly reduce dependence and improve parents' recognition of services.

Expand the coverage of inclusive childcare services and strengthen the universality of services. The government should increase policy support and financial investment in inclusive childcare services, expand the coverage of inclusive childcare institutions, reduce the access threshold of childcare services, and enable childcare services to benefit more families of different types.

Strengthen the professional ability training of childcare teachers to improve the professionalism of services. Relevant departments should improve the training system for childcare teachers, focus on training professional abilities such as infant emotional comfort,

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202606_9(6).0026

behavior habit formation, and all-dimensional enlightenment education, so as to fundamentally guarantee the quality and effect of childcare services.

Acknowledgements

The authors gratefully acknowledge the financial support from the 2024 Scientific Research Project of the Hunan Provincial Department of Education, titled ***A Study on the Impacts of Childcare Services on Family and Child Development Under the Low Fertility Background*** (Grant No. 24C1309), and the investigation support provided by various childcare institutions in Hunan province. We also thank all the parents who participated in the questionnaire survey for their valuable time and support.

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