Journal of Service Science and Management, 2026, 19(6), 567-578
https://www.scirp.org/journal/jssm
ISSN Online: 1940-9907
ISSN Print: 1940-9893

Research on Strategies for Improving the Quality of Infant and Toddler Care Services under the Medicine-Childcare Integration Model in Guigang City

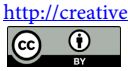
Kunmei Lun[1*#], Kelin Cao[2*]

[1]Guangxi Vocational & Technical Institute of Industry, Nanning, China
[2]Guigang Maternal and Child Health Hospital, Guigang, China
Email: [#]441562611@qq.com, 35360326@qq.com

How to cite this paper: Lun, K. M., & Cao, K. L. (2026). Research on Strategies for Improving the Quality of Infant and Toddler Care Services under the Medicine-Childcare Integration Model in Guigang City. *Journal of Service Science and Management, 19,* 567-578.
https://doi.org/10.4236/jssm.2026.196026

Received: October 13, 2026
Accepted: November 24, 2026
Published: November 27, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/



Open Access

Abstract

Objective: To explore the application effect of the "Medicine-Childcare Integration" model in infant and toddler care services in Guigang City, Guangxi, and to provide evidence-based references for the promotion of this model. **Methods:** A quasi-experimental research design with geographic-based cluster allocation was adopted. Families of infants and toddlers from eight sampled areas (four sub-districts and four townships) in Guigang City, Guangxi, from June 2025 to May 2026 were enrolled. Two urban sub-districts were assigned to the experimental group receiving the "Medicine-Childcare Integration" intervention, and two townships were assigned to the control group receiving conventional services, with 78 families per group. Individual-level randomization was not performed in this study. The experimental group received comprehensive interventions integrating medical and health care, childcare services, family parenting guidance and community support under the "Medicine-Childcare Integration" model, while the control group maintained the original infant and toddler care service model. Changes in infant-toddler care service quality scores, family satisfaction, community participation rate and infant-toddler health and development indicators were compared between the two groups before and after intervention. **Results:** After intervention, the total score of care service quality in the experimental group was (85.3 ± 6.2) points, which was significantly higher than (72.1 ± 8.5) points in the control group, with statistically significant difference ($t = 11.08$, $P < 0.001$). The family satisfaction rate of the experimental group was 92.3% (72/78), significantly higher than 68.0% (53/78) of the control group ($\chi^2 = 14.72$, $P < 0.001$). The community

*These authors contributed equally to this work.
[#]Corresponding author.

participation rate of the experimental group was 85.9% (67/78), higher than 55.1% (43/78) of the control group ($\chi^2 = 17.38$, $P < 0.001$). The qualified rate of infant-toddler health and development in the experimental group was 91.0% (71/78), higher than 76.9% (60/78) of the control group ($\chi^2 = 7.82$, $P = 0.005$). The incidence of common infant-toddler diseases in the experimental group was 12.8% (10/78), lower than 28.2% (22/78) of the control group ($\chi^2 = 5.67$, $P = 0.017$). **Conclusion:** The "Medicine-Childcare Integration" model can effectively improve the quality of infant and toddler care services in Guigang City, enhance family satisfaction and community participation, promote the healthy development of infants and toddlers, and reduce the incidence of common diseases among them. Since urban sites were assigned to intervention and township sites to control, geographic confounding cannot be fully separated from intervention effects, so caution is needed when generalizing findings. It is worthy of popularization and application in similar regions.

Keywords

Medicine-Childcare Integration, Infant and Toddler Care, Service Quality, Guigang City, Integration of Medicine and Childcare

1. Introduction

The period for children under 3 years old witnesses the fastest human growth and development, as well as the critical stage with the greatest brain plasticity. The World Health Organization points out that the nurturing environment during the first 1 000 days of life (from conception to 2 years of age) exerts a decisive influence on lifelong health status and developmental potential of individuals (Black et al., 2017). In recent years, with the adjustment and optimization of China's fertility policies, the implementation of the three-child policy has continuously boosted the demand for infant and toddler care services. Meanwhile, prominent challenges including insufficient supply of professional care resources, uneven service quality and weak family parenting capacity have become major bottlenecks restricting the healthy development of infants and toddlers.

In 2019, the General Office of the State Council issued *Guiding Opinions on Promoting the Development of Care Services for Children under 3 Years Old*, which clearly proposed to fully mobilize social forces to carry out infant and toddler care services in diverse forms[1]. In 2023, multiple government departments, including the National Health Commission jointly issued *Guiding Opinions on Promoting Medical and Health Institutions to Support the Development of Childcare Services*, encouraging medical and health institutions to support childcare services in various forms and advance in-depth integration of medicine and child-

[1]General Office of the State Council of the People's Republic of China (2019). Guiding Opinions on Promoting the Development of Care Services for Children under 3 Years Old (Guo Ban Fa [2019] No. 15). https://www.gov.cn/gongbao/content/2019/content_5392295.htm

care[2]. Against such policy background, local regions are actively exploring infant-toddler care service models adapted to local realities. Among them, models such as "medicine-childcare integration" have attracted wide attention for their advantages in integrating medical and childcare resources (Hu et al., 2024).

The "Medicine-Childcare Integration" model represents further development based on "medicine-childcare combination". It emphasizes four-party collaboration among medical and health institutions, childcare institutions, communities and families, so as to build a full-chain care service system covering pregnancy to 3 years old. The core of this model lies in establishing institutional collaboration mechanisms to organically embed medical services such as child healthcare, disease prevention and treatment, and nutrition guidance into daily childcare procedures. Meanwhile, family parenting guidance is delivered via community platforms, forming a service pattern of "medicine embedded in childcare, childcare empowered by medicine, and linkage between families and childcare institutions" (Chinese Maternal and Child Health Association, Committee on Infant and Toddler Nurturing Care, 2026). Plenty of practical explorations on medicine-childcare integration have been carried out home and abroad. For instance, Sweden has realized deep integration of childcare and education through reform of integrated preschool and childcare services; the United States supports state-level agencies in improving the quality of infant and toddler services through federal policies and funding mechanisms (Bao, 2025; National Center for Children in Poverty, 2024). Domestic regions have also launched relevant practices. West China Second University Hospital, Sichuan University has explored a multidisciplinary kindergarten-visiting model adopting the PDCA cycle from the perspective of medicine-childcare integration and achieved favorable outcomes (Qiao et al., 2025).

Nevertheless, existing studies mostly focus on theoretical discussions or practical experience summaries of medicine-childcare integration, while well-controlled studies verifying its actual improvement effect on infant-toddler care service quality remain scarce. As the only prefecture-level city in Guangxi that has obtained central government financial support for the inclusive childcare service demonstration project, Guigang City launched its medicine-childcare integration work for infant-toddler care in December 2022. It has signed demonstration-site agreements on medicine-childcare integration services with multiple childcare institutions, which provides a favorable research scenario for effect evaluation[3]. Based on the pilot practice of the "Medicine-Childcare Integration" model in Guigang City, this study adopts a quasi-experimental design to systematically evaluate

[2]National Health Commission of the People's Republic of China, National Administration of Traditional Chinese Medicine, & National Disease Control and Prevention Administration (2023). Guiding Opinions on Promoting Medical and Health Institutions to Support the Development of Childcare Services (Guo Wei Ban Ren Kou Fa [2023] No. 14).
https://www.gov.cn/zhengce/zhengceku/202310/content_6909700.htm

[3]Joint-Meeting Office of Guigang Work for Promoting Care-Service Development for Children under 3 Years Old (2024). Work Plan for Promoting Medical-Health Institutions to Support Childcare-Service Development in Guigang City (Gui Lian Ban [2024] No. 1). Local internal working document, not publicly released online.

the model's influences on infant-toddler care service quality, family satisfaction, community participation and infant-toddler health development, so as to provide scientific evidence for further optimization and promotion of the model.

2. Materials and Methods

2.1. Research Subjects

Families with infants and toddlers from typical urban and township areas including Gangbei District, Qintang District and Guiping City in Guigang City, Guangxi, from June 2025 to May 2026 were selected as research subjects. Study flow including screening, enrollment, withdrawal and analysis was fully documented: 212 families were screened; 171 met eligibility criteria; 156 families provided informed consent and were formally enrolled (78 in experimental group, 78 in control group). No participant withdrew during follow-up, and all 156 participants were included in final analysis. Moves or withdrawals after enrollment were classified as attrition rather than initial eligibility exclusion. **Inclusion criteria**: 1) Infants and toddlers aged 6 - 36 months; 2) Guardians with full civil capacity who could cooperate with questionnaire surveys and follow-ups; 3) Informed consent obtained with signed research participation forms. **Exclusion criteria**: 1) Infants and toddlers suffering from severe underlying diseases affecting development such as congenital malformations and inherited metabolic diseases; 2) Subjects who moved out of Guigang City at baseline screening stage before formal enrollment. This research protocol was reviewed and approved by the Ethics Committee of Guangxi Vocational & Technical College of Industry (Approval No.: GYJG-2025-089). Informed consent was obtained from all participants.

2.2. Research Methods

2.2.1. Research Design

A quasi-experimental research design was adopted. Eight sampling sites (four sub-districts and four townships) were selected. Two urban sub-districts were allocated to the experimental group implementing the "Medicine-Childcare Integration" model, and two townships were allocated to the control group maintaining conventional infant-toddler care services. The remaining four sampled areas were not included in this study. This study used geographic cluster allocation instead of individual randomization. Assigning all urban sites to intervention and all township sites to control makes it impossible to disentangle intervention effects from inherent geographic differences. The research lasted for 12 months. Data were collected at two time-points: baseline (before intervention) and 12 months after intervention (endpoint).

2.2.2. Intervention Protocol for the "Medicine-Childcare Integration" Model

Interventions for the experimental group were initiated after baseline survey, covering four aspects as follows. First, construct a collaborative medicine-childcare service network. Led by Guigang Maternal and Child Health Hospital, a four-level

service network of "Municipal Maternal and Child Health Hospital-Community Health Service Center-Childcare Institution-Community" was established in collaboration with community health service centers, childcare institutions and neighborhood committees, with clear responsibilities, divisions of labor and collaboration procedures for all parties. Full-time health administrators were assigned to the Department of Child Health Care of Guigang Maternal and Child Health Hospital. Through responsible physician liaison and on-site stationing, physicians conducted on-site guidance at local childcare institutions for at least twice per month, no less than half a day each time (see footnote 3). Second, deliver professional training for childcare practitioners. Medical and health personnel provided regular training for staff from childcare institutions. Training contents included growth and development monitoring of infants and toddlers, identification and management of common diseases, nutrition and feeding guidance, injury prevention, psychobehavioral development assessment, etc. Centralized training was organized once every quarter, with no less than four class-hours per session. Third, implement family parenting guidance. Parent-child activities, parenting lectures and one-on-one home visits were carried out at community childcare sites to teach guardians scientific parenting knowledge and help them master skills for daily care, early development promotion and identification of common diseases in infants and toddlers. Fourth, strengthen community-based supportive services. Infant-toddler care information files were built relying on community service platforms. Popular science parenting information was released regularly. Community volunteers were organized to participate in auxiliary infant-toddler care services, and parent mutual-aid communication groups were established to promote experience sharing and emotional support among families.

2.2.3. Measures for the Control Group

The control group maintained the original infant-toddler care service model. Childcare institutions provided routine daily care services, while community health service centers performed child healthcare according to national basic public health service specifications, without institutionalized collaboration mechanisms between the two sides.

2.3. Evaluation Indicators

2.3.1. Quality Score of Infant-Toddler Care Services

A self-designed questionnaire for evaluating infant-toddler care service quality was adopted. It was revised with reference to *Quality Assessment Standards for Childcare Institutions*[4] and *Jiangsu Local Standard for Infant and Toddler Childcare Services*[5],

[4]National Health Commission of the People's Republic of China (2023). Quality Assessment Standards for Childcare Institutions (WS/T 821—2023). https://www.nhc.gov.cn/fzs/c100048/202311/57f6f5c484bf40b79d3fe84b590bd791/files/1746697550575_72515.pdf (In Chinese)

[5]Jiangsu Provincial Health Commission (2024). Specification for Infant and Toddler Childcare Services (DB32/T 4663—2024), Local Standard of Jiangsu Province. https://dbba.sacinfo.org.cn/portal/download/9608fb330d5c2f27adaa0df024b91592078590e72054a6a2c43ca8d03ee00c79 (In Chinese)

combined with local realities of Guigang City. The full questionnaire, scoring rules, item composition, dimension weights, respondent information and pilot-validation procedures are provided in supplementary materials. This service-quality questionnaire measures objective service supply, which is conceptually distinct from the family satisfaction questionnaire measuring guardians' subjective satisfaction. The questionnaire contained four dimensions: medical service quality, childcare service quality, family parenting guidance quality and community support service quality. Each dimension included multiple items, scored with the 5-point Likert scale (1 = very dissatisfied, 5 = very satisfied), and converted into a 100-point scale. Pre-survey tests showed that the Cronbach's α coefficient of the questionnaire was 0.89, α coefficients for each dimension ranged from 0.82 to 0.91, and the content validity index was 0.93.

2.3.2. Family Satisfaction

A self-designed family satisfaction questionnaire was used, covering five domains: service attitude, professional competence, service accessibility, communication effect and overall evaluation, adopting the 5-point Likert scale. Satisfaction rate = (Number of "very satisfied" + Number of "satisfied")/Total number of respondents × 100%.

2.3.3. Community Participation Rate

The frequency of guardians participating in community-organized parent-child activities, parenting lectures, health education sessions and other events during intervention was recorded. Active participation was defined as attending no less than twice per month; otherwise, participation was defined as passive. Community participation rate = Number of actively participating subjects/Total number of subjects × 100%.

2.3.4. Health and Development Indicators of Infants and Toddlers

In accordance with *Growth Reference Standards for Chinese Children under 7 Years Old*[6], uniformly-trained health-care workers measured height, weight, head circumference and other indicators using standardized tools. Age-for-height Z-score (HAZ) and age-for-weight Z-score (WAZ) were calculated. Subjects with both HAZ ≥ −2 SD and WAZ ≥ −2 SD were defined as qualified for healthy development. The incidence of common diseases including upper respiratory tract infection, diarrhea and pneumonia among infants and toddlers during intervention was recorded.

2.4. Statistical Analysis

SPSS 30.0 statistical software was used for data analysis. Given cluster-based quasi-experimental design, community clustering effect should be considered. Limited by

[6]Ministry of Health of the People's Republic of China (2009). Reference Standards for Growth and Development of Chinese Children under 7 Years Old. (In Chinese) https://www.nhc.gov.cn/wjw/gfxwj/200909/f296bc03c45e4c1291e789a69db55b46.shtml

small number of clusters, statistical inference has inherent limitations. Measurement data conforming to normal distribution were described as mean ± standard deviation ($\bar{x} \pm s$). Paired t-test was used for within-group pre-post comparison. Between-group comparisons adjusted for baseline values, with effect sizes and corresponding confidence intervals reported. Count data were presented as case numbers (percentages), and compared using χ^2 test or Fisher's exact test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of Baseline Data between the Two Groups

A total of 156 families with infants and toddlers were enrolled in this study, with 78 cases in the experimental group and 78 cases in the control group. No statistically significant differences were observed between the two groups at baseline in maternal age, gestational weeks, infant-toddler months of age, gender composition and guardians' educational attainment ($P > 0.05$), indicating good comparability, as shown in Table 1.

Table 1. Comparison of baseline data between the two groups.

Item	Experimental group ($n = 78$)	Control group ($n = 78$)	Statistical value	P value
Maternal age (years, ($\bar{x} \pm s$))	28.5 ± 5.2	27.9 ± 5.8	$t = 0.68$	0.497
Gestational weeks (weeks, ($\bar{x} \pm s$))	32.4 ± 3.1	32.1 ± 3.4	$t = 0.56$	0.577
Infant-toddler age (months, ($\bar{x} \pm s$))	18.6 ± 6.3	19.1 ± 5.8	$t = 0.55$	0.583
Male [n (%)]	42 (53.8)	38 (48.7)	$\chi^2 = 0.39$	0.532
Guardians with junior college education or above [n (%)]	35 (44.9)	32 (41.0)	$\chi^2 = 0.25$	0.616

3.2. Comparison of Care Service Quality Scores before and after Intervention between the Two Groups

Before intervention, no statistically significant differences were found in each-dimension scores and total scores of care service quality between the two groups ($P > 0.05$). After intervention, the total score and each-dimension score of care service quality in the experimental group were significantly higher than pre-intervention values and corresponding values of the control group ($P < 0.001$), as shown in Table 2.

Table 2. Comparison of care service quality scores before and after intervention between the two groups (points, ($\bar{x} \pm s$)).

Group	Time	Medical service quality	Childcare service quality	Family parenting guidance quality	Community support service quality	Total score
Experimental group ($n = 78$)	Pre-intervention	68.3 ± 7.5	66.1 ± 8.2	65.4 ± 7.8	64.8 ± 8.5	67.2 ± 6.8
Experimental group ($n = 78$)	Post-intervention	86.1 ± 5.8	84.5 ± 6.5	85.8 ± 6.0	84.2 ± 6.8	85.3 ± 6.2

Continued

Control group (n = 78)	Pre-intervention	67.8 ± 7.9	65.5 ± 8.5	64.9 ± 8.1	64.2 ± 8.7	66.8 ± 7.1
Control group (n = 78)	Post-intervention	73.2 ± 7.1	71.0 ± 8.9	72.5 ± 8.2	70.8 ± 9.1	72.1 ± 8.5

Note: For post-intervention comparison between the experimental group and the control group, the t-values for medical service quality = 12.43, childcare service quality = 10.87, family parenting guidance quality = 11.56, community support service quality = 10.45, total score = 11.08 respectively, all $P < 0.001$.

3.3. Comparison of Family Satisfaction between the Two Groups

After intervention, the family satisfaction rate of the experimental group was 92.3% (72/78), including 38 cases (48.7%) of very satisfied and 34 cases (43.6%) of satisfied. The family satisfaction rate of the control group was 68.0% (53/78), including 18 cases (23.1%) of very satisfied and 35 cases (44.9%) of satisfied. The difference between groups was statistically significant ($\chi^2 = 14.72$, $P < 0.001$).

3.4. Comparison of Community Participation Rate between the Two Groups

After intervention, 67 subjects in the experimental group actively participated in community activities, with a participation rate of 85.9%; 43 subjects in the control group participated actively, with a participation rate of 55.1%. The between-group difference was statistically significant ($\chi^2 = 17.38$, $P < 0.001$).

3.5. Comparison of Infant-Toddler Health and Development Indicators between the Two Groups

After intervention, 71 infants and toddlers in the experimental group reached the health-development standard, with a qualified rate of 91.0%; 60 in the control group reached the standard, with a qualified rate of 76.9%. The difference was statistically significant ($\chi^2 = 7.82$, $P = 0.005$). During intervention, common diseases occurred in 10 infants and toddlers in the experimental group (incidence rate 12.8%), and in 22 infants and toddlers in the control group (incidence rate 28.2%). The between-group difference was statistically significant ($\chi^2 = 5.67$, $P = 0.017$), as shown in Table 3.

Table 3. Comparison of infant-toddler health and development indicators between the two groups.

/	n	Qualified for healthy development [n (%)]	Occurrence of common diseases [n (%)]
Experimental group	78	71 (91.0)	10 (12.8)
Control group	78	60 (76.9)	22 (28.2)
χ^2 value	—	7.82	5.67
P value	—	0.005	0.017

4. Discussion

Results of this study demonstrated that after 12-month implementation of the "Medicine-Childcare Integration" model, the total score of care service quality in the experimental group reached (85.3 ± 6.2) points, which was significantly higher than (72.1 ± 8.5) points of the control group, with high statistical significance. Among all dimensions of service quality, family parenting guidance quality obtained the largest improvement (20.4 points), followed by community support service quality (19.4 points), childcare service quality (18.4 points), and medical service quality (17.8 points), which represented the smallest improvement among four dimensions. This could be mainly attributed to full-time child-health physicians dispatched by Guigang Maternal and Child Health Hospital to work on-site at childcare institutions. Child healthcare services were transformed from the conventional "passive waiting-mode inside medical institutions" to an "active kindergarten-visiting mode". Medical and health professionals could directly engage in daily health management, nutritional diet assessment, infectious-disease prevention and control guidance for childcare institutions, effectively compensating for the shortage of professional medical support within traditional childcare services (Qiao et al., 2025). The childcare service quality dimension also improved remarkably, which was closely related to systematic professional training for childcare staff covering core competencies such as growth-development monitoring, identification of common diseases, nutrition-feeding guidance and injury prevention, substantially improving professional skills of front-line childcare workers.

Improvement in family parenting guidance quality constituted another highlight of this study. Multiple approaches including parent-child activities, parenting lectures and one-on-one home visits delivered at community childcare sites brought scientific parenting knowledge directly to families. After intervention, the family satisfaction rate of the experimental group reached 92.3%, markedly higher than 68.0% of the control group, suggesting that family-support services under the "Medicine-Childcare Integration" model were highly recognized by guardians. This finding was consistent with the conclusion reported by Hu et al. (2024) that integrating health services into childcare could improve caregiving quality and family satisfaction in infant-toddler care.

The elevated community participation rate reflected the advantages of the "Medicine-Childcare Integration" model in integrating community resources. The community participation rate of the experimental group reached 85.9%, far exceeding 55.1% of the control group. It indicated that this model successfully mobilized community service resources and built effective linkage mechanisms among medical institutions, childcare institutions, communities and families. While promoting medicine-childcare integration, Guigang City required a 100% signing-guidance rate between medical institutions and childcare institutions, and health administrators should conduct on-site visits to local childcare institutions for at least twice per month. Such institutional arrangements provided solid guarantees for service integration at the community level (see footnote 3).

In terms of infant-toddler health and development, the qualified rate for healthy development in the experimental group (91.0%) was significantly higher than that in the control group (76.9%), whereas the incidence of common diseases (12.8%) was significantly lower than that of the control group (28.2%). Note that all urban sites were allocated to intervention and township sites to control, geographic confounding may interfere with outcome interpretation. It illustrated that the "Medicine-Childcare Integration" model not only enhanced perceived service quality, but also exerted positive effects on objective health outcomes. This result was in line with trends reported in domestic and international research. The multidisciplinary kindergarten-visiting model with PDCA-cycle-driven continuous quality improvement reported by Qiao et al. (2025) also yielded favorable health benefits. The expert consensus on medical-childcare integration (Chinese Maternal and Child Health Association, Committee on Infant and Toddler Nurturing Care, 2026) also indicated that integrated medical and childcare services could improve health and development outcomes for infants and toddlers.

This study has several limitations. First, a quasi-experimental design rather than a strict randomized controlled trial was adopted. We used geographic cluster allocation, assigning urban sites to intervention and township sites to control, so intervention effects cannot be fully separated from geographic confounding. The number of clusters was small, which limited statistical power. Although baseline balance tests were performed to control selection bias, confounding factors could not be completely excluded. Second, the 12-month research period may be insufficient to evaluate long-term effects of the "Medicine-Childcare Integration" model, and long-term follow-up is required to identify certain long-term developmental outcomes of infants and toddlers. Third, this is a single-center study with samples exclusively from Guigang City, so caution should be exercised when generalizing its conclusions to other regions. Fourth, the self-designed questionnaire for service-quality evaluation exhibited good reliability and validity verified by pre-investigation, Full questionnaire materials are provided in supplementary materials; further revision and validation are still needed compared with internationally-used scales.

5. Conclusion

The practical application of the "Medicine-Childcare Integration" model in Guigang City, Guangxi, can effectively improve the quality of infant-toddler care services, raise family satisfaction and community participation rates, promote healthy development of infants and toddlers, and reduce the incidence of their common diseases. By integrating medical-health and childcare resources, constructing a four-level service network, delivering systematic staff training and family parenting guidance, this model forms a service pattern of "medicine embedded in childcare, childcare empowered by medicine, and linkage between families and childcare institutions". Due to cluster-based allocation with urban-versus-township grouping, intervention effect and geographic effect cannot be fully disentangled.

It offers referable practical pathways for regions with similar conditions to improve infant-toddler care service quality. Further multi-center, large-sample prospective randomized controlled studies with extended follow-up periods are warranted. Service-quality evaluation tools should also be further optimized to generate higher-level evidence for model promotion.

6. Limitations of the Study

This is a single-center quasi-experimental study. Participants were assigned by geographic cluster rather than individual randomization; all urban sub-districts went to intervention and all townships to control, which cannot separate intervention effect from geographic differences. Statistical inference is limited given small cluster quantity. Despite baseline balance testing, the non-fully-randomized design may leave unmeasured confounding factors influencing research outcomes. Second, the 12-month follow-up duration is relatively short for assessing long-term effects of infant-toddler care interventions, and some long-term developmental outcomes can only be fully demonstrated over longer observation periods. Third, all samples were recruited within Guigang City of Guangxi. Geographic and cultural homogeneity of the sample source may restrict the external validity of study conclusions. Its applicability in regions with diverse economic-development levels and childcare-service foundations needs further verification. Fourth, although the self-designed service-quality evaluation questionnaire showed favorable reliability and validity in pre-surveys, the questionnaire is attached in supplementary materials; cross-validation with internationally accepted scales has not been performed. The cross-cultural applicability of this scale awaits confirmation in future research. Fifth, cost-benefit analysis of the "Medicine-Childcare Integration" model was not conducted in this study. Health-economic evaluations should be incorporated into future studies to provide cost-effectiveness evidence for health-policy-oriented promotion of this model.

Funding

2025 Guangxi University Young and Middle-aged Teachers' Scientific Research Basic Capacity Improvement Project "Research on Strategies for Improving the Quality of Infant-Toddler Care Services under the Medicine-Childcare Integration Model in Guigang City" (No. 2025KY1548); 2024 Scientific Research Project of Guangxi Vocational & Technical College of Industry "Research on Strategies for Improving the Quality of Health-Parenting Services for Children under 3 Years Old under the Medicine-Childcare Integration Model— A Case Study of Guigang City, Guangxi" (No. GYKY2024023B).

Acknowledgements

We sincerely appreciate the strong support and cooperation from Guigang Municipal Health Commission, Guigang Maternal and Child Health Hospital, all participating childcare institutions and communities throughout study implementa-

tion. We thank all medical staff from the Department of Child Health Care of Guigang Maternal and Child Health Hospital for their professional support in on-site guidance, staff training and data collection. We are grateful to community staff from all participating sub-districts and townships for their hard work in household surveys and event organization. We thank all families of participating infants and toddlers; your active cooperation guarantees smooth completion of this study. We also appreciate valuable comments from peer experts for revision and improvement of this manuscript.

Author Contributions

Lun KM and Cao KL designed the study and drafted the manuscript. Lun KM collected the data and performed the statistical analysis. Cao KL supervised and revised the manuscript. All authors have read and approved the final manuscript.

Conflicts of Interest

All authors declare no commercial or other conflicts of interest. All clinical data of this study originate from real survey records. Data sorting and statistical analysis were performed objectively and truthfully without data falsification or tampering.

References

Bao, B. B. (2025). Integration of Childcare and Kindergarten Education: The Practice and Enlightenment of Sweden's Inclusive Preschool Education Reform and Development. *Journal of Teacher Education, 12,* 125-132. (In Chinese)

Black, M. M., Walker, S. P., Fernald, L. C. H., Andersen, C. T., DiGirolamo, A. M., Lu, C. et al. (2017). Early Childhood Development Coming of Age: Science through the Life Course. *The Lancet, 389,* 77-90. https://doi.org/10.1016/s0140-6736(16)31389-7

Chinese Maternal and Child Health Association, Committee on Infant and Toddler Nurturing Care (2026). Expert Consensus on Medical-Childcare Integration in Infant and Toddler Care Services. *Chinese Journal of Child Health Care, 34,* 473-477. (In Chinese)

Hu, Y, Liang, J. J., Song, Y. Y., & Xu, T. (2024). Current Situation and Prospects of Child Care Services for Children Aged 0-3 Based on the Medical and Educational Integration Model. *Chinese Journal of Women and Children Health, 15,* 1-4. (In Chinese)

National Center for Children in Poverty (2024). *United States Early Childhood Policy Profile*. National Center for Children in Poverty. https://www.nccp.org/early-childhood-us/

Qiao, M. T., Pu, J., Xiao, S. Y. et al. (2025). Multidisciplinary Patrol Supervision of Nursery Services Focusing on the PDCA Cycle: Exploration and Practice Based on the Integration of Medical Care and Education. *Journal of Sichuan University (Medical Sciences), 56,* 484-488. (In Chinese) https://doi.org/10.12182/20250360108