A study on the ReliabilityTest and Norm Establishment of the PCI Scale in the Urban Area of Lanzhou City

Yilin Cheng[1,*]

[1] School of Social and Political Science,The University of Edinburgh,Edinburgh, EH8 9JU,UK

*Corresponding *author. Email:chengyilin62@gmail.com*

Abstract. This paper presents a study on the validation and norm establishment of the Parent-Child Interaction (PCI) Scale in the urban areas of Lanzhou City. Focusing on the significance of PCI for child development, this research validates the reliability and validity of the scale and establishes norms for its application in Lanzhou's urban context. PCI education has good reliability and validity and can effectively assess the quality of PCI. The establishment of the Lanzhou urban norm of the PCI Scale can establish a standard for evaluating the level of early parent-child interaction of urban children in Lanzhou City and can more accurately and scientifically identify the problems in individual and group PCI and take relevant measures in time, so as to improve the quality of PCI as a whole, and to promote the healthy growth of young children. And it can provide a reference for the study of PCI in other regions of the country.

Keywords: Parent-Child Interaction, Scale Validation, Norm Establishment, Lanzhou China, Child Development

1 Introduction

Parent-child interaction (PCI) plays a pivotal role in the developmental trajectories of children[4]. These interactions, encompassing a range of behaviors from caregiving to play, and from instruction to emotional support, are foundational in shaping a child's social, emotional, and cognitive skills[2]. The quality and nature of these interactions

P. Dou and K. Zhang (eds.), *Proceedings of the 2023 International Conference on Economic Management, Financial Innovation and Public Service (EMFIPS 2023)*, Advances in Economics, Business and Management Research 287,
https://doi.org/10.2991/978-94-6463-441-9_55

are predictive of numerous aspects of a child's future, including academic success, social relationships, and emotional health[5].

Globally, a substantial body of research underscores the importance of positive parent-child interactions. International researchers have documented how these interactions support language development, problem-solving skills, and social competence, among other areas [3]. Studies from various cultural backgrounds emphasize the universal relevance of nurturing and responsive parenting. Cultural differences in the relationship between parenting and children's behavior. Developmental psychology.

In China, there is a burgeoning interest in examining these dynamics within its rapidly evolving social fabric. Chinese scholars have contributed significantly to the understanding of how traditional parenting styles are adapting to modern influences [1]. Nonetheless, there remains a noticeable gap in the literature concerning the parent-child interaction dynamics in the less economically developed urban areas, like Lanzhou, where socio-economic factors may distinctly influence family life.

This study aims to fill this gap by validating the Parent-Child Interaction Scale in the context of Lanzhou city and establishing normative data for its urban population. By adapting and examining a widely recognized scale within this specific demographic, the research seeks to offer valuable insights into the parenting practices of Lanzhou's urban families, further enriching the current understanding of parent-child interactions in diverse socio-economic settings in China.

2 Methods

2.1 Participants

This study selected families with only one child from urban area of Lanzhou city, China. We only included famiels with children who ages between 0-3 years old. Additionally, either one of the parents or both parents can participate our experiments. However, creating a better family atmosphere could be part of the experiments, too.

2.2 Design

The participants were recruited using a stratified sampling technique to ensure representativeness across different urban districts in Lanzhou. The study was conducted over a period of 6 months, allowing for thorough data collection and

analysis. All participants were made aware of the purpose and content of the experiment， and all of them have signed in the consent forms. To improve the data accuracy of our study, we use the video recording equipment to observe the behaviors of our participants, the experimenters then extracted the data according to the video tape. To ensure the precision of the scales, a pilot study was performed prior to the main study to refine the assessment tools and procedures.

2.3 Measures

The PCI scales were used to measure the interactions between the parents and children. Two versions of the PCI scales were employed in our study: the original version and an adapted version tailored to the Chinese cultural context. The original scales were used to establish a baseline for comparison, while the adapted scales were utilized to capture culturally specific aspects of parent-child interactions. Each scale consisted of items measuring key dimensions of interaction, such as emotional warmth, responsiveness, and involvement. The Chinese version of PCI scales underwent a rigorous translation and cultural adaptation process, by expert consultations to ensure the scales' relevance and sensitivity to Lanzhou’s urban context. Additionally, to strengthen the study's methodological robustness, the adapted scales were subjected to a back-translation procedure, validating the accuracy of the translation.

2.4 Statistical Analysis

Descriptive statistics provided an initial overview of the scale scores. To examine the reliability of PCI scales, Cronbach's alpha coefficients were conducted to assess the internal consistency of the scales, Confirmatory factor analysis was utilized to verify the scales' construct validity. Multilevel modeling and structural equation modeling were used to account for the nested structure of the data and to explore the relationships between different dimensions of parent-child interactions and child developmental outcomes.

Descriptive statistical analysis is conducted on the PCI scale scores, as well as on general demographic characteristics of the participants, parenting styles, and the depression levels of the participating parents. For reliability testing, 20 pairs of 0–1-year-old healthy mother-infant and 20 pairs of 1-3 year old healthy mother-infant

can be randomly selected. A second measurement is conducted by another group of observers two weeks after the first feeding and (or) educational interaction, and a correlation analysis of the two sets of scores is performed to evaluate the stability coefficient and rate reliability of the scale. Finally, the internal consistency reliability of the entire scale can be calculated using the Spearman-Brown formula. The correlation coefficients between each subscale score and the total scale score are calculated, and the validity of the scale is judged based on whether the correlations are significant. The two methods combined can be used to assess the content validity of the scale. Criterion validity is based on a certain established theory, selecting an indicator or measurement tool as a criterion (standard), and analyzing the correlation coefficient between the scale scores and the criterion (standard) as the criterion validity coefficient. 20 pairs of 0–1-year-old healthy mother-infant and 20 pairs of 1-3 year old healthy mother-infant can be randomly selected, and after they complete the feeding and (or) educational interaction measurement, a HOME-IT scale measurement is conducted by professionals. Then, the correlation analysis between their feeding scale and interaction scale scores and the HOME-IT scale scores is performed to obtain the criterion validity coefficient of the parent-child interaction scale.

The analyses were performed using SPSS and AMOS software, with $P<0.05$ as the criterion for statistical significance.

3 Results

3.1 Description of Participants and PCI Scores

The PCI Education Scale, aimed at children aged 0 to 3 years, included 329 children aged 0 to 1 year (45.47%), 270 children aged 1 to 2 years (37.64%), and 123 children aged 2 to 3 years (16.90%) in the educational interaction group. The PCI Feeding Scale, for children aged 0 to 1 year, included 22 children aged 0 to 4 months (25.58%), 36 children aged 4 to 8 months (41.86%), and 28 children aged 8 to 12 months (32.56%) in the feeding interaction group.

The data (Table 1) indicated that as children aged, there was a general trend of increased total PCI scores, suggesting a maturation of interactive behaviors and responsiveness in the parent-child dynamic. For the youngest group (0-1 year), the mean total score was 49.93, with a standard deviation (SD) of 7.48, reflecting a broad

spectrum of interaction levels. In the 1-2 years age group, the total score mean increased to 52.62 (SD=6.63). The 2-3 years age group exhibited a further increase in the total mean score to 55.37 (SD=6.68).

Table 1. PCI Education Scale Age Mean Constants.

Age Group	0-1 year				1-2 years			
Score	Mean	SD	Min	Max	Mean	SD	Min	Max
Total	49.93	7.481	26	67	52.62	6.629	34	66
Sensitivity to Child's Signals	8.09	1.583	2	11	8.43	1.452	4	11
Response to Child's Distress	10.08	1.32	0	11	10	1.494	3	11
Social-Emotional Development	8.45	1.682	3	11	8.7	1.713	1	11
Cognitive Development	10.49	2.865	1	17	11.77	2.559	4	17
Clarity of Child's Signals	6.82	1.756	1	10	7.38	1.44	3	10
Response to Caregiver	6.02	2.575	1	14	6.34	2.436	1	13

Age Group	2-3 year			
Score	Mean	SD	Min	Max
Total	55.37	6.676	30	67
Sensitivity to Child's Signals	8.93	1.269	5	11

Response to Child's Distress	10.2	1.465	3	11
Social-Emotional Development	8.93	1.633	3	11
Cognitive Development	13.23	2.541	5	17
Clarity of Child's Signals	7.38	1.156	5	10
Response to Caregiver	6.71	2.231	1	12

3.2 Reliability and Validity Analysis of the PCI Scale

The correlation coefficients of the subscale scores of the education and feeding scales with the total scores were tested by Pearson's correlation analysis respectively. (Table 2)

Table 2. The correlation coefficients of the subscale scores of the education and feeding scales with the total scores.

Subscale Items	Total Score of Education Scale	Total Score of Feeding Scale
Sensitivity to Child's Signals	0.188**	0.676**
Response to Child's Distress	0.276**	0.261**
Social-Emotional Development	0.725**	0.863**
Cognitive Development	0.794**	0.804**
Clarity of Child's Signals	0.552**	0.840**
Response to Caregiver	0.611**	0. 843**

**. Significant correlation at the 0.01 level (two-tailed)

The Cronbach's alpha coefficients for the educational scale and the feeding scale were calculated separately using SPSS 26 software. The Cronbach's alpha coefficient for the PCI educational scale was found to be 0.813, and for the PCI feeding scale, it was 0.912. Thirty previously evaluated educational videos and ten feeding videos were randomly selected for a second evaluation by different assessors. The correlation between the two sets of evaluations was analyzed. The correlations for the two evaluations were found to be 0.916 and 0.873, respectively, with P-values less than 0.01. Finally, the internal consistency reliability of the entire scale was calculated using the Spearman-Brown formula. The reliability coefficient for half of the educational scale was 0.722, with $P < 0.01$, and the internal consistency reliability calculated using the Spearman-Brown formula was 0.839. The reliability coefficient for half of the feeding scale was 0.857, with $P < 0.01$, and the internal consistency reliability calculated using the Spearman-Brown formula was 0.923.

3.3 Norm Establishment

The Cronbach's alpha coefficients, indicative of the scale's internal consistency, were robust for both the educational ($\alpha = 0.813$) and feeding ($\alpha = 0.912$) scales. The high correlation coefficients for the inter-rater reliability analysis ($r = 0.916$ for education, $r = 0.873$ for feeding) suggested that the scale yields consistent results across different evaluators and points in time, reinforcing its stability.

4 Discussion

This research has yielded critical insights into the nature of PCI within the urban context of Lanzhou city. The study's key findings highlight a developmental progression in the PCI scores, which tended to increase with the child's age across the sampled population. This trend reflects a maturing dynamic within the parent-child relationship, as indicated by the rising mean scores from the youngest group. These figures, alongside the significant correlations found in the inter-rater reliability checks, establish the scales as reliable tools for assessing parent-child interactions. The norms established for the PCI scales provide a valuable reference for evaluating parent-child interactions in Lanzhou's unique urban environment. The findings

underscore the scales' adaptability and the necessity of considering cultural specificity in the assessment of parent-child relationships.

4.1 Applicability of the PCI Scale in Urban Lanzhou

The urban landscape of Lanzhou presents a unique blend of traditional practices and modern urban pressures that shape family interactions in distinct ways. The PCI Scale's validation and norm establishment in this study provide a robust framework for understanding and assessing parent-child interactions in this context. The scale's nuanced adaptation to the cultural and socio-economic realities of Lanzhou ensures its relevance and utility for local practitioners and researchers.

The adaptability of the PCI Scale was evident in its capacity to capture varied interaction patterns across different age groups and to reflect developmental changes in the quality of these interactions. The scale's structure, which considers the cultural norms and values specific to Lanzhou, allows for an accurate assessment of parent-child relationships, offering valuable insights into the local family dynamics.

Healthcare providers, educators, and policymakers in Lanzhou can apply the PCI Scale to identify families in need of support, tailor interventions to enhance parent-child interactions, and monitor the effectiveness of these interventions over time. The scale's applicability extends beyond individual assessments, facilitating larger community-based studies that can inform local child development policies and programs.

The reliability and validity of the PCI Scale, as demonstrated in this study, establish its potential as a standard tool in the region. Its application is particularly pertinent for early childhood development initiatives, where understanding the quality of parent-child interactions is crucial for designing targeted developmental programs. Moreover, the scale can be instrumental in cross-cultural studies, comparing parent-child interactions in Lanzhou with those in other urban and rural regions, thus contributing to a broader understanding of child development in diverse settings.

4.2 The Relationship Between Parent-Child Interaction Patterns and Cultural Background

The findings of this study highlight a complex relationship between parent-child interaction patterns and the cultural milieu from which they arise. In Lanzhou, a city

that embodies a mix of traditional Chinese values and the influences of urbanization, these interactions are not merely byproducts of individual parenting styles but are also reflections of broader societal norms and practices.

Cultural background significantly influences the way parents socialize and engage with their children. In Lanzhou, this is evident in the emphasis on educational achievement, respect for elders, and communal harmony—values deeply rooted in Chinese culture. The PCI Scale's adaptation considers these cultural aspects, providing a lens through which to view and understand how such values manifest in daily parent-child interactions.

Moreover, the study has illustrated that cultural norms around parenting evolve, as do the children within these settings. As Lanzhou continues to develop and modernize, the interactions between parents and children also adapt, balancing traditional expectations with the demands of modern urban life. This evolution is captured in the developmental progression of PCI scores with age, suggesting that parents in Lanzhou may be adopting more involved and responsive interaction styles as their children grow, perhaps reflecting the changing educational and social landscapes of the city.

The role of culture in shaping parenting behaviors and expectations is critical to the interpretation of the PCI Scale results. For instance, the consistent scores across age groups in the domain of 'Response to Child’s Distress' may reflect a cultural emphasis on emotional support and stability within the family unit. Conversely, the variability observed in the 'Cognitive Development' scores could indicate differing parental beliefs or resources dedicated to cognitive stimulation, which may be influenced by educational and economic factors prevalent in urban Lanzhou.

This interconnection between parent-child interactions and cultural background has important implications for the design and implementation of child development programs in Lanzhou. Interventions and support systems must be culturally congruent, recognizing the values, beliefs, and practices that define the local parenting landscape. By aligning strategies with the cultural context, such initiatives are more likely to be effective and resonate with the families they aim to support.

4.3 Implications of the Findings for Future Policies and Practices

The insights gleaned from this study carry significant implications for the development and implementation of policies and practices aimed at supporting

families and promoting child development in Lanzhou. By establishing validated norms for the Parent-Child Interaction (PCI) Scale, the research provides a foundational tool that policymakers and practitioners can utilize to measure and enhance parent-child relationships within the city's unique cultural and socioeconomic framework.

For policymakers, the nuanced understanding of parent-child interactions, as influenced by age and cultural context, can inform the creation of targeted developmental policies. These policies could focus on promoting parenting practices that are responsive to children's emotional and cognitive needs, as evidenced by the age-related progression in PCI scores. The recognition of the importance of early cognitive and emotional support could lead to increased investment in early childhood education and parental support programs, especially in urban areas where traditional support structures may be less prevalent.

Health and education practitioners can use the findings to tailor their interventions to the specific needs of different age groups. For instance, the stability in parental responses to children’s distress across all age groups suggests a need for consistent emotional support strategies, while the variability in cognitive development scores indicates a potential benefit in offering varied cognitive stimulation resources that evolve with the child's developmental stage.

Furthermore, the study's findings can influence the practice of professionals working with families by highlighting the importance of cultural sensitivity. Understanding the cultural context of Lanzhou allows practitioners to engage with families in a manner that respects and incorporates local values and practices, thereby enhancing the effectiveness of their interventions.

The research also has broader implications for urban development initiatives, emphasizing the need to consider family and child welfare in urban planning. As cities like Lanzhou continue to grow and evolve, ensuring that child development remains a priority can contribute to the overall well-being and future success of urban populations.

Lastly, the study offers a model for other less-developed urban settings in China and beyond, suggesting that similar assessments and adaptations of the PCI Scale can be valuable in understanding and supporting parent-child interactions in diverse cultural landscapes.

4.4 Limitations

While the study has provided valuable insights into parent-child interactions within Lanzhou's urban context, it is not without limitations. One of the key limitations is the cross-sectional design, which, although effective for establishing norms and capturing a snapshot of interactions, does not allow for the observation of changes over time. Longitudinal studies could provide a deeper understanding of the evolution of parent-child interactions and the long-term effects of cultural and socioeconomic factors.

Another limitation is the focus on urban Lanzhou, which may not fully capture the diversity of parenting practices across different rural and urban areas within the region. Future studies could expand the scope to include a broader range of socioeconomic backgrounds and geographic areas to enhance the generalizability of the findings.

The study also relied on the PCI Scale, which, despite thorough adaptation and validation, may still miss nuanced aspects of interactions that are unique to Lanzhou's cultural context. Incorporating qualitative methods, such as in-depth interviews or observational studies, could complement the quantitative data and provide a more holistic view of parent-child relationships.

5 Conclusion

This study has made significant strides in understanding parent-child interactions within the urban context of Lanzhou, revealing key insights into the developmental dynamics of these relationships. The adaptation and validation of the Parent-Child Interaction (PCI) Scale for the Lanzhou urban setting have established robust norms, illustrating a clear developmental progression in interaction quality as children age. The findings show that parent-child interactions become more involved and responsive over time, with specific patterns and practices influenced by the unique cultural and socioeconomic backdrop of Lanzhou. The reliability and validity analyses of the PCI scales reinforce their utility as effective tools for assessing parent-child relationships in this specific urban environment. These results not only contribute to the field of developmental psychology by providing a localized assessment tool but also offer a valuable framework for policymakers and

practitioners to enhance child development strategies within Lanzhou's distinct urban setting.

References

1. Sijia D, Yaojun L (2023). Unequal parenting in China: A study of socio-cultural and political effects. Sociological Review.
2. Yifu Y, Liying B (2002). Domestic and foreign studies on parent-child relationship and its impact on children's. psychological development[J]. Journal of Fujian Normal University (Philosophy and Social Science Edition), 130-136.
3. Hui X , Jianxin Z ,Meiling Z (2008). A Research Summary of How Family Parenting Patterns Influence Children"s. Socializational Development[J].Psychological Science.
4. Yunhua W(1999). A study of the effects of parenting styles on the development of self-esteem in children and. adolescents[J]. Psychological Development and Education.
5. Runcan P L, Constantineanu C, Ielics B (2012) .The Role of Communication in the Parent-Child. Interaction[J].Procedia - Social and Behavioral Sciences.