

Original Research Article

Parental and Teacher Factors Associated with Cognitive Development of Preschool Children

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Abstract

Early years are the foundational stages for children's cognitive development. This study aimed at analyzing the parental and teacher characteristics associated with preschool children's cognitive development. A cross-sectional design based on quantitative data was adopted in the study. A standard checklist was used to test the cognitive skills of 280 preschool children sampled through multi-stage cum stratified method equally from community and institutional schools in Birendranagar Municipality of Surkhet district in Nepal. The 280 parents and 32 teachers of these children were interviewed for their background characteristics. Many parental and teacher characteristics had significant association with children's cognitive development. The mothers with secondary level and higher education and employing non-labour occupation were associated with their children's higher cognitive outcomes. Similarly, teachers with secondary level and higher degree, preschool experiences below ten years, and high-paid salaries had significant positive association with children's cognitive development. Additionally, parental interaction and engagement with children and their teachers were beneficial for better cognitive skills of the children. So, the educational plans, policies, and programmes should give equal priority to the parental programmes to sensitize and empower the parents, especially the mothers, for their active roles in caring their children and interacting with the teachers. At the same time, the government and all the educational institutions should minimize the gap on teacher's pay between preschool and higher levels.

Keywords: Cognitive development, parent-child interaction, parental and teacher characteristics, parent-teacher meeting, preschool children

Introduction

Early years are the foundational stages for children's cognitive development. Many researchers confirmed that children's brain rapidly grow and develop during early five years of life (Tierney & Nelson III, 2009; Wisconsin Council on Children and Families, 2007). The earlier brain development is closely linked with children's cognitive development which influences their health, learning and behaviours (Young, 2002) and predicts future outcomes such as academic achievement, job opportunities, and earnings (Borghans et al., 2015). So, stimulating experience and responsive care giving in earlier life is beneficial for healthy brain development and cognitive functioning (Bick & Nelson, 2017) that places the roles of caregivers in the forefront for children's optimum development.

A significant proportion (43%) of the children below five years in the low- and middle-income countries like Nepal have developmental delays (Black et al., 2017), and 10.1% of the children aged 3-4 has significant cognitive delays (Emerson et al., 2018). It means a large proportion of the preschool-aged children in these countries need timely supports to enhance their cognitive ability. In Nepal, about 36% of the Under-5 children are unable to meet developmental potential (UNICEF, 2019). It shows the developmental situation of these

children very serious and alarming that demands instant care and opportunities to improve their developmental outcomes including cognitive ability.

Children in their early years spend most of their times with their parents at home. However, with the changing maternal occupations and busy life schedule, the children are left to the preschools and daycare centres at very young ages (Acharya, 2015; Venetsanou & Kambas, 2010) where they spend many hours in the day with their teachers and facilitators. So, it is interesting to assess the roles of parents and teachers on children's cognitive development.

Most previous evidences support that roles of parents at home and teachers at preschool are significant for children's cognitive development. However, the association of parent and teacher characteristics with children's cognitive development shows mixed results. Parental education positively predicts their children's cognitive outcomes (Ajayi et al., 2017; Aturupane et al., 2013; Ghosh, 2023; Sania et al., 2019; Singh & Mukherjee, 2017). But mother's influence on the children's cognitive development is the most powerful than fathers (Ajayi et al., 2017; Bogale et al., 2013; Emerson et al., 2018; Flôres et al., 2019; Kaplan et al., 2001; Muñoz et al., 2022; Sania et al., 2019; Warsito et al., 2012). Surprisingly, the study by Sharma et al. (2019) showed that father's illiteracy increased the risk of having children's cognitive delay, but mother's educational level was insignificantly associated with the children's cognitive development. Interestingly, Kaplan et al. (2001) revealed that maternal educational level and paternal occupational status were significantly associated with children's cognitive function but not of paternal educational level and maternal occupational status. However, Castillo Gualda et al. (2011) and Firkowska et al. (1978) found that parents' education and occupation had strong association with cognitive ability and mental performance of the children. Similarly, studies of Emerson et al. (2018) and Miquelote et al. (2012) showed that parental stimulation plays significant positive roles in childhood cognitive development, whereas Rodrigues et al. (2021) indicated paternal sensitivity as an associated factor for better cognitive outcomes of children.

Early childhood development (ECD) and preschool education have become a global agenda as a part of Sustainable Development Goals that emphasized health, nutrition and education of young children (UNICEF, 2017), and preschool education has strong evidence for its benefits on cognitive development of the children (Camilli et al., 2010). Preschool quality significantly and positively impacted children's academic achievement and behavioural improvements (von Suchodoletz et al., 2023) where teachers' roles are pivotal. Some of the previous literature works showed inconsistent results on the roles of teacher characteristics, such as education, experience and training on child outcomes including language, literacy and mathematics (von Suchodoletz et al., 2023). Croninger et al. (2007) however, Wang et al. (2020) showed significant positive associations of teacher qualifications, including education, experience and training, with academic and developmental outcomes of the children. Nevertheless, a meta-analysis did not find the significant associations between teacher characteristics such as age, education and experience and children's developmental outcomes (von Suchodoletz et al., 2023). Similarly, Buddin and Zamarro (2009), and Lin and Magnuson (2018) found the supportive results that teacher's educational level could not predict children's academic achievement. Moreover, Firkowska et al. (1978) did not find significant association of school factors with children's mental performance.

The evidences discussed above show conflicting results for the association of parent and teacher factors with cognitive development of the children that directs a way to further study in this issue. Therefore, this study aims to analyze the association of parent and teacher characteristics with preschool children's cognitive development.

Methods and Materials

Study Design

A cross-sectional study was conducted among 3 to 5 years ECD or nursery class children from community and institutional schools. This study collected quantitative data through their skills tests and interviewing with their parents and teachers.

Participants

Among 131 schools with 6,018 preschool children in Birendranagar Municipality of Surkhet district in Nepal (Center for Education and Human Resource Development, 2018), 28 schools were randomly selected, representing equally from community schools and institutional schools. Then, ten ECD/nursery class children of each selected schools were sampled randomly. Altogether, 280 preschool children sampled through multi-stage cum stratified method, the 280 parents, and 32 teachers of the sampled students participated for the study. The study sample was calculated using the formulae of $n_0 = \frac{Z^2 pq}{e^2}$ and $n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$ as recommended by

Cochran (1963) with the Z value 1.96, the precision level (e) .05 and the p value .75 based on the ECD Index score of the preschool children aged 3-5 years in Nepal that is 75% (Central Bureau of Statistics, 2020).

Research Tool

A standard checklist was used to measure the preschool children's cognitive development that was adopted from the Revised Philippine ECD Checklist (Education Department of Republic of the Philippines, n. d.). The checklist was a comprehensive tool measuring seven different domains of child development including cognitive domain. The cognitive part in the tool consisted of 21 items, such as imitating behaviors, matching objects, letters, colors and pictures, sorting out specific shapes and sizes, naming colors and animals/vegetables, copying shapes, stating functions of household items, solving simple puzzles, understanding opposites, pointing to right direction, and identifying wrong in pictures. The children were involved in the cognitive tests of these skills which were directly observed by the researcher. Each of these skills was scored '1' for presence and '0' for absence. For every child, the total raw scores, which range between 0 and 21, were transformed into the scaled scores, guided by the *Scaled Score Equivalent to Raw Scores Table*, as prescribed in the checklist. Further, the scaled scores which ranged from 1 to 6, 7 to 13, and 14 to 19 were interpreted as delay, average, and advanced developments respectively.

The children's background consisting of parental and teacher characteristics were added in the next part of the checklist that was utilized to interview their parents and teachers for their background information. The checklist is a well validated tool, which was pre-tested among 56 preschool children to ensure its reliability in the local context. The test extracted 0.825 Cronbach's alpha.

Data Collection Procedure

First, preliminary information on the sampled children were collected from the schools. Second, the parents were participated for interview about their child's individual and parental characteristics at the place of their convenience after receiving their written informed consent. Third, ECD/nursery teachers of the children were interviewed for their characteristics at school. Lastly, the children were involved in cognitive tests with the help of their teachers, and their skills were observed and recorded on the checklist.

Statistical Analysis

The children's total raw scores which were manually calculated in the checklist were converted into the scaled scores and levels of cognitive development. These scaled scores and cognitive levels were inserted into Statistical Package for the Social Sciences (SPSS) version 25. The children's cognitive development levels were demonstrated using univariate methods such as number, percent, mean, and standard deviation. The association between parental and teacher characteristics and children's cognitive development were analysed through bivariate tool (i.e., Fisher's exact test). For the applicability of the test, average and advanced levels in cognitive development were merged together to call the 'normal level' that finally classified the cognitive levels into 'Delay' and 'Normal'.

Ethical Considerations

An ethics approval letter (ERB Protocol Registration No. 58/2021 PhD) was received from the Nepal Health Research Council before collecting the data. A due permission was obtained from the concerned school authorities. A written-informed-consent was received from every parent, and an oral-informed-consent was taken from every teacher participated in the study.

Results

Levels of Cognitive Development Among Preschool Children

The preschool children's cognitive developmental levels classified into delay, average, and advanced developments are presented in Table 1. Nearly three-quarters (73.2%) of the children had average development, 23.2% had advanced development, and 3.6% was in delayed level of cognitive development. The total raw-scores of the children were between 6 and 21 (mean = 13.3; SD = 3.5), and the scaled-scores between 6 and 19 (mean = 11.8; SD = 2.5).

Table 1

Levels of Cognitive Development Among Preschool Children

Levels of cognitive development	Number = 280	%
Delay	10	3.6
Average	205	73.2
Advanced	65	23.2
Statistics	Raw scores	Scaled scores
Mean	13.3	11.8
Standard deviation	3.5	2.5
Minimum	6	6
Maximum	21	19

Association of Parental and Teacher Characteristics With Children's Cognitive Development

The parental and teacher factors such as age, education, occupation, income, experience, training, and interactions were applied for Fisher's exact test to analyse their associations with cognitive outcomes of preschool children (Table 2). The analysis shows a multi-factorial influence on the cognitive development of the children, with the mother's and teacher's roles to be the most significant.

Table 2
Association of Parental & Teacher Characteristics with Children's Cognitive Development

Parental and teacher characteristics	Total	Levels of cognitive development				P
		Delay		Normal		
		n	%	n	%	
Mother's age (mean age = 28.1 yr)						
< Mean	177	6	3.4	171	96.6	1.0
> Mean	103	4	3.9	99	96.1	
Father's age (mean age = 31.8 yr)						
< Mean	162	6	3.7	156	96.3	1.0
> Mean	118	4	3.4	114	96.6	
Mother's education						
Basic level & below	91	7	7.7	84	92.3	.015*
Secondary level & higher	189	3	1.6	186	98.4	
Father's education						
Basic level & below	77	5	6.5	72	93.5	.144
Secondary level & higher	203	5	2.5	198	97.5	
Mother's occupation						
Labour	38	4	10.5	34	89.5	.033*
Non-labour	242	6	2.5	236	97.5	
Father's occupation						
Labour	83	6	7.2	77	92.8	.070
Non-labour	197	4	2.0	193	98.0	
Parental income (mean = NRs 28292.9 monthly)						
< Mean	173	7	4.0	166	96.0	.746
> Mean	107	3	2.8	104	97.2	
Parental engagement in child's activities						
Daily	128	1	0.8	127	99.2	.024*
Non-daily	152	9	5.9	143	94.1	
Parental meeting with teachers						
Yes	169	1	0.6	168	99.4	.001*
No	111	9	8.1	102	91.9	
Teacher's education						
Grade 8	103	8	7.8	95	92.2	.006*
Grade 12 & higher	177	2	1.1	175	98.9	
Teacher's experience (mean = 10.2 yr)						
< Mean	163	2	1.2	161	98.8	.019*
> Mean	117	8	6.8	109	93.2	
Teacher's training						
Yes	261	9	3.4	252	96.6	.511
No	19	1	5.3	18	94.7	
Teacher's remuneration (mean = NRs 11239.3 monthly)						
< Mean	180	10	5.6	170	94.4	.016*
> Mean	100	0	0.0	100	100.0	

Note. N = 280; *p < .05, Fisher's exact test.

The preschool children's cognitive development levels by the mean ages of their mothers (28.1 years) and fathers (31.8 years) demonstrated statistically insignificant result ($p = 1.0$). The developmental levels by their mothers' education showed that 92.3% of the children whose mothers had basic level education or who cannot read and write were normal, whereas it was 98.4% for the children whose mothers had secondary level and higher education, that was significantly associated ($p = .015$). But in the fathers' case, the association was insignificant ($p = .144$). Higher proportion of the children with the mothers, who had daily wage-based labour as their major occupation, had cognitive delay than their counterparts from non-labour occupations, such as housewife, business, salaried job, and agriculture. The association of mothers' occupations with cognitive outcomes of their children was statistically significant ($p = .033$). Inversely, the association of fathers' occupations with cognitive outcomes of their children was insignificant ($p = .070$). The next socio-economic factor, the parental income had similar insignificant result ($p = .746$).

Almost all (99.2%) of the children who had parents engaging daily with them in stimulating activities like sharing ideas, telling stories, and involving in games and recreational activities, had normal cognitive skills, which was 94.1% for the children of those parents who reported non-daily engagement. The association between parental engagement with their children and the cognitive skills of their children was statistically significant ($p = .024$). Similarly, almost all (99.4%) of the children whose parents reported to meet their teachers and discuss on their children's issues had normal cognitive skills, whereas it was 91.9% for the children whose parents never met their teachers. There was statistically significant association between parental meeting with teachers and children's cognitive development ($p = .001$).

Preschool teacher characteristics such as education, experience, and remuneration demonstrated significant associations with children's cognitive skills, whereas teacher's training on preschool education had insignificant result. Children's cognitive levels by their teachers' educational status revealed that 92.2% of the children facilitated by the teachers with education of grade eight had normal outcomes, whereas it was 98.9% for grade 12 and higher educational level, that was significantly associated ($p = .006$). Similarly, almost all (98.8%) of the children facilitated by the teachers with the preschool experience below the mean years (Mean = 10.2 years) had normal cognitive development, whereas it was 93.2% for the children facilitated by the teachers with the experience above the mean years; the association was statistically significant ($p = .019$). However, their cognitive development levels by their teacher's training on preschool education revealed insignificant result ($p = .511$). Interestingly, all the children whose teachers received the salary more than the mean of NRs 11,239.3 per month had normal cognitive skills, whereas 94.4% of the children facilitated by the teachers receiving monthly salary below the mean had normal outcomes, that was statistically significant ($p = .016$).

Discussion

Out of 13 parental and teacher factors applied for Fisher's exact test, seven factors – mother's education and occupation, parental engagement in child's activities, parental meeting with teachers, and teacher's education, experience, and remuneration – showed statistically significant association with preschool children's cognitive development.

A mother plays a vital role in her children's cognitive development (Flôres et al., 2019). Mother's educational level showed significant positive association with children's cognitive

levels ($p = .015$, Fisher's exact test). It means mothers with higher education had children with higher cognitive skills, whereas the mothers with less education had less skilled children. This finding agreeing on significant role of mother's education on children's cognitive development is supported by the findings of many studies that showed statistically significant association between maternal education and children's cognitive ability (Ajayi et al., 2017; Aturupane et al., 2013; Bogale et al., 2013; Duncan & Magnuson, 2012; Firkowska et al., 1978; Ghosh, 2023; Kaplan et al., 2001; Muñoz et al., 2022; Warsito et al., 2012). Thus, mother's education is a potent factor for children's cognitive development.

The next maternal characteristic, mother's occupation, is statistically a significant factor in home context for children's cognitive development with $p = .033$, Fisher's exact test. The children of non-labour mothers were highly skilled in cognitive domain than those from labour ones. It means mother's occupation is a factor influencing children's cognitive ability. This finding is supported by the finding of Castillo Gualda et al. (2011) who showed positive significant influence of maternal occupation on adolescents' cognitive scores. Inversely, Kaplan et al. (2001) did not find the association significant. The reasons behind the contradicting evidences may be the variations on their study contexts and nature of occupations. However, in the local contexts of the study area, the binary classification of labour and non-labour occupations of mothers stood to be a significant factor associated with children's cognitive development.

Parental engagement in child's activities is another factor associated with cognitive development of the children that has statistical significance ($p = .024$, Fisher's exact test). It means the children who had the parents engaging daily in their activities like sharing ideas, telling stories, and involving in games and recreational activities had better cognitive skills than others. Parental engagement, concern and care towards their children positively influence their children's cognitive development. This finding aligns with the finding of Bai et al. (2021) who indicated that parental engagement with children in stimulating activities like story-telling, singing and playing positively influenced the children's cognitive development. Many such studies showed positive influence of parent-child interaction and involvement on children's cognitive development (Sharma et al., 2023; Sylvia et al., 2021; Warsito et al., 2012; Zill et al., 2003). Thus, parental engagement with children in their activities is a significant positive factor influencing children's cognitive ability.

Parent-teacher interactions during parental visits to school played significant role in their children's cognitive development. There was statistically significant association between parental meeting with teachers to discuss on their child's issues and children's cognitive skills, $p = .001$, Fisher's exact test. It means the children whose parents met their teachers to discuss on their issues had better cognitive outcomes than those whose parents never made such discussion. This finding shows a significant positive role of parent-teacher interactions on children's cognitive development. This finding aligns with the findings of many studies that showed significant influence of parent-teacher interactions and involvement on children's cognitive development (Aturupane et al., 2013; Wolf & McCoy, 2019; Zill et al., 2003). Thus, it is concluded that parental interaction with teachers positively influences their children's cognitive development.

Teacher characteristics such as educational qualification, experience and remuneration are the factors associated with children's cognitive development. Teacher's education was significantly associated with children's cognitive skills, ($p = .006$, Fisher's exact test). The children whose teachers had grade 12 and higher educational qualification were significantly better in cognitive skills than those from less educated teachers. It means teacher's education has positive association with children's cognitive ability. In existing literature, there is a lack of studies testing the association between teacher's educational qualification and preschool children's cognitive development. However, a few studies showed significantly positive association of teacher's educational level with children's language development (Wang et al., 2020) and academic achievement (Lai et al., 2011). In contrast, teacher's educational level had no significant association with elementary school children's academic achievement (Buddin & Zamarro, 2009). These previous studies conducted in different contexts differ from my study in many respects such as study contexts, measurement outcome and participants' age groups. Therefore, this finding of present study is unique and interesting that concludes that teacher's education is a significant factor associated with children's cognitive development.

The next teacher characteristic significantly associated with children's cognitive development is their years of preschool experience ($p = .019$, Fisher's exact test). The children of less experienced teachers were better in cognitive skills than those from highly experienced ones. This finding is very surprising and opposite of my hypothesis. Interestingly, during informal talks, many preschool teachers with longer experience shared about their job insecurity and dissatisfaction with their low-paid salary, whereas the less experienced teachers were not so much worried and were more satisfied in their job. Low pay and job insecurity become more complex and devastating with increment of a teacher's experience that finally de-motivates a teacher with more than 10 years' experience. I did not find any study testing association between teacher's years of preschool experience and children's cognitive outcomes. However, many studies showed positive influence of teacher's experience on school children's academic achievement (Aturupane et al., 2013; Buddin & Zamarro, 2009; Ewetan & Ewetan, 2015). In contrast, a couple of studies revealed insignificant association of teacher's experience with children's developmental outcomes (Wang et al., 2020) and educational achievement (Aslam, 2003). In the local context of my study where most of the highly experienced teachers are dissatisfied and de-motivated, it is concluded that teacher's experience is a significant factor for cognitive development of preschool children.

Teacher's remuneration is another factor significantly associated with children's cognitive development ($p = .016$, Fisher's exact test). The children of highly paid (above the mean of NRs 11,239.28/month) teachers had better cognitive skills than those from less paid ones. The finding of present study showing significant influence of teacher pay with children's cognitive skills aligns with Zill et al. (2003) who showed teacher's salary to be positively associated with Kindergarten children's cognitive development. Thus, teacher's remuneration is a significant factor of children's cognitive development.

Conclusion and Implications

Many parental and teacher characteristics are significant for children's cognitive development. Specifically, higher educated and non-labour mothers, and higher educated, less experienced and high-paid teachers have significant positive association with children's

cognitive development. Additionally, parental interaction and engagement with children and their teachers are beneficial for better cognitive outcomes of preschool children. So, the educational plans, policies, and programmes should equally prioritize the parental programmes to sensitize and empower the parents, especially the mothers, for their active roles in caring their children and interacting with the teachers. At the same time, the government and all the educational institutions must minimize the gap on teacher's pay between preschool and higher levels.

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Conflict of Interest

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