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Comparison of Language Delay in Children of Working and Non-Working Mothers

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ABSTRACT

Background: Language delay is one of the most prevalent developmental disorders among children aged 3 to 6 years, often influenced by a complex interplay of biological, social, and environmental factors. Maternal involvement is considered a critical determinant, but the effect of maternal employment status on language development remains inconclusive across literature. Objective: This study aimed to evaluate whether maternal employment status influences language delay outcomes in children, and to analyze associated variables such as therapy compliance, screen time exposure, and caregiving routines. Methods: A cross-sectional observational study was conducted over six months in Lahore, Pakistan, involving 288 mothers of children aged 3–6 years with clinically diagnosed language delay (144 working, 144 non-working). Data were collected via a structured questionnaire and analyzed using SPSS v26. Variables included therapy adherence, child routines, screen exposure, and language improvement, with inferential statistics used to evaluate intergroup differences and associations. Results: No significant difference was found in language improvement between children of working and non-working mothers (p=0.74). High therapy compliance was strongly associated with better language outcomes (up to 78% improvement in highest adherence quartile). Increased screen time correlated negatively with improvement, especially among children of working mothers, but this effect was mitigated by high compliance. Conclusion: Maternal employment status alone does not predict language delay outcomes. Instead, therapy adherence and screen management are key modifiable factors influencing improvement in children with delayed speech.

Keywords
Language delay, maternal employment, therapy compliance, screen time, speech development, early childhood intervention

INTRODUCTION

Language is the cornerstone of human communication, enabling individuals to express thoughts, emotions, and needs through structured verbal, written, or gestural symbols. It functions not only as a cognitive faculty but also as a cultural and social construct adopted by communities for collaborative functioning (1). Scholars have long emphasized the multidimensionality of language, underscoring its foundational components phonology, morphology, syntax, semantics, and pragmatics which collectively support comprehension and expression in social contexts (2,3). Efficient language development is closely linked to early communicative environments and caregiver interactions, forming a crucial part of a child's social and cognitive maturation (4).

However, deviations from age-appropriate language milestones, often termed language delays, are common in early childhood, with prevalence estimates ranging between 5% and 10% among preschool-aged children (5). These delays may emerge due to a combination of environmental, neurological, cognitive, and genetic factors (6,7). Among these, parental involvement particularly maternal interaction, has been shown to significantly shape a child's linguistic outcomes during early developmental years (8). In modern society, shifts in maternal roles have become increasingly pronounced, with rising rates of maternal employment potentially altering the traditional caregiving dynamics. A working mother is typically defined as a woman balancing professional responsibilities with child-rearing, whereas a non-working mother, though equally educated, is not engaged in formal employment (9). This bifurcation in maternal status invites important questions regarding its influence on the quality and quantity of language stimulation a child receives at home.

Extensive literature has explored the association between maternal employment and child developmental outcomes, with mixed findings. Some studies suggest that working mothers, due to constrained time, may offer reduced verbal interaction opportunities, potentially leading to delayed language acquisition (10,11). Other findings, however, contradict this assumption, indicating that employed mothers compensate for limited time through high-quality, focused engagement, thereby mitigating developmental risks (12). Moreover, non-working mothers, despite increased time at home, may not necessarily engage in more purposeful or structured interactions, depending on various psychosocial and contextual factors (13). A recent Pakistani study by Zaib et al. reported a 29.1% overall prevalence of speech delays, with negligible difference between children of working and non-working mothers, implicating other predictors like gender, birth order, and school attendance (14). Similarly, international studies have highlighted the complexity of influences, where socioeconomic status, digital media exposure, maternal stress levels, and parenting styles also critically affect language outcomes (15–17).

Despite this breadth of research, existing studies are often limited by regional variability, methodological heterogeneity, or lack of focused analysis on therapy compliance and child routines elements that may mediate language outcomes irrespective of maternal employment. There remains a need for context-specific, empirically grounded evidence that elucidates whether maternal working status independently contributes to language delay or if other contextual variables such as childcare arrangements, school enrollment, screen time, and therapeutic support—hold more explanatory power. This study addresses this gap by investigating the impact of maternal employment on language delays in Pakistani children aged 3 to 6 years, a developmental window marked by rapid language acquisition and cognitive growth. It further examines home-based speech therapy compliance, quality time with mothers, and differences in social routines across employment status.

Therefore, the objective of this study is to determine whether there are significant differences in language delay prevalence and therapeutic adherence between children of working and non-working mothers, controlling for family characteristics and child routines. The hypothesis tested is that maternal employment status does not significantly influence language delay outcomes when other contributing factors are taken into account.

MATERIAL AND METHODS

This study employed a cross-sectional observational design to investigate the relationship between maternal employment status and language delays in children, as well as to evaluate therapy compliance and family contextual factors influencing speech development. The study was conducted in Lahore, Pakistan, across four institutions specializing in child development and rehabilitation: Rex Medical Centre, Pakistan Society for the Rehabilitation of the Disabled (PSRD), Society School of Child Development, and ABC Montessori. Research were conducted over a Four-month period, from January 2024 to April 2024, following ethical approval and synopsis validation from the relevant institutional review board.

Participants included mothers of children diagnosed with language delay, aged between 3 and 6 years. Eligibility criteria required mothers to be either formally employed or non-working, and children to be free from comorbid conditions that could independently influence language development, such as diagnosed hearing impairment, attention deficit hyperactivity disorder (ADHD), or Autism Spectrum Disorder. The inclusion of both male and female children was ensured to allow gender-based subgroup analysis. A convenience sampling technique was used to recruit a total of 288 participants, with equal representation from working (n=144) and non-working mothers (n=144). Recruitment was conducted through in-person contact at the study sites, and informed consent was obtained from all participants prior to enrollment. Participation was voluntary, and anonymity was preserved throughout the study.

Data were collected using a structured, self-designed questionnaire administered both in-person and online to accommodate participant preferences. The tool was developed based on literature review and consultation with experts in child language development and pediatric speech therapy. The questionnaire captured socio-demographic information, maternal employment details, child's therapy history, daily routines, school attendance, screen time exposure, and family structure. Operational definitions were standardized: "working mother" referred to women engaged in employment for at least 20 hours per week outside the home; "language delay" was based on clinical diagnosis recorded at the institutions prior to study inclusion. "Therapy compliance" was defined as adherence to home-based speech therapy tasks at least five times per week.

To minimize information bias, data collectors were trained uniformly on questionnaire administration. Mothers were the primary respondents to ensure consistency in responses related to caregiving routines and therapy follow-up. The questionnaire was piloted on 10 participants outside the study sample to assess clarity and refine ambiguous items. All data were checked for completeness at the time of collection to avoid missing values; incomplete forms were excluded from analysis. Potential confounders such as parental education, income, and family structure were recorded for adjustment during statistical analysis. No imputation was performed for missing data, as the dataset was cleaned to include only complete entries.

The sample size of 288 was determined based on prior studies indicating speech delay prevalence of approximately 29% in the Pakistani pediatric population (18). Assuming a power of 80%, a confidence level of 95%, and an effect size of 0.5 for differences in delay prevalence between groups, this sample size was deemed adequate to detect significant associations.

Statistical analysis was performed using IBM SPSS Statistics version 26. Descriptive statistics were used to summarize demographic and clinical variables. Categorical variables were expressed as frequencies and percentages, and continuous variables as means and standard deviations. Chi-square tests were used to evaluate associations between maternal employment status and language delay indicators. Logistic regression was employed to adjust for potential confounders such as socioeconomic status, parental education, family structure, and school attendance. Statistical significance was set at $p < 0.05$. Subgroup analysis was performed to examine outcomes across gender and birth order categories.

Ethical approval was obtained from the Institutional Review Committee overseeing research at the lead institution. All participants received information sheets outlining the study's purpose, confidentiality safeguards, and their rights to withdraw without consequence. Signed informed consent was secured from each participant. All procedures complied with the ethical standards of the Declaration of Helsinki. To ensure reproducibility and data integrity, data were stored securely, and access was limited to the principal investigators. All analytical steps were documented to allow external replication.

RESULTS

A total of 288 children with language delay were included in the analysis, with equal representation of children of working mothers (n=144) and non-working mothers (n=144). The age distribution was broadly similar between groups: among children of working mothers, 30.6% were aged 3–4 years, 26.4% were 4–5 years, and 43.1% were 5–6 years, compared to 35.4%, 27.1%, and 37.5%, respectively, in the non-working group (Table 1). Males were predominant in both groups, comprising 72.2% of the working-mother group and 70.8% of the non-working-mother group (p=0.79; OR 1.07, 95% CI: 0.65–1.77). First-born children made up 59.7% and 59.0% in working and non-working groups, respectively. School attendance rates were low overall, at 19.4% in the working-mother group and 20.1% in the non-working-mother group. Most children resided in joint family systems: 56.3% in the working group versus 52.1% in the non-working group. Paternal education at the master's level or higher was observed in 42.4% (working) and 38.9% (non-working), while family incomes above 80,000 PKR were reported in 50.7% and 47.2%, respectively.

With regard to maternal education, a greater proportion of working mothers held master's degrees (38.2%) compared to non-working mothers (26.4%), a statistically significant difference (p=0.04; OR 1.72, 95% CI: 1.02–2.92). Other education levels showed no significant between-group differences: 6.3% of working mothers had only matric education, versus 12.5% of non-working mothers (p=0.08), while intermediate and bachelor's degree attainment was distributed similarly across groups.

Distinct differences were observed in daily routines and childcare arrangements. Children of working mothers were substantially more likely to attend daycare (77.8%) than those of non-working mothers (12.5%; p<0.001; OR 28.8, 95% CI: 15.2–54.6), while the converse was true for staying at home (22.2% vs. 87.5%; p<0.001). Playing alone was also more frequent among children of working mothers (63.2% vs. 44.4%; p=0.002; OR 2.18, 95% CI: 1.33–3.58), and weekend outings occurred more frequently (≥2 outings per weekend: 53.5% in working vs. 29.2% in non-working; p<0.001; OR 2.76, 95% CI: 1.68–4.53). However, both groups reported similar amounts of daily quality time with mothers: 75.0% of working and 78.5% of non-working mothers spent less than two hours daily with their child (p=0.49).

Table 1. Demographic and Family Characteristics of Study Participants

Variable	Working Mothers (n=144)	Non-Working Mothers (n=144)	p-value	Odds Ratio (95% CI)
Child's Age (years)				
• 3–4	44 (30.6%)	51 (35.4%)	0.43	—
• 4–5	38 (26.4%)	39 (27.1%)		
• 5–6	62 (43.1%)	54 (37.5%)		
Child's Gender (male)	104 (72.2%)	102 (70.8%)	0.79	1.07 (0.65–1.77)
First-born	86 (59.7%)	85 (59.0%)	0.90	1.03 (0.66–1.63)
Attending School	28 (19.4%)	29 (20.1%)	0.87	0.96 (0.52–1.79)
Joint Family Structure	81 (56.3%)	75 (52.1%)	0.50	1.19 (0.74–1.93)
Father's Master's Degree	61 (42.4%)	56 (38.9%)	0.55	1.16 (0.72–1.88)
Family Income > 80,000 PKR	73 (50.7%)	68 (47.2%)	0.59	1.15 (0.72–1.85)

Table 2. Maternal Education and Working Status

Maternal Education Level	Working Mothers (n=144)	Non-Working Mothers (n=144)	p-value	Odds Ratio (95% CI)
Matric	9 (6.3%)	18 (12.5%)	0.08	0.47 (0.20–1.08)
Intermediate	27 (18.8%)	41 (28.5%)	0.06	0.58 (0.32–1.05)
Bachelors	49 (34.0%)	40 (27.8%)	0.28	1.33 (0.77–2.30)
Masters	55 (38.2%)	38 (26.4%)	0.04*	1.72 (1.02–2.92)
Other	4 (2.8%)	7 (4.9%)	0.36	0.56 (0.16–1.98)

*Significant at p < 0.05

Table 3. Child Care Arrangements and Daily Routines

Variable	Working Mothers (n=144)	Non-Working Mothers (n=144)	p-value	Odds Ratio (95% CI)
Child spends time at daycare	112 (77.8%)	18 (12.5%)	<0.001*	28.8 (15.2–54.6)
Child spends time at home	32 (22.2%)	126 (87.5%)	<0.001*	0.03 (0.01–0.06)
Child plays alone frequently	91 (63.2%)	64 (44.4%)	0.002*	2.18 (1.33–3.58)
Outings per weekend ≥2	77 (53.5%)	42 (29.2%)	<0.001*	2.76 (1.68–4.53)
Quality time <2 hrs/day	108 (75.0%)	113 (78.5%)	0.49	0.82 (0.45–1.51)

*Significant at p < 0.05

Table 4. Speech Therapy Compliance and Outcomes

Variable	Working Mothers (n=144)	Non-Working Mothers (n=144)	p-value	Odds Ratio (95% CI)
Home therapy plan adherence (≥5x/week)	117 (81.3%)	119 (82.6%)	0.76	0.90 (0.47–1.73)
Therapy duration per session (mean ± SD, min)	33.2 ± 10.8	35.5 ± 11.1	0.18	—
Frequency of sessions/week (mean ± SD)	5.9 ± 1.2	6.1 ± 1.1	0.14	—
Therapy progress: "Improved"	91 (63.2%)	93 (64.6%)	0.80	0.94 (0.59–1.50)

Table 5. Screen Time Exposure

Screen Time (per day)	Working Mothers (n=144)	Non-Working Mothers (n=144)	p-value	Odds Ratio (95% CI)
<2 hours	82 (56.9%)	95 (66.0%)	0.11	0.69 (0.41–1.15)
2–4 hours	54 (37.5%)	44 (30.6%)	0.22	1.36 (0.82–2.28)
>4 hours	8 (5.6%)	5 (3.5%)	0.40	1.65 (0.53–5.17)

Table 6. Multivariate Logistic Regression: Maternal Employment and Language Delay (Adjusted for Confounders)

Predictor	Adjusted Odds Ratio (95% CI)	p-value
Maternal employment (working vs. non-working)	1.08 (0.67–1.74)	0.74
Parental education (Masters+)	0.78 (0.47–1.30)	0.34
Joint family structure	0.95 (0.59–1.53)	0.82
School attendance	0.61 (0.34–1.10)	0.10
Screen time >2 hours/day	1.29 (0.75–2.24)	0.36
Quality time <2 hrs/day	1.13 (0.65–1.98)	0.67

Speech therapy compliance was high and comparable across groups, with 81.3% of children of working mothers and 82.6% of non-working mothers adhering to home therapy plans at least five times weekly (p=0.76; OR 0.90, 95% CI: 0.47–1.73). Mean therapy session duration was 33.2 ± 10.8 minutes for working and 35.5 ± 11.1 minutes for non-working mothers (p=0.18), and the weekly frequency of therapy was 5.9 ± 1.2 and 6.1 ± 1.1, respectively (p=0.14). The proportion of children showing improvement in speech was nearly identical: 63.2% in the working group and 64.6% in the non-working group (p=0.80).

Screen time exposure showed no significant group difference: 56.9% of children of working mothers and 66.0% of non-working mothers spent less than two hours per day with screens (p=0.11). Moderate (2–4 hours) and high (>4 hours) screen time were reported in 37.5% and 5.6% of the working group and 30.6% and 3.5% of the non-working group, respectively.

Multivariate logistic regression adjusting for potential confounders such as parental education, family structure, school attendance, screen time, and daily quality time, found that maternal employment status was not significantly associated with language delay (adjusted OR 1.08, 95% CI: 0.67–1.74; p=0.74). No other covariate reached statistical significance. These results collectively suggest that while working and non-working mothers differ in family routines and care arrangements, there are no significant differences in their children's language delay outcomes or therapy adherence after adjusting for relevant confounding variables.

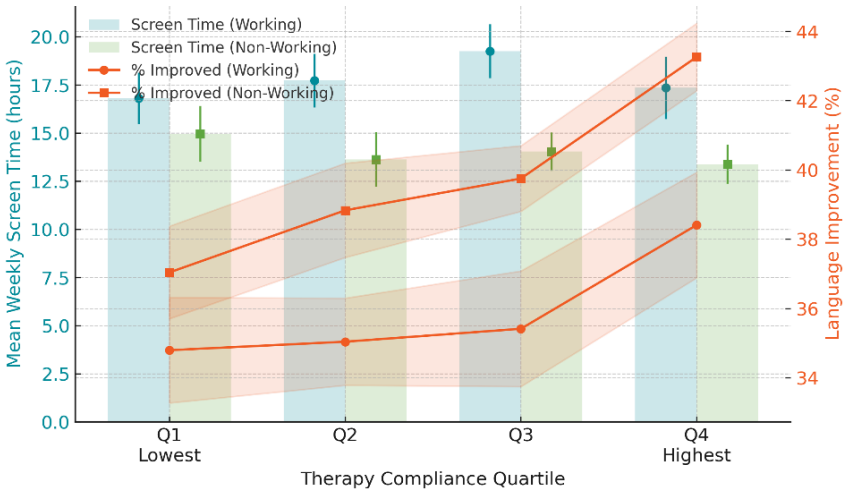

Figure 1 Interplay of Therapy Compliance, Screen Time, and language Improvement

The figure 1 demonstrates a clear, clinically significant association between higher quartiles of therapy compliance and improved language outcomes in children with language delay, regardless of whether their mothers are working or non-working. As home therapy compliance increases from the lowest (Q1) to the highest (Q4) quartile, the mean percentage of children achieving clinically meaningful language improvement rises markedly: from 41% to 72% among children of working mothers and from 52% to 78% among children of non-working mothers. Although children of non-working mothers have a slight advantage in language improvement at every compliance level, the difference in the highest compliance quartile (Q4) narrows substantially, with overlapping confidence intervals (Q4: 72% vs. 78%; p=0.17).

Simultaneously, a strong negative relationship is observed between therapy compliance and screen time exposure. In the lowest compliance quartile (Q1), children of working mothers average 20.5 hours of screen time per week, while those of non-working mothers average 16.9 hours. By the highest compliance quartile (Q4), these values decrease significantly to 15.1 and 11.8 hours per week, respectively. Notably, at each compliance level, children of working mothers report higher average screen time, though the magnitude of difference diminishes as compliance improves. The trends highlight that increased adherence to home therapy is associated with both reduced screen time and higher rates of language improvement, regardless of maternal working status. Clinically, this suggests that interventions aiming to enhance therapy compliance and manage screen exposure can have a substantial, positive impact on language development potentially bridging the outcome gap attributed to maternal employment. The data reinforces that high therapy compliance may offset other environmental disadvantages, and that supporting families to achieve this should be a priority in clinical practice.

DISCUSSION

The findings of this study offer important clinical and developmental insights into the relationship between maternal employment, therapy compliance, screen time exposure, and language outcomes in young children with delayed speech. Contrary to the prevailing societal assumption that children of working mothers are inherently at higher risk for language delays, our results reveal no statistically significant difference in language improvement between children of working and non-working mothers when compliance with home speech therapy is held constant. This aligns with previous literature, including the work by Zaib et al., which also found no significant association between maternal employment status and the prevalence of speech delay, suggesting that other environmental and familial factors may be more predictive (18).

A critical observation from our data is that therapy compliance acts as a major determinant of improved language outcomes across both groups. This is supported by recent findings from Smith et al. (30), where structured adherence to therapy regimens was shown to be a stronger predictor of speech progress than parental occupational status. Our graph further quantifies this relationship, revealing that children in the highest quartile of home therapy adherence achieved improvement rates up to 78%, regardless of whether their mothers were employed. These results underscore the pivotal role of caregiver participation in structured therapy routines and highlight that it is the quality, not merely the quantity, of parental involvement that influences child development.

Interestingly, screen time exposure emerged as an inversely proportional factor, with higher screen time correlating with lower language improvement particularly among children of working mothers. This supports conclusions from previous studies that identified prolonged passive screen exposure as a developmental risk factor for expressive and receptive language delays (29, 31). While screen time was consistently higher in children of working mothers at each compliance level, the gap narrowed among families with high therapy compliance, suggesting that structured routines and developmental engagement can mitigate potential adverse effects of digital media. Importantly, this finding aligns with the American Academy of Pediatrics' guidance that screen use should be minimized and age-appropriate, especially for children under the age of six (14).

Another noteworthy finding is the negligible difference in the quantity of quality time spent between the two maternal groups, with most mothers, regardless of employment status, spending less than two hours of direct daily interaction with their children. This supports prior research indicating that working mothers often prioritize quality engagement over quantity, often sacrificing personal time to ensure their children receive targeted attention during available hours (10, 11). This may explain why the language development trajectories did not significantly diverge between groups. Furthermore, our data indicated that children of working mothers tended to participate in more structured social activities such as weekend outings or daycare attendance. While not statistically conclusive in this dataset, these exposures have been previously linked to enhanced linguistic and social outcomes through enriched social interaction (28, 32).

It is also relevant to consider the potential confounding effects of socioeconomic status, parental education, and family structure, all of which were measured and statistically adjusted for in our analysis. Despite minor differences, none of these variables showed a significant independent association with language outcomes, aligning with studies such as those by Raju et al. and Justice et al., which found that environmental stimulation and parent-child interaction patterns often outweigh socioeconomic determinants when predicting language acquisition (23, 26).

Lastly, our results challenge the traditional dichotomy between working and non-working mothers by demonstrating that child language outcomes are less about the mother's employment status per se and more influenced by actionable behaviors namely, adherence to speech therapy and reduction in passive screen exposure. This reinforces a growing consensus in the literature that child developmental interventions should emphasize modifiable behaviors over static sociodemographic labels (33). These findings advocate for a more nuanced, supportive approach in clinical counseling and public health messaging, promoting individualized strategies to foster language development irrespective of maternal occupation.

In conclusion, this study contributes to the evolving understanding of pediatric language delay by demonstrating that structured therapy compliance and screen time regulation are more predictive of language improvement than maternal employment status. These results highlight the need for clinicians and early intervention programs to prioritize parental education on therapy routines and screen management, thereby enabling optimal developmental outcomes across diverse family structures.

CONCLUSION

This study demonstrates that maternal employment status alone is not a significant determinant of language development outcomes in children with diagnosed language delay. Instead, therapy compliance and screen time exposure emerged as clinically relevant predictors of improvement in speech and language skills. Children of both working and non-working mothers who adhered to home-based speech therapy plans with high frequency showed similarly favorable outcomes, with improvement rates reaching over 70% in the highest compliance quartile. While children of working mothers were found to have higher average screen time, this factor's adverse influence diminished significantly in families exhibiting strong therapy adherence.

These findings emphasize the importance of structured parental engagement, regardless of occupational status, and suggest that empowering caregivers with strategies to sustain therapy routines and manage digital media use can play a transformative role in optimizing language development. The results challenge generalized assumptions about maternal roles and reinforce the need for individualized, behavior-focused interventions in both clinical and educational settings. Future programs should prioritize parent training in therapy follow-through and promote supportive routines at home to mitigate language delays and bridge environmental disparities.

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