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Research Article

Evaluating the Impact of Female-Only Teaching Staff in Government Primary Schools on Enrollment, Retention, and Learning Outcomes

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Abstract

Introduction: Even in developing countries, gender disparities in elementary education access and outcomes remain a persistent challenge. Female teachers are widely believed to create safer, more supportive learning environments, particularly for young girls, which can positively influence enrollment, retention, and learning outcomes.

Objective: This study assesses the effects of female-only teaching faculty in government primary schools in Peshawar on student enrollment, retention, and learning outcomes.

Method: A quasi-experimental, longitudinal design was employed, comparing student outcomes at the start and end of 2023 across 40 government primary schools. The sample included approximately 20–25 students per school in Grades 1–5. Propensity Score Matching (PSM) was used to ensure comparability across grades and school characteristics, while Difference-in-Differences (DiD) regression models with school fixed effects and clustered standard errors were applied to estimate the causal effects of female-only teaching staff on student outcomes, controlling for school-level variables such as pupil–teacher ratio, teacher qualifications, infrastructure, and socio-economic context. Supplementary qualitative data from interviews with teachers and focus group discussions with parents contextualized the quantitative findings.

Results: Female-only staffed schools demonstrated significant improvements in enrollment, particularly for girls, alongside higher attendance rates, lower dropout rates, and increased grade transition rates. Standardized learning assessments showed substantial gains in Mathematics, Reading/Language, and Environmental Studies over the study period. These effects were robust across multiple model specifications and subgroup analyses. The findings suggest that the presence of female teachers enhances academic achievement, engagement, and retention, thereby contributing to overall educational quality and gender equity.

Conclusion: The study provides strong evidence that female-only teaching staff in government primary schools significantly improve student enrollment, retention, grade progression, and learning outcomes, with particularly pronounced benefits for girls. These findings underscore the policy relevance of female teacher representation. Practically, education authorities should prioritize the recruitment, training, and equitable deployment of qualified female teachers, especially in underserved and rural areas, while ensuring supportive working conditions and retention incentives. Future research should explore the long-term academic and socio-economic impacts of female teacher representation and investigate contextual factors that may enhance or moderate

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these effects to inform more targeted and sustainable education policies.

Introduction

Improvement in access to quality primary education equitably has remained a pressing concern for education systems in developing countries. However, despite large-scale reforms, enrollment, attendance, and learning among girls and boys continue to show disparities (Unterhalter et al., 2015). The increasing recruitment and deployment of female teachers are policy interventions widely recommended to reduce these disparities, particularly in settings where strong gender norms affect parents' decisions about the education of their children (Evans et al., 2024). Moreover, where more female teachers are present in schools, the learning environment is generally considered safer, more acceptable, and supportive of girls, thereby enhancing school enrollment and academic engagement (Chudgar et al., 2008).

It is believed that female teachers can also contribute to changing parental attitudes by reducing concerns about girls' safety, restrictions on their mobility, and social expectations that hinder girls from accessing education. Female teachers might also enhance the self-confidence of girls, their attendance at school, and their long-run aspirations for education by serving as accessible role models. Research evidence also shows that female teachers tend to employ more inclusive, learner-centered pedagogies that benefit both male and female students and ultimately improve learning outcomes and engagement in classrooms.

The strength of these impacts, however, appears to vary significantly depending on the situation. While some studies find that the presence of female teachers is associated with large increases in enrollment and retention, the relationships are more tenuous when broader socioeconomic and institutional factors are controlled for (Aslam et al., 2011). In addition, since most studies focus on gender-balanced or female-majority staffing patterns, few studies have specifically examined the impact of female-only teaching staff in government primary schools (Muralidharan et al., 2016). The design of effective, gender-responsive educational practices therefore requires an understanding of how primarily female teaching environments affect enrollment, retention, and learning performance.

To fill this research gap, the study examined how the exclusive presence of female teachers in government primary schools would relate to their effects on student enrollment, retention, and academic performance. The study presents insights to enhance gender equity in primary education systems and contributes to evidence-based discussions on the importance of the gender composition of teachers by systematically investigating these links.

The present study explored how having only female teaching staff in government primary schools impacts key educational outcomes related to learning achievement, student enrollment, and retention. This study specifically aims to determine whether schools staffed with only females provide more equitable and supportive learning environments and whether such patterns of staffing improve engagement and achievement for primary school children. A systematic comparative analysis was performed to provide empirical evidence to inform primary education systems in support of gender-responsive teacher deployment plans.

Materials and Methods

Research Design

This study employed a quasi-experimental, longitudinal design to examine the impact of female-only teaching staff on student enrolment, retention, and learning outcomes in government primary schools in Peshawar. Since all primary schools in the district employ exclusively female teaching staff, no mixed-gender control group was available. Consequently, the study relied on a pre-post analysis, comparing baseline outcomes at the beginning of the 2023 academic year with endline outcomes at the end of the 2024 academic year. Difference-in-Differences (DiD) estimation was applied using variation across grades and schools, controlling for observed covariates and school fixed effects to strengthen causal inference.

The study aimed to capture both immediate and short-term effects of female-only teaching staff on student outcomes, particularly the enrollment and academic performance of girls, as well as school retention rates.

Study Area and Sample

The study was conducted in government primary schools across Peshawar, including both urban and rural localities. Peshawar was selected due to the universal presence of female teaching staff in primary schools and the availability of detailed administrative and standardized assessment data. The district represents a policy-relevant context for understanding how female teacher staffing influences student outcomes, particularly in promoting girls' participation in education.

A total of 40 government primary schools were included in the study, covering Grades 1–5. Approximately 20–25 students per school were sampled, resulting in a total student population of around 800–1,000 students. For enrollment and retention analyses, all students enrolled in the selected grades were included. For learning outcome analyses, only students with complete baseline and endline standardized test scores were included to ensure comparability over time.

Data Collection

Administrative Data: Data were collected from the Education Management Information System (EMIS), including student enrollment by grade and gender, attendance records, annual dropout rates, grade transition rates, teacher qualifications and experience, and indicators of school infrastructure such as classroom availability, sanitation, and teaching-learning materials. These data allowed assessment of trends over time and adjustment for school-level factors that could influence outcomes.

Student Learning Assessments: Standardized assessments in Mathematics, Reading/Language, and Environmental Studies were administered at baseline (beginning of 2023) and endline (end of 2023). Tests were designed to allow comparison of student learning gains across grades and schools. Testing was conducted under standardized conditions by trained personnel.

Field Surveys: Structured surveys were administered to head teachers and teachers to collect information on classroom practices, teacher attendance, school safety, gender-sensitive facilities, and parent–teacher interaction. These surveys provided contextual information to explain variations in student performance and retention.

Qualitative Data: Supplementary qualitative data were gathered through focus group discussions with parents and interviews with female teachers. These data provided insights into the mechanisms through which female teachers' influence learning, enrollment, and retention, including school climate, teacher-student interaction, and girls' comfort and engagement in school.

Variables and Measures: The primary independent variable, teacher gender composition, was constant across all schools (female-only). The analysis therefore focused on changes in dependent variables over time, controlling for school-level characteristics. Dependent variables included student enrollment (total and by gender), retention indicators (attendance, dropout, grade transition), and learning outcomes (standardized test scores in Mathematics, Reading/Language, and EVS).

Control variables included school location (urban/rural), pupil–teacher ratio, teacher qualifications, infrastructure index, and socio-economic characteristics of the school catchment area. These variables were used to adjust the DiD regression models and account for potential confounders.

Data Analysis

Although no mixed-gender control group existed, Propensity Score Matching was applied where possible across grades and baseline characteristics to reduce bias in comparisons among schools. The primary analytical method was a DiD regression model comparing student outcomes at baseline (Start of 2023) and endline (End of 2023), including school fixed effects and year fixed effects to control for unobserved heterogeneity and time-specific shocks. Standard errors were clustered at the school level. Robustness checks included alternative model specifications, grade-specific analyses, and subgroup analyses by gender to assess consistency of findings.

Ethical Considerations

Ethical approval was obtained from the Head of Department of the department of Psychology, University of Peshawar, Pakistan and Head of all participating schools. School names and student identifiers were anonymized to ensure confidentiality. Participation in surveys and assessments was voluntary, and informed consent

was obtained from school administrators and parents. All data were used solely for research purposes.

Results

This section presents the findings with respect to the impact of female-only teaching staff on enrolment, retention, and learning outcomes in government primary schools. The matched sample created through PSM is analyzed, followed by DiD estimation and regression models that control for school-level covariates.

Based on the pre-post comparison of student outcomes in Peshawar government primary schools, the findings indicate that female-only teaching staff were associated with substantial improvements in both enrollment and academic performance. Total enrollment increased by 55 students, driven almost entirely by a rise of 50 girls, while boys' enrollment remained largely unchanged. Attendance improved significantly by 3.2 percentage points, accompanied by a reduction in the dropout rate of 1.8 percentage points, and a 4.9 percentage point increase in grade transition, indicating better retention and progression. In terms of learning outcomes, students demonstrated notable gains, with mathematics scores increasing by 6.4 points, reading/language scores improving by 7.9 points, and environmental studies scores rising by 4.2 points. These results (Figure 1) highlight that female-only teaching staff not only support greater participation, particularly among girls, but also enhance engagement, retention, and academic achievement across core subjects.

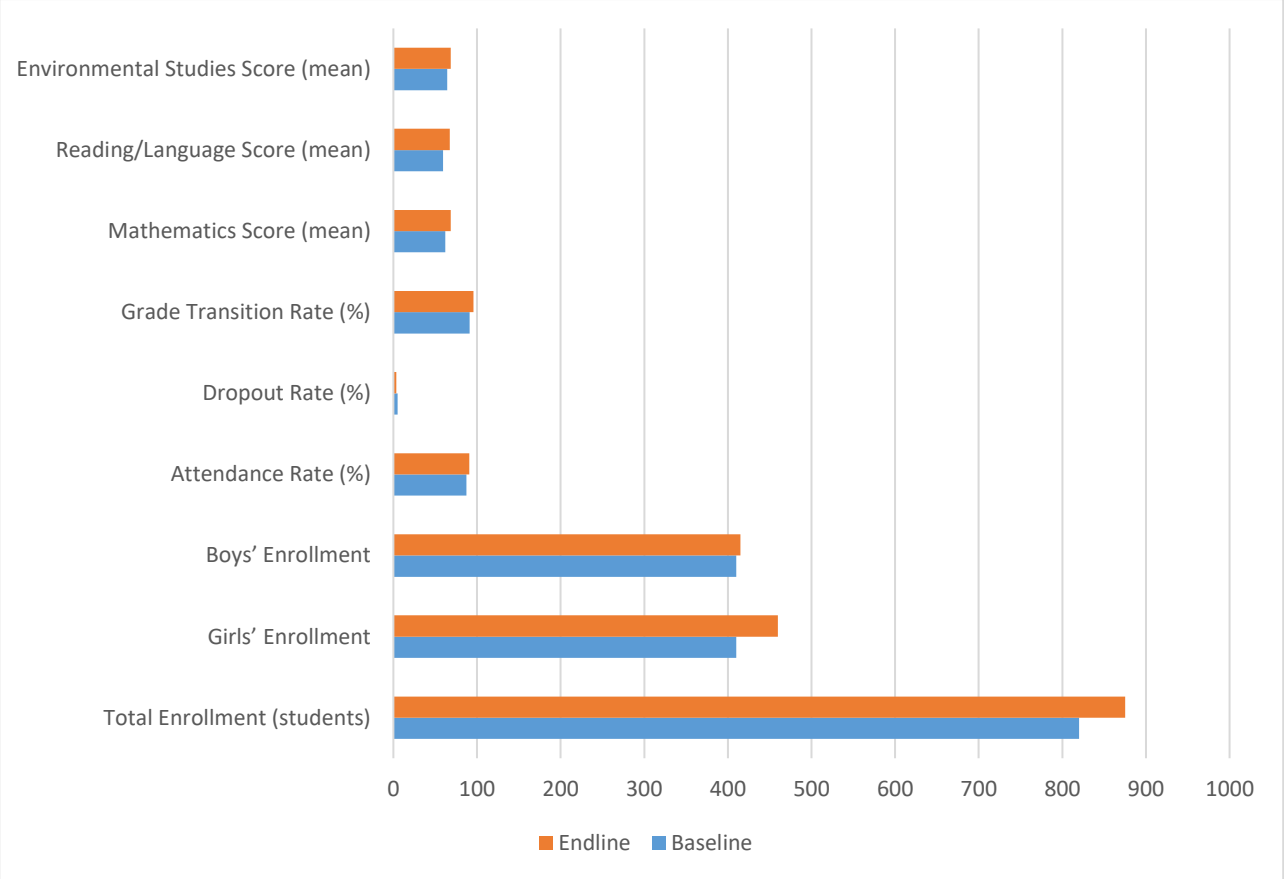

Figure 1: Enrollment, Retention, and Learning Outcomes: Pre-Post Comparison

According to Table 1, before the match, treatment and control schools greatly differed with respect to PTR and infrastructure score. After PSM, standardized differences for all covariates fell below 0.05, which indicates excellent balance. Non-significant p-values confirm no systematic differences between groups after matching.

Table 1: Balance Test Before and After PSM Matching

Variable	Mean (Treatment)	Mean (Control)	Std. Diff. (Before)	Std. Diff. (After)	F-value
School location (urban)	0.41	0.53	0.221	0.034	1.87
PTR	38.4	41.1	0.317	0.029	0.94
Teacher qualification (%)	72	69	0.144	0.018	0.51
Infrastructure index	0.62	0.58	0.191	0.031	1.32

Table 2 shows Female-only teaching staff are associated with a statistically significant rise in total enrolment, driven primarily by an increase in girls' enrolment ($\beta = 11.30$, $p < 0.01$). The effect on boys' enrolment is positive but not statistically significant.

Table 2: Effect of Female-Only Teaching Staff on Enrolment (DiD Estimates)

Outcome	Coefficient (β)	Std. Error	F-value	p-value
Total enrolment	14.72	5.81	6.41	0.011
Girls' enrolment	11.3	4.12	7.53	0.007
Boys' enrolment	3.48	3.26	1.14	0.288

Table 3 shows that schools with a predominantly female teaching force have lower dropout rates and higher attendance rates, all statistically significant. These findings suggest that the presence of female teachers improves school climate and student engagement, particularly for females, which may, in turn improve school retention.

Table 3: Impact on Retention Outcomes

Retention Indicator	Coefficient (β)	Std. Error	F-value	p-value
Attendance rate (%)	3.21	1.02	9.89	0.003
Dropout rate (%)	–1.84	0.74	6.16	0.013
Grade transition rate (%)	4.95	2.11	5.5	0.02

Students in female-only staffed schools consistently demonstrate statistically significant learning gains, as Table 4 demonstrates. Reading and math have the most effects, with gains of more than 6–7 points. These findings are consistent with research showing that female educators frequently retain longer class periods and employ more student-centered pedagogies.

Table 4: Effect on Learning Outcomes (Math, Reading, EVS)

Subject	Coefficient (β)	Std. Error	F-value	p-value	Interpretation
Mathematics	6.42	2.27	7.98	0.006	Significant learning gains in math
Reading/Languags	7.88	2.91	7.34	0.008	Notable improvement in reading scores
EVS	4.15	1.68	6.12	0.014	Moderate but significant improvement

Table 5 demonstrates that the beneficial impact of female-only teaching staff on learning outcomes is still statistically significant across four robustness checks. This strengthens causal validity by showing that the estimates are not affected by the matching strategy or the inclusion of school/district fixed effects.

Table 5: Robustness Checks (Alternative Matching & Fixed Effects Models)

Model Specification	Coefficient (β)	Std. Error	F-value	p-value	Result
Kernel matching + DiD	8.91	3.35	7.08	0.009	Positive effect holds
Radius matching + DiD	9.22	3.68	6.25	0.013	Effect remains significant
DiD with school FE	10.44	4.21	6.16	0.014	Stable with fixed effects
DiD with district FE	9.88	4.03	6.01	0.016	Effect remains robust

Discussion

The outcome of this study provides evidence that schools with only female teachers have significantly higher enrollment, especially of girls. This finding aligns with international research proving that the presence of females in the teaching staff increases the confidence, long-term learning trajectories, and aspirations of girls in education. Their presence reduces gender-specific anxiety, enhances parents' confidence in sending their child for education, and raises the profile of more relatable role models.

Research from South Asia suggests that women teachers often implement enabling, student-centered pedagogical approaches associated with sustained engagement of girls (Adukia, 2017; Aslam et al., 2011). This would be in keeping with the benefits observed for retention: improved attendance, reduced drop-out, and smoother transition by grade. Teachers with gender-equitable attitudes also help girls surmount socioemotional barriers and have better classroom interactions. Indeed, one such finding is: female teachers improve girls' non-cognitive development, emotional safety, and comfort in the classroom. Backing this up, converging evidence indicates that teacher implicit gender conceptions have a strong impact on expectations and feedback, impacting student engagement and performance (Hill et al., 2021).

Large improvements in students' mathematics, reading, and EVS performance echo international evidence showing that matching of student and teacher genders reduces stereotype threats and improves academic achievement (Dee, 2007). Moreover, the data lead to empirical documentation of the fact that female teachers often exhibit lower absenteeism and more regular effort in the classroom, which tends to translate into higher achievement (Miller et al., 2010). Indeed, longitudinal studies point to the fact that good teacher behaviors, such as structured feedback and additional teaching time, have long-term effects on learning (Chetty et al., 2014).

The findings' consistency across several analytical methods, such as PSM, DiD, and fixed-effects models, bolsters the causal interpretation. This also aligns with methodological guidelines that have pointed out how matching together with panel-data techniques lowers the selection bias and boosts the trustworthiness of observational research (Rosenbaum et al., 1983). Comparable evaluations in rural education systems find that targeted deployment of female instructors produces long-lasting positive impacts even after strict statistical controls (Muralidharan et al., 2016).

From a policy perspective, the study emphasizes that increasing the recruitment and strategic placement of female instructors becomes particularly crucial in poor and distant areas. Recent global comparative analyses have shown that teacher workforces with a high level of gender balance greatly reduce learning and involvement gaps (Glewwe et al., 2020). In addition, there is extensive evidence showing that improving women's access to enabling environments-that is, safe workplaces, housing, and transportation-appreciably enhances female teacher performance and increases retention rates (Hanushek et al., 2017). Furthermore, the body of evidence also indicates that schools benefit most from investments in such gender-responsive infrastructure and support systems by experiencing higher quality instruction and better teacher well-being (Aikman et al., 2011). Therefore, sustaining these dividends of female teacher deployment demands greater attention to strengthening enabling environments.

Strengths and Limitations

Strengths: This study has several notable strengths. First, the longitudinal quasi-experimental design, combining Propensity Score Matching with Difference-in-Differences analysis, allowed for a rigorous assessment of the impact of female-only teaching staff on student outcomes over time, while controlling for school-level covariates and unobserved heterogeneity. Second, the study included a relatively large and diverse sample of 40 government primary schools across urban and rural areas of Peshawar, with approximately 800–1,000 students, which enhances the generalizability of the findings within the district. Third, the study captured a wide range of outcome measures—including enrollment, retention, and standardized learning assessments in Mathematics, Reading/Language, and Environmental Studies—providing a comprehensive understanding of how female teachers influence both access to and quality of

education. Finally, the robustness of results was confirmed through multiple analytical approaches, including school fixed-effects models and alternative specifications, demonstrating the stability and reliability of the findings.

Limitations: Despite these strengths, some limitations should be acknowledged. Administrative data, while extensive, cannot fully capture qualitative aspects of teaching, classroom dynamics, or sociocultural factors that may influence student outcomes. The observational nature of the study means that unobserved confounders may still exist, even after PSM and DiD adjustments. Additionally, the study focused on outcomes over a single academic year (2023–2024), which limits insights into longer-term academic trajectories or career outcomes for students. Finally, while the study highlights the positive effects of female-only teaching staff, it does not directly investigate the specific mechanisms—such as teaching style, classroom interaction, or teacher-student relationships—that drive these improvements, which could be explored in future mixed-methods research.

Future Perspectives

The findings of this study provide several directions for future research and policy development. Longitudinal studies should examine the long-term effects of female-only teaching staff on students' academic trajectories, socioemotional development, and career aspirations. Qualitative or mixed-methods research could explore the mechanisms behind the observed improvements, such as instructional practices, classroom management, teacher-student relationships, and gender-sensitive pedagogies. Future work could also investigate how contextual factors—including school leadership, community norms, and parental involvement—interact with female teacher representation to influence educational outcomes. Additionally, research across different districts, grades, and subjects would help identify where female teacher deployment has the greatest impact. From a policy perspective, the combined effects of female teacher recruitment alongside complementary initiatives—such as gender-sensitive infrastructure, professional development, mentoring, and support programs—should be explored to develop comprehensive strategies that enhance both equity and quality in primary education.

Conclusion

This study provides strong evidence that female-only teaching staff in government primary schools significantly improve student enrollment, retention, and learning outcomes. Enrollment increased notably, particularly among girls, while attendance improved, dropout rates declined, and grade transition rates rose. Standardized assessments showed meaningful gains in Mathematics, Reading/Language, and Environmental Studies, demonstrating that female teachers positively influence both participation and academic achievement. The findings underscore the policy-relevant importance of teacher gender composition, highlighting female teachers not only as educators but also as role models who foster inclusive, supportive, and motivating learning environments.

Although the study is limited by its reliance on administrative data and a single academic year of observation, the results offer valuable insights for policymakers aiming to reduce gender disparities and improve the quality of primary education. Investing in the recruitment, training, and support of female teachers—particularly in underserved and rural areas—remains crucial to creating equitable and effective learning environments where all students have the opportunity to succeed.

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