A Meta-Analysis of the Effect of Private Tutoring on the Academic Achievement of Secondary School Students in India

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Abstract

This study, aimed to conduct a meta analysis on the effectiveness of private tutoring on the academic achievement of students at the secondary stage in India. Fifteen data sets from seven studies published between 2000 and 2024, with a combined sample size of 7,961 students, were included. Using Meta-Essentials software and a random effects model, the combined effect size was found to be 0.24, indicating a small positive effect of private tutoring on students' scholastic gains. The findings suggest that while private tuition may offer a modest benefit, its overall contribution to enhancing academic performance is limited, challenging the often-held perception that private tutoring results in substantial gains in students' academic achievement.

Keywords: Shadow Education, Meta-Analysis, Effect Size, Private Tutoring

Introduction

Private supplementary tutoring, commonly known as tuition in India, refers to out-of-school educational activities procured at a cost by students to enhance their formal academic performance. In academic literature, this phenomenon is widely described by the metaphor shadow education, as it mimics the formal schooling with shared goals, reflects its changes, and often receives less policy attention than the mainstream education (Stevenson and Baker, 1992; Bray, 2003). Primarily seen as a support to formal schooling, shadow education has evolved from its initial role of supplementation to competing with formal education (Bhorkar and Bray, 2018).

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Magnitude of Shadow Education

Shadow education is a global phenomenon with deep roots in India as well. Zhang (2023) highlighted the scale and patterns of private supplementary tutoring in thirty-two countries, emphasising its global expansion. This trend is mirrored in India, where a nationwide survey by the NSO (2017–18) found that 36.8 per cent of sampled higher secondary students had enrolled in private coaching (National Statistical Office, 2020). The coaching sector in India generated Rs.58,088 crores in revenue as of December 2022, with the potential to grow to Rs. 1,33,995 crore by 2028 (India Brand Equity Foundation, 2023). With such a significant financial footprint, private tuitions have come under the government's scrutiny. The Government of India prohibited teachers from engaging in private tutoring under the Right of Children to Free and Compulsory Education (RTE) Act, 2009 (Government of India, 2009). In January 2024, the Department of Higher Education issued model guidelines for states "for the regulation of coaching centres for better guidance and assistance to the students..." (Department of Higher Education, 2024), highlighting the government's concern about the growing prevalence of private tutoring in students' lives.

Impact of Shadow Education on Students

Private tuition has been linked with both constructive and adverse student outcomes (Jha, 2021). Supplementary tutoring is associated with increased exam confidence, better time management, and serves as a source of innovation and customisation in education (Bhorkar, 2023). On the flip side, it can lead to an additional financial burden, increased educational inequality, decreased self-learning capacity, and reduced social interaction (Bray, 2003). Globally, literature reports mixed results on the impact of private tutoring on students' academic achievement. Zhang and Liu (2022) found that shadow education was positively associated with learning outcomes at various education levels. Conversely, Zhang *et al.* (2024) indicated that private tuitions can negatively affect students' academic performance by promoting excessive focus on results, peer animosity, and academic pressure.

Rationale of the Study

The National Education Policy 2020 (Ministry of Education, 2020) underscored the significance of adolescence while highlighting the harms of the coaching culture. Despite this, the sector continues to thrive due to the perception that tuition leads to better grades. Evidence both supports and challenges the claim that tutoring impacts students' academic outcomes. Zhang and Liu (2022) used advanced meta-analysis techniques to investigate the effect of tutoring interventions on students in Grades 1–12, but no such study was found in the Indian context that

combines previous studies to assess the overall impact on secondary-level students. This gap necessitated the present study, which aims to provide empirical evidence about the effectiveness or limitations of private supplementary tutoring. The study focused on secondary students because a significant proportion attend tuitions to secure good grades, which are often viewed as gateways to higher education and early indicators of future academic and socio-economic success (Choudhury *et al.*, 2024).

Research Question

What is the overall effect of private tutoring on the academic achievement of secondary school students' in India?

Objective

To conduct a meta-analysis of studies on the effectiveness of private supplementary tutoring on the scholastic achievement of students in Grades 9 to 12.

Hypothesis

There is no statistically significant overall effect of private tutoring on the academic achievement of secondary school students.

Research Design

This study used a meta-analysis method to systematically combine the results of previous quantitative investigations and draw new inferences (Berman and Parker, 2002). Meta-analysis is a statistical technique that aggregates data from multiple studies to draw a single conclusion, producing stronger results by including more subjects, greater diversity, and accumulated effects (Borenstein *et al.*, 2009). The study performed a quantitative synthesis to determine whether private tutoring in India affects academic outcomes for secondary students, and if so, its nature and magnitude. Data extracted from relevant studies was analysed using Meta-Essentials—a set of user-friendly MS Excel workbooks designed to integrate and synthesise effect sizes efficiently (Kumar *et al.*, 2023; Suurmond *et al.*, 2017).

Data Collection

Based on the research objective, the following inclusion criteria were used:

- Studies published between 2001 and 2024, original and in English.
- Studies focused on private tutoring in India.
- Studies measuring academic achievement of students in Grades 9 to 12.

Ideally, all studies meeting the inclusion criteria should be included, but this is rarely feasible (Borenstein *et al.*, 2009). The following exclusion criteria were applied:

- The full text could not be accessed.
- The study lacked sufficient quantitative data for effect size calculation.

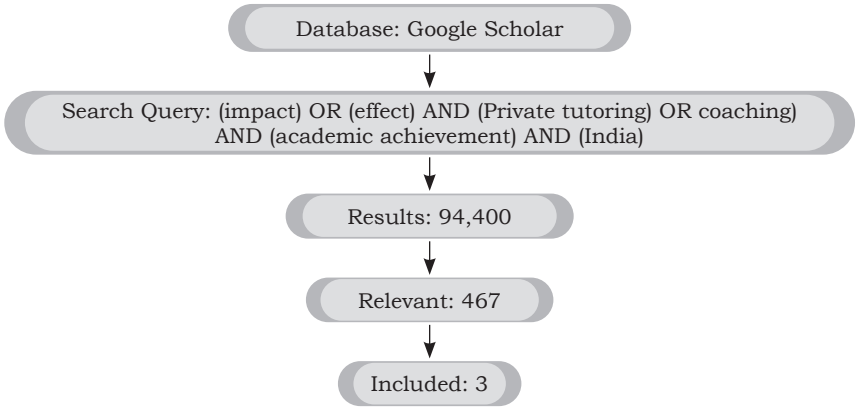

Fig. 1: An example of search strategy

Studies were identified through databases such as Google Scholar, ERIC, and NCERT e-journals. For further refinement, keywords like 'secondary school' were added as needed. References from the identified studies were also examined to locate additional relevant works. Aybirdi *et al.* (2023) argued that including grey literature such as theses reduces publication bias, so relevant theses were sourced from Shodhganga, with two ultimately included. After removing duplicates, seven studies with fifteen data sets were retained for the meta-analysis.

Table 1

List of Selected Studies Arranged from Newest to Oldest

Author(s)	Year	Location	Type
Manpreet Kaur	2023	Gautam Budh Nagar	Thesis
Rahul Dandekar and Manisha Karne	2022	Mumbai	Research article
Dr. Akhil D. Thaker	2020	Ahmedabad	Research article
Rathindranath De and Ankita Dey	2019	West Bengal	Research article
Kotaky Rima	2018	Assam	Thesis
K A Gafoor and M K Sarabi	2017	Kerala	Research article
Abdul Gafoor, K., Muhammad Sunnummel	2007	Kerala	Research article

Brief Review of Selected Studies

Kaur (2023) explored cultural, social, psychological, and economic factors influencing private tuitions, finding a significant positive effect on academic performance. Over 80 per cent of the sampled students attended tutoring regardless of socio-economic status. The researcher recommended more flexible curricula and personalised classroom support to reduce reliance on tutoring.

Dandekar and Karne (2022) studied 643 secondary students in Mumbai, concluding that those attending private tuitions achieved higher scores. They also found that the tuitions were predominantly a middle-class phenomenon, with lower-income students limited by affordability and upper-income students relying on active parental involvement instead.

Thaker (2020) examined 190 secondary students in Ahmedabad and found no significant difference in academic performance between students who did and did not attend tuitions, arguing that consistent practice was more influential than tutoring.

De and Dey (2019) used SCERT data from West Bengal to analyse Grade 9 students, highlighting that rural children and girls disproportionately relied on the private tutoring. They found no significant difference in total marks between students who did and did not receive tutoring.

Rima (2018) conducted an extensive study in Assam comparing students' achievement with and without tuitions across English, Mathematics, and General Science. A significant difference was found only in General Science scores. The study revealed contrasting views among stakeholders on the necessity of private tuition, with students highlighting drawbacks like reduced leisure and study time.

Gafoor and Sarabi (2017) studied 988 ninth-grade students in Kerala, finding that private tuition positively influenced mathematics achievement, especially for girls who found the subject challenging. However, the benefit was not universal and depended on the time spent studying.

Gafoor and Sunnummel (2007) investigated the effect of tutoring on science scores among 664 secondary students in Kerala. While tuition recipients performed better, students with similar intelligence and motivation levels showed comparable performance, suggesting tutoring did not consistently boost grades.

The review revealed that the private tutoring is widespread across India but lacks consensus on its effectiveness, strengthening the need for a meta-analysis to reach a clear conclusion.

Data Analysis and Findings

Quantitative data from the seven studies was input into Excel and analysed using Meta-Essentials. This study used *Workbook 3: Differences Between Independent Groups–Continuous Data* (Van Rhee *et al.,* 2015) to meta-analyse studies comparing mean scores of two independent groups.

Table 2

Quantitative Data of Selected Studies

Study Name	Group Type	N	Mean/ Adjusted Mean	SD	t/F
Kaur (2023)	Treatment Group	250	116.94	40.35	2.03
	Control Group	250	110.76	39.38	
Dandekar and Karne (2022)	Treatment Group	449	66.67	12.11	5.84
	Control Group	194	60.42	12.59	
Thaker (2020)	Treatment Group	75	62.56	14.77	0.94
	Control Group	115	60.56	13.54	
De and Dey (2019*	Treatment Group	185			
	Control Group	99			
Rima (2018)	Treatment Group	241	38.11	17.2	1.76
	Control Group	209	35.33	16.19	
	Treatment Group	300	51.27	20.21	1.04
	Control Group	150	49.2	19.33	
	Treatment Group	302	36.99	17.94	0.71
	Control Group	148	35.65	20.43	
	Treatment Group	385	47.85	21.11	1.38
	Control Group	65	43.88	23.61	
	Treatment Group	174	48.47	20.49	2.12
	Control Group	276	43.37	30.41	
	Treatment Group	166	51.2	21.34	4.91
	Control Group	284	41.95	17.95	
Gafoor and Sarabi (2017)	Treatment Group	408	32.68	9.94	7.50
	Control Group	580	30.83	10.76	
Gafoor and Sunnummel (2007)	Treatment Group	410	26.30	6.73	2.95
	Control Group	254	24.67	6.63	
	Treatment Group	410	9.15	4.34	2.76
	Control Group	254	8.42	2.49	
	Treatment Group	410	8.59	2.61	2.10
	Control Group	254	8.12	2.57	
	Treatment Group	410	8.74	2.74	3.06
	Control Group	254	8.10	2.61	

* The study reported odd ratio = 1.27 at 95% Confidence Interval: (0.76, 2.13)

Hedge's *g*, the bias-adjusted standardised mean difference, was used as the effect size measure (Hak *et al.*, 2016; Lakens, 2013). Following recommendations favouring the random effects model over the fixed effects model (Hak *et al.*, 2016), the researcher adopted the random effects approach, which assumes that variations in effect sizes, arise from both sampling error and true differences between studies (Borenstein *et al.*, 2009). For De and Dey (2019), the odds ratio was converted to Cohen's *d* using the formula $d = LogOddsRatio \times (\sqrt{3}/\pi)$.

Eight of the fifteen data sets showed no significant effect, one showed a medium positive effect, and the remainder showed small positive effects. None reported a negative effect size, suggesting possible publication bias.

Table 3

Study-wise Effect Size and Interpretation

Study	Effect size hedge 'g'	Weightage (in %)	Standard error	Interpretation
Kaur (2023)	0.18	7.02	0.09	Statistically insignificant
Dandekar and Karne (2022)	0.50	7.17	0.09	Medium positive effect
Thaker (2020)	0.14	4.29	0.15	Statistically insignificant
De and Dey (2019)	0.13	5.24	0.13	Statistically insignificant
Rima (2018)	0.17	6.73	0.09	Statistically insignificant
	0.10	6.44	0.10	Statistically insignificant
	0.07	6.42	0.10	Statistically insignificant
	0.18	4.83	0.13	Statistically insignificant
	0.20	6.60	0.10	Small positive effect
	0.48	6.50	0.10	Small positive effect
Gafoor and Sarabi (2017)	0.48	8.46	0.07	Small positive effect
Gafoor and Sunnummel (2007)	0.24	7.57	0.08	Small positive effect
	0.22	7.58	0.08	Small positive effect
	0.17	7.58	0.08	Statistically insignificant
	0.24	7.57	0.08	Small positive effect
Combined	0.24	100	0.04	Small positive effect

Table 4
Combined Effect Size

Combined effect size	Observed
Hedges' g	0.24
Standard error	0.04
CI Lower limit	0.16
CI Upper limit	0.32

The combined effect size was 0.24, indicating a small positive effect (Cohen, 1988). The narrow standard error suggests a precise estimate (Borenstein *et al.*, 2009). The 95 per cent confidence interval (0.16–0.32) ranges from insignificant to positive but small. Since the confidence interval does not include zero, the effect is statistically significant (Hak *et al.*, 2016). Thus, the null hypothesis is rejected, confirming that private tutoring has a small positive impact on the secondary students' academic achievement.

The forest plot is the primary outcome of any meta-analysis, as it visually represents the statistical findings. The x-axis displays the effect size scale, while each row—except the final one—depicts an individual study's estimated effect size as a point accompanied by its confidence interval (Ergen & Kanadli, 2017). The size of each point reflects the weight of the corresponding study in determining the overall result. The final row presents a diamond or bullet symbol representing the combined or weighted average effect size (Liu et al., 2020). The horizontal line around this symbol indicates the confidence interval for the combined effect. Since the confidence interval does not include zero, the meta-analytic effect is statistically significant (Hak et al., 2016). Therefore, the researchers reject the null hypothesis that private tuition has no effect on the academic achievement of secondary school students and conclude that it exerts a small but positive influence on their academic performance.

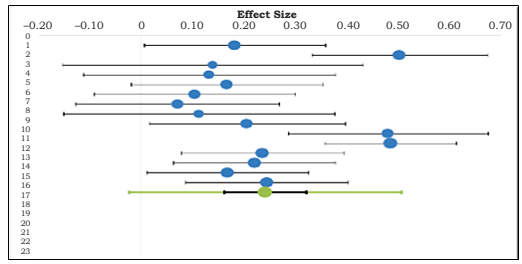

Fig. 2 Forest Plot

Publication Bias

Publication bias assumes that statistically significant results are more likely to be published, potentially inflating the combined effect size (Page *et al.*, 2024). Funnel plot analysis requires more than ten studies for adequate statistical power (Sterne *et al.*, 2011) and was therefore unsuitable here. The inclusion of theses mitigated bias to an extent (Aybirdi *et al.*, 2023), but the small sample size limits a statistical assessment of publication bias.

Discussion

The findings reject the null hypothesis, with the overall effect size of 0.24 indicating a modest

positive impact (Jha, 2021). This aligns with Zhan *et al.* (2013) and Zhang and Liu (2022), who reported positive effects of tutoring, although the effect was small in this study. Variations in tutoring type, quality, and duration, along with possible methodological limitations, could influence outcomes (Papakostidis and Giannoudis, 2022). The high demand for tutoring, especially in science and commerce (Choudhury *et al.*, 2024), calls for a cost-benefit analysis to determine if the gains justify the investment. Unethical practices within private tutoring should also be addressed alongside regulatory measures.

Educational Implications

1. **For secondary school students:** Private tutoring may slightly improve grades, especially for below-average performers, by providing additional learning resources and boosting confidence.
2. **For teachers:** By adopting flexible, student-centred methods, teachers can reduce students' dependence on tutoring.
3. **For policymakers:** Equitable access to quality tutoring or improved classroom teaching should be prioritised. Regulatory measures must address the root causes of tutoring demand.
4. **For researchers:** Meta-analysis offers a valuable tool for summarising multiple quantitative studies and should be applied to other educational issues.
5. **For parents:** Parents should reassess investments in tutoring and collaborate with schools to support their children's specific learning needs.

Conclusion

This study synthesised the results of previous quantitative research, to assess the effect of private tutoring on secondary students' academic achievement in India. The findings indicate a small but statistically significant positive effect. The study was limited by its small sample size for publication bias analysis and depended on the rigour of included studies. The actual impact of tutoring likely depends on factors such as its quality and dosage, which were beyond the scope of this study. Future research should examine how private tutoring affects broader student outcomes like motivation and well being. Combining private and formal education could provide a more comprehensive and effective learning experience, benefiting students and reducing teachers' workloads.

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