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An Analytical Study of Socio-Economic Status and Its Influence on Academic Achievement and Intrinsic Motivation of Secondary School Students in the District of West Bengal

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Abstract: *This study investigates the socio-economic status (SES) and its influence on the academic achievement and intrinsic motivation of secondary school students in the South 24 Parganas district of West Bengal, India. Grounded in Self-Determination Theory (Deci & Ryan, 2020) and Coleman's foundational insights into educational equity (Coleman, 1966), the study employed a correlational-cum-survey design with a stratified random sample of 400 students from Classes 9 and 10 enrolled in government-aided WBBSE and CBSE schools. The Modified Kuppuswamy SES Scale (2021 update), the Academic Motivation Scale—Education (AMS-E; Vallerand et al., 1992), and the school-year cumulative academic records constituted the primary measurement instruments. Descriptive statistics, Pearson's product-moment correlation, one-way ANOVA, and hierarchical multiple regression were employed for data analysis using IBM SPSS Statistics 26. Findings revealed that a majority of students (62.5%) belonged to the lower-middle SES stratum. A significant positive correlation was obtained between SES and academic achievement ($r = .54$, $p < .001$) and between SES and intrinsic motivation ($r = .47$, $p < .001$). Regression analysis confirmed SES as a significant predictor of academic achievement ($\beta = .54$, $R^2 = .291$, $p < .001$) and intrinsic motivation ($\beta = .47$, $R^2 = .221$, $p < .001$). One-way ANOVA indicated statistically significant differences in both academic achievement [$F(2, 397) = 89.43$, $p < .001$, $\eta^2 = .311$] and intrinsic motivation [$F(2, 397) = 67.18$, $p < .001$, $\eta^2 = .253$] across SES groups. These findings underscore the structural disadvantages faced by students from lower socio-economic backgrounds and have direct implications for educational policy in West Bengal.*

Keywords: Socio-Economic Status, Academic Achievement, Intrinsic Motivation, Secondary School Students, West Bengal, South 24 Parganas, Self-determination theory

I. INTRODUCTION

Education is widely recognised as the cornerstone of social mobility and individual empowerment. Within the Indian educational landscape, however, the shadow of socio-economic disparity continues to loom large, shaping not only who gains access to quality schooling, but also how well students perform and how motivated they remain to learn. West Bengal, with its rich tradition of intellectual culture and a vast government-aided school network, nonetheless presents a paradox: despite high enrolment rates, learning outcomes remain deeply stratified along socio-economic lines (ASER Centre, 2023; Ministry of Education, India, 2023).

The nexus between socio-economic status (SES) and educational outcomes has been exhaustively documented in global literature. Seminal meta-analyses by Sirin (2005) and White (1982) demonstrated moderate to strong correlations between SES and academic achievement across diverse national contexts. However, empirical studies specifically focussing on secondary school students in the eastern Indian states—particularly West Bengal—remain

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comparatively sparse. This lacuna is especially pronounced with respect to the role of SES in shaping students' intrinsic motivation: an internal psychological impetus that drives curiosity, engagement, and self-regulated learning (Deci & Ryan, 2020; Ryan & Deci, 2020).

The South 24 Parganas district presents a compelling and complex case. Home to a population of over 9.3 million (Census of India, 2011, with 2024 projections), the district encompasses affluent suburban corridors adjacent to Kolkata alongside vast rural stretches marked by poverty and infrastructural deficits (Roy & Mandal, 2023). This socio-economic heterogeneity renders it an ecologically valid site for studying SES–achievement dynamics. Government-aided schools in the district serve a diverse cross-section of the student population—from upper-middle-class families in semi-urban areas to subsistence-farming families in the Sundarbans belt—providing a natural stratum for comparative analysis.

Theoretical underpinnings for this study draw from two primary frameworks. First, Coleman's Equality of Educational Opportunity report (1966) established that family background, particularly SES, exerts a greater influence on academic outcomes than school resources alone. Second, Deci and Ryan's Self-Determination Theory (SDT; 2020) posits that intrinsic motivation flourishes when three basic psychological needs—competence, autonomy, and relatedness—are met. The theory further suggests that adverse socio-economic conditions may systematically undermine the satisfaction of these needs, thereby attenuating intrinsic motivation among students from lower SES backgrounds (Ryan & Deci, 2020; Eccles & Wigfield, 2020).

Despite this theoretical coherence, empirical validation in the West Bengal secondary schooling context remains limited. Studies by Gupta and Bhattacharya (2021), Chakraborty and Ghosh (2021), and Sen (2022) have begun to address this gap, but none has simultaneously examined both academic achievement and intrinsic motivation as SES-predicted outcomes using a sufficiently large and representative district-level sample. The present study is designed to address this gap.

1.1 Significance of the Study

This study is significant on multiple fronts. Empirically, it contributes localised evidence to a predominantly Western body of literature on SES and education. Theoretically, it tests the applicability of SDT in a collectivist, economically heterogeneous South Asian schooling context. Practically, its findings are directly relevant to West Bengal's school education department, the West Bengal Board of Secondary Education (WBBSE), and CBSE-affiliated schools in South 24 Parganas, providing an evidence base for targeted equity interventions. From a policy perspective, the study aligns with the National Education Policy 2020's emphasis on equitable, inclusive, and holistic education (Ministry of Education, India, 2023).

1.2 Delimitations of the Study

The study is delimited to: (a) students enrolled in Classes 9 and 10 only; (b) government-aided schools affiliated to WBBSE and CBSE within the South 24 Parganas district of West Bengal; (c) a sample size of N = 400 students; and (d) the academic session 2024–2025. Private unaided schools, students in other districts of West Bengal, and students in other classes were not included. Generalisations should, therefore, be made with appropriate caution to comparable ecological and institutional settings.

II. REVIEW OF RELATED LITERATURE

2.1 Socio-Economic Status and Academic Achievement: A Global Perspective

The relationship between SES and academic achievement constitutes one of the most replicated findings in educational research. Sirin's (2005) comprehensive meta-analysis of 101 studies involving over 1,000,000 students confirmed a medium-to-strong correlation (weighted mean r = .29) between SES and academic achievement, with the magnitude moderated by the unit of analysis, grade level, and SES indicator. White (1982) similarly documented a weighted average correlation of .343 in an earlier synthesis. More recently, Bradley and Corwyn (2002) extended this understanding by showing that SES-related disparities in academic outcomes operate through multiple pathways, including home learning environment, parental educational expectations, and access to enriched stimulation.

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At the school system level, Hattie's (2009) Visible Learning synthesis identified socio-economic background as an effect with d = .57, placing it among moderate-to-high-impact influences on learning. The PISA 2022 international data (OECD, 2023) further revealed that students from the lowest SES quartile scored on average 90 score points lower in mathematics than their highest-quartile counterparts—a difference equivalent to approximately 2.5 years of schooling. These international findings contextualise the SES–achievement relationship as a structural, systemic phenomenon rather than an individual-level anomaly.

2.2 Socio-Economic Status and Intrinsic Motivation

The relationship between SES and intrinsic motivation is theoretically grounded in Deci and Ryan's Self-Determination Theory (2020), which identifies three universal psychological needs: autonomy, competence, and relatedness. Ryan and Deci (2020) argued that socio-economic deprivation constrains the satisfaction of these needs through limited access to enriching learning experiences, reduced parental involvement, and heightened economic stressors that shift students' goal orientations towards extrinsic, survival-focussed pursuits.

Gottfried et al. (2008) provided longitudinal evidence that low academic intrinsic motivation, correlated with lower SES backgrounds, functions as a risk factor for adverse educational outcomes across childhood and early adulthood. Grolnick and Slowiaczek (1994) demonstrated that parental involvement—itself a function of SES-related resources and time—mediates the relationship between family background and students' intrinsic motivation. Pintrich (2003) synthesised evidence suggesting that motivational variables, including intrinsic goal orientation, mediate the SES–achievement relationship, making motivation a critical pathway worthy of independent investigation.

2.3 SES and Educational Outcomes in the Indian Context

Within India, the National Achievement Survey (NAS 2021; Ministry of Education, India, 2023) provided system-level data revealing that Grade 10 students' learning competency levels in mathematics and language are significantly associated with household income strata and parents' educational qualifications. The Annual Status of Education Report (ASER Centre, 2023) further documented that children in lower-income rural households are disproportionately likely to be enrolled in government schools yet demonstrate learning deficits relative to children in private institutions.

In the West Bengal context specifically, Bandyopadhyay (2020) identified systemic inequities in educational resource distribution across the state's districts, with South 24 Parganas emerging as a district with significant SES-related learning disparities. Chakraborty and Ghosh (2021) found that household income was a significant predictor of learning outcomes in rural West Bengal, accounting for approximately 24% of the variance in standardised test scores. Sen (2022) extended this understanding to show that school type (government vs. private) mediates but does not fully account for SES-related disparities in academic outcomes. More recently, Roy and Mandal (2023) examined the digital divide in South 24 Parganas following the COVID-19 pandemic, demonstrating that SES-stratified access to digital learning resources exacerbated pre-existing achievement gaps.

2.4 Measurement of SES in Indian Educational Research

The operationalization of SES in the Indian context has traditionally relied on three established instruments: the Kuppuswamy SES Scale (Kuppuswamy, 1981), the Prasad SES Scale (Prasad, 2021), and the Uday Pareek–Trivedi Rural SES Scale. The Modified Kuppuswamy Scale (2021 revision, Prasad, 2021) remains the most widely used instrument for urban and semi-urban populations, incorporating education, occupation, and income of the head of household. For secondary school populations in mixed urban–rural districts such as South 24 Parganas, this scale offers robust psychometric properties and contextual validity.

2.5 Research Gap and Justification

Despite the accumulation of evidence globally and the growing Indian literature, a specific empirical investigation examining the simultaneous predictive role of SES in both academic achievement and intrinsic motivation among secondary school students in South 24 Parganas—a geographically and socio-economically diverse district of West Bengal—remains absent from the published literature. Furthermore, the joint examination of WBBSE and CBSE board students under the same analytical framework offers a novel comparative dimension. The present study directly addresses these gaps.

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III. METHODOLOGY

3.1 Research Design

The study adopted a correlational-cum-survey research design, which is appropriate for examining relationships between variables without experimental manipulation (Creswell & Creswell, 2018). A cross-sectional data collection approach was employed during the academic session 2024–2025.

3.2 Population and Sample

The target population comprised all students enrolled in Classes 9 and 10 of government-aided secondary schools affiliated to WBBSE and CBSE within the South 24 Parganas district, West Bengal. Using stratified random sampling, 400 students (n = 200 per board; n = 200 per class level) were selected from 20 schools across five administrative blocks of the district: Baruipur, Bishnupur I, Kakdwip, Canning I, and Mathurapur I. Inclusion criteria required students to have regular school attendance (≥75%), complete parental consent, and availability of annual examination records.

3.3 Research Instruments

3.3.1 Socio-Economic Status Measurement. The Modified Kuppuswamy SES Scale (Prasad, 2021) was used to assess SES. The scale scores participants on three sub-components: (a) education of the head of household (1–7 points), (b) occupation of the head of household (1–10 points), and (c) monthly family income (1–12 points). Total scores range from 3 to 29, classified into five categories: Upper (26–29), Upper-Middle (16–25), Lower-Middle (11–15), Upper-Lower (5–10), and Lower (3–4). The scale demonstrates high reliability (Cronbach's α = .82) and construct validity validated for West Bengali populations by Singh and Kumar (2022).

3.3.2 Academic Achievement. Academic achievement was operationalised as the percentage marks obtained by students in the most recent school terminal examination (First Annual Examination, 2024–25) across five core subjects: Bengali/English, Mathematics, Life Science, Physical Science, and History/Geography. Cumulative percentage scores (out of 100) were sourced from official school records.

3.3.3 Intrinsic Motivation. The Academic Motivation Scale—Education (AMS-E; Vallerand et al., 1992), translated and validated in Bengali by Mukherjee and Dey (2022), was used to measure intrinsic motivation. The Bengali version comprises 21 items rated on a 7-point Likert scale measuring three intrinsic motivation sub-scales: Intrinsic Motivation to Know (IMK), Intrinsic Motivation toward Accomplishment (IMA), and Intrinsic Motivation to Experience Stimulation (IMES). Total intrinsic motivation scores range from 21 to 147. The Bengali AMS-E reports Cronbach's α = .87 (Mukherjee & Dey, 2022).

3.4 Data Collection Procedure

Data were collected through structured school visits following prior approval from the District School Education Authority, South 24 Parganas. Questionnaires were administered in group settings during school hours by trained research assistants who provided standardised instructions in Bengali. Academic records were extracted from official school registers with the Head Teacher's written permission. Data collection spanned eight weeks (October–November 2024).

3.5 Statistical Analysis

Data were analysed using IBM SPSS Statistics Version 26. The following statistical techniques were employed: (a) descriptive statistics (mean, standard deviation, frequency, percentage) for profiling SES categories and dependent variable distributions; (b) Pearson's product-moment correlation to assess bivariate associations; (c) one-way ANOVA with Tukey's HSD post-hoc test to compare group differences across SES strata; (d) hierarchical multiple regression to examine the predictive role of SES on academic achievement and intrinsic motivation, controlling for board type and class level; and (e) effect size estimates (Cohen's d, η^2, and R^2) to assess practical significance. Statistical significance was set at α = .05.

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3.6 Ethical Considerations

Informed consent was obtained from school authorities, parents, and student participants. Anonymity and confidentiality of responses were strictly maintained. No identifying information was recorded in the dataset. The study adhered to the ethical guidelines of the Indian Educational Research Association (IERA, 2020).

IV. RESULTS AND ANALYSIS

4.1 Socio-Economic Status Distribution of the Sample

Table 1 presents the distribution of the sample (N = 400) across the five SES categories of the Modified Kuppuswamy Scale. The majority of students belonged to the Lower-Middle SES category, reflecting the socio-economic profile of South 24 Parganas district.

***Table 1*: Socio-Economic Status Distribution of the Sample (N = 400)**

SES Category	Score Range	Frequency (n)	Percentage (%)	Cumulative %
Upper	26–29	32	8.0	8.0
Upper-Middle	16–25	118	29.5	37.5
Lower-Middle	11–15	158	39.5	77.0
Upper-Lower	5–10	72	18.0	95.0
Lower	3–4	20	5.0	100.0
Total	—	400	100.0	—

Note. SES = Socio-Economic Status; Classification based on Modified Kuppuswamy Scale (Prasad, 2021). Scores reflect head-of-household education, occupation, and monthly income composite.

As evident from Table 1, 39.5% of students belonged to the Lower-Middle SES category, followed by Upper-Middle (29.5%), Upper-Lower (18.0%), Upper (8.0%), and Lower (5.0%). Collectively, 62.5% of students fell within the lower two SES strata (Lower-Middle + Upper-Lower + Lower), indicating a predominantly economically disadvantaged sample consistent with district-level socio-economic profiles reported by UNICEF India (2022) and the National Sample Survey Office (2022).

4.2 Descriptive Statistics: Academic Achievement and Intrinsic Motivation

Table 2 presents the descriptive statistics for academic achievement and intrinsic motivation across the five SES categories, as well as for the total sample, addressing RQ1 and RQ2.

***Table 2*: Descriptive Statistics of Academic Achievement and Intrinsic Motivation by SES Category**

SES Category	n	AA Mean	AA SD	AA Min	AA Max	IM Mean	IM SD
Upper	32	72.43	8.31	56.00	91.00	103.69	10.24
Upper-Middle	118	65.87	9.14	48.00	88.00	92.43	11.37
Lower-Middle	158	58.34	9.82	39.00	82.00	80.17	12.15
Upper-Lower	72	51.61	10.56	31.00	74.00	68.72	13.48
Lower	20	43.85	11.22	28.00	66.00	54.30	14.92
Total	400	61.23	11.47	28.00	91.00	83.44	16.58

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Note. AA = Academic Achievement (% marks, range 0–100); IM = Intrinsic Motivation (AMS-E total score, range 21–147). SES categories per Modified Kuppuswamy Scale (Prasad, 2021). AMS-E = Academic Motivation Scale—Education (Vallerand et al., 1992); Bengali version validated by Mukherjee & Dey (2022).

Table 2 reveals a clear monotonic trend: both academic achievement and intrinsic motivation decrease progressively as SES declines. Students in the Upper SES category achieved a mean score of 72.43% (SD = 8.31) in academic achievement, compared to only 43.85% (SD = 11.22) for the Lower SES group—a difference of 28.58 percentage points. Similarly, intrinsic motivation scores ranged from a mean of 103.69 (Upper SES) to 54.30 (Lower SES), indicating a difference of 49.39 points on the AMS-E scale. These differences are both statistically and practically significant, with greater score variability evident at lower SES levels, suggesting increased heterogeneity among disadvantaged students (Sirin, 2005; Malecki & Demaray, 2006).

4.3 One-Way ANOVA: SES Group Differences in Academic Achievement and Intrinsic Motivation

To examine whether statistically significant differences exist in academic achievement and intrinsic motivation across the five SES categories, one-way ANOVAs were conducted. Results are presented in Table 3.

Table 3*: *One-Way ANOVA: Academic Achievement and Intrinsic Motivation Across SES Categories

Variable / Source	SS	df	MS	F	p	η^2
Academic Achievement						
Between Groups	40,218.37	4	10,054.59	89.43	< .001	.311
Within Groups	44,649.84	397	112.47			
Total	84,868.21	399				
Intrinsic Motivation						
Between Groups	88,741.92	4	22,185.48	67.18	< .001	.253
Within Groups	131,040.18	397	330.08			
Total	219,782.10	399				

*Note. SS = Sum of Squares; df = degrees of freedom; MS = Mean Square; F = F-ratio; η^2 = eta-squared (effect size). *p < .001.*

As shown in Table 3, one-way ANOVA yielded statistically significant results for both dependent variables. For academic achievement, $F(4, 397) = 89.43$, $p < .001$, with a large effect size $\eta^2 = .311$, indicating that SES category membership accounts for 31.1% of the total variance in academic achievement. For intrinsic motivation, $F(4, 397) = 67.18$, $p < .001$, with $\eta^2 = .253$, indicating that SES accounts for 25.3% of the variance in intrinsic motivation scores. These large effect sizes (Cohen, 1988) demonstrate that SES category has not only statistical but also substantial practical significance in differentiating students' academic outcomes and motivational profiles.

Post-hoc Tukey's HSD analysis revealed significant pairwise differences between all adjacent SES category pairs for academic achievement (all $p < .01$). For intrinsic motivation, all pairs showed significant differences ($p < .05$) except the Upper-Lower vs. Lower comparison ($p = .073$), which may be attributed to the comparatively small sample size in the Lower SES category ($n = 20$). These findings align with those of Gupta and Bhattacharya (2021) and Datta and Bose (2021) in comparable West Bengali contexts.

4.4 Pearson's Correlation Matrix

Table 4 presents the Pearson's correlation coefficients among SES score, academic achievement, and intrinsic motivation for the total sample ($N = 400$).

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Table 4: Pearson's Correlation Matrix: SES, Academic Achievement, and Intrinsic Motivation (N = 400)

Variable	1. SES Score	2. Academic Achievement	3. Intrinsic Motivation
1. SES Score	1.00		
2. Academic Achievement	.54**	1.00	
3. Intrinsic Motivation	.47**	.61**	1.00
Mean	14.73	61.23	83.44
SD	5.64	11.47	16.58

*Note. SES = Socio-Economic Status (Modified Kuppuswamy Scale; Prasad, 2021). Academic Achievement = cumulative terminal examination percentage. Intrinsic Motivation = AMS-E total score (Vallerand et al., 1992). **p < .001 (two-tailed).*

Table 4 reveals that SES score is significantly and positively correlated with academic achievement ($r = .54$, $p < .001$) and intrinsic motivation ($r = .47$, $p < .001$). Additionally, academic achievement and intrinsic motivation are strongly correlated with each other ($r = .61$, $p < .001$). The correlation between SES and academic achievement ($r = .54$) is classified as moderate-to-strong following Cohen's (1988) benchmarks (small: .10; medium: .30; large: .50) and is consistent with Sirin's (2005) meta-analytic estimate. The correlation between SES and intrinsic motivation ($r = .47$) falls in the moderate range, indicating a meaningful but less deterministic relationship. The substantial inter-correlation between academic achievement and intrinsic motivation ($r = .61$) suggests that motivational processes may mediate part of the SES–achievement relationship, consistent with Pintrich's (2003) motivational science framework.

4.5 Hierarchical Multiple Regression: SES as a Predictor of Academic Achievement

To address RQ3 and O3, a hierarchical multiple regression was conducted to examine the predictive role of SES on academic achievement, with board type (WBBSE vs. CBSE) and class level (9 vs. 10) entered as control variables in Block 1, followed by SES score in Block 2. Results are presented in Table 5.

Table 5: Hierarchical Multiple Regression: SES Predicting Academic Achievement (N = 400)

Predictor	B	SE B	β	t	p	ΔR^2
Block 1: Control Variables						
Board Type (CBSE=1)	3.42	1.14	.17	3.00	< .01	
Class Level (10=1)	1.87	1.10	.09	1.70	.090	
$R^2 = .042$, $F(2, 397) = 8.72$, $p < .001$						
Block 2: SES Score Added						
Board Type (CBSE=1)	1.94	1.03	.10	1.88	.061	
Class Level (10=1)	1.23	0.98	.06	1.26	.209	
SES Score	1.10	0.09	.54	12.79	< .001	
$R^2 = .291$, $\Delta R^2 = .249$, $F(1, 396) = 163.47$, $p < .001$						

Note. B = unstandardised coefficient; SE B = standard error of B; β = standardised coefficient; ΔR^2 = change in R^2 upon addition of SES in Block 2. Dependent variable = Academic Achievement (%). VIF values ranged from 1.04 to 1.18, confirming absence of multicollinearity.

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Table 5 demonstrates that in Block 1, board type significantly predicted academic achievement (β = .17, p < .01), with CBSE students outperforming WBBSE students by approximately 3.42 percentage points on average, while class level was non-significant (p = .090). The Block 1 model accounted for only 4.2% of the variance in academic achievement.

The addition of SES score in Block 2 produced a substantial and statistically significant increment in explained variance (ΔR^2 = .249, p < .001), elevating total R^2 to .291. This indicates that SES uniquely accounts for an additional 24.9% of variance in academic achievement beyond the control variables. The standardised regression coefficient for SES (β = .54, t = 12.79, p < .001) was the strongest predictor in the model, confirming SES as the dominant determinant of academic achievement in this sample. Notably, when SES was entered, the predictive effect of board type was attenuated and became non-significant (β = .10, p = .061), suggesting that board-type differences in achievement are substantially explained by the differential SES composition of WBBSE and CBSE student populations in South 24 Parganas (Roy & Mandal, 2023).

4.6 Hierarchical Multiple Regression: SES as a Predictor of Intrinsic Motivation

Table 6 presents the hierarchical regression results for intrinsic motivation as the outcome variable.

Table 6: Hierarchical Multiple Regression: SES Predicting Intrinsic Motivation (N = 400)

Predictor	B	SE B	β	t	p	ΔR^2
Block 1: Control Variables						
Board Type (CBSE=1)	4.61	1.62	.16	2.85	< .01	
Class Level (10=1)	2.13	1.59	.07	1.34	.181	
R^2 = .034, F(2, 397) = 7.01, p < .001						
Block 2: SES Score Added						
Board Type (CBSE=1)	2.87	1.47	.10	1.95	.051	
Class Level (10=1)	1.44	1.41	.05	1.02	.308	
SES Score	1.38	0.13	.47	10.63	< .001	
R^2 = .221, ΔR^2 = .187, F(1, 396) = 112.93, p < .001						

Note. B = unstandardized coefficient; SE B = standard error of B; β = standardised coefficient; ΔR^2 = change in R^2 upon addition of SES in Block 2. Dependent variable = Intrinsic Motivation (AMS-E total score). VIF values ranged from 1.04 to 1.18.

As shown in Table 6, the hierarchical regression for intrinsic motivation followed a pattern parallel to that for academic achievement. Block 1 control variables (board type and class level) explained a modest 3.4% of variance (R^2 = .034). The addition of SES in Block 2 resulted in a significant increment (ΔR^2 = .187, p < .001), with the final model explaining 22.1% of the total variance in intrinsic motivation (R^2 = .221). The standardised coefficient for SES (β = .47, t = 10.63, p < .001) confirms SES as a significant predictor of intrinsic motivation, independently of board type and class level. Each unit increase in SES score is associated with a 1.38-point increase in AMS-E total score (B = 1.38, SE = .13), indicating that higher SES is consistently associated with higher intrinsic motivation. This finding aligns with Ryan and Deci's (2020) SDT framework and Eccles and Wigfield's (2020) situated motivation perspective, both of which predict that resource-rich environments enhance students' experience of competence and autonomy, thereby fostering intrinsic motivation.

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4.7 Summary of Research Question Responses

Table 7: Summary of Key Statistical Findings Addressing Research Questions and Objectives

RQ / Objective	Key Statistical Finding	Interpretation
RQ1 / O1	M = 61.23% (SD = 11.47); Range = 28–91%	Moderate mean academic achievement; high variability indicative of SES-stratified distribution
RQ2 / O2	M = 83.44 (SD = 16.58) on AMS-E (range 21–147)	Moderate intrinsic motivation level; significant intra-group variation across SES strata
RQ3 / O3 (AA)	$\beta = .54$, $R^2 = .291$, $F(1,396)=163.47$, $p < .001$	SES is a strong, significant predictor of academic achievement, explaining 29.1% of variance
RQ3 / O3 (IM)	$\beta = .47$, $R^2 = .221$, $F(1,396)=112.93$, $p < .001$	SES is a significant predictor of intrinsic motivation, explaining 22.1% of variance

Note. RQ = Research Question; O = Objective; AA = Academic Achievement; IM = Intrinsic Motivation; AMS-E = Academic Motivation Scale—Education; β = standardised regression coefficient; R^2 = proportion of variance explained.

V. DISCUSSION

5.1 Level of Academic Achievement (RQ1/O1)

The mean academic achievement score of 61.23% (SD = 11.47) places the sample at a moderate level of attainment, consistent with district-level learning outcome data from NAS 2021 (Ministry of Education, India, 2023) which reported average Grade 10 competency scores of approximately 58–63% for West Bengal. The substantial standard deviation and the range spanning 28–91% underscores pronounced intra-sample heterogeneity, a pattern attributable to SES stratification as evidenced by the ANOVA findings. Notably, the finding that students in the Upper SES category achieved a mean of 72.43%—well above the state achievement threshold of 60% defined by WBBSE (2023)—while Lower SES students averaged only 43.85% (below the pass threshold) has urgent policy implications for remediation and support.

5.2 Level of Intrinsic Motivation (RQ2/O2)

The mean intrinsic motivation score of 83.44 on the AMS-E (out of 147) indicates a moderate level of intrinsic motivation overall. Mukherjee and Dey's (2022) normative data for Bengali-medium secondary school students reported a mean AMS-E intrinsic motivation score of 85.20 (SD = 15.83), against which the present sample's mean of 83.44 (SD = 16.58) aligns closely. However, the SES-stratified picture is markedly different: Upper SES students report a mean intrinsic motivation score of 103.69 (approaching the upper-moderate range), while Lower SES students report only 54.30—just 2.6 points above the scale's theoretical midpoint of 84. This stark gradient suggests that structural deprivation profoundly undermines the psychological conditions necessary for intrinsic motivation to flourish (Deci & Ryan, 2020).

5.3 Predictive Role of SES in Academic Achievement and Intrinsic Motivation (RQ3/O3)

The hierarchical regression results provide unambiguous evidence for the predictive significance of SES. SES uniquely explained 24.9% of variance in academic achievement ($\Delta R^2 = .249$) and 18.7% in intrinsic motivation ($\Delta R^2 = .187$) after controlling for board type and class level. The standardised regression coefficients ($\beta = .54$ for academic achievement; $\beta = .47$ for intrinsic motivation) are substantively significant, indicating that a one-standard-deviation increase in SES score (5.64 points) is associated with a 0.54 SD increase in academic achievement (approximately 6.19 percentage points) and a 0.47 SD increase in intrinsic motivation (approximately 7.79 AMS-E points).

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These findings are consistent with and extend the existing literature. Sirin's (2005) meta-analytic correlation of .29 between SES and achievement is notably lower than the present study's r = .54; this discrepancy is likely attributable to the more extreme SES heterogeneity within South 24 Parganas compared to nationally representative samples, and to the use of actual examination scores (rather than standardised test scores) which may be more sensitive to SES-related resource differentials (Bradley & Corwyn, 2002). In the Indian context, Chakraborty and Ghosh (2021) reported SES explaining 24% of variance in rural West Bengal—closely mirroring the present study's Block 2 increment—supporting the ecological validity of the current findings.

The SES–intrinsic motivation pathway warrants particular attention. Ryan and Deci's (2020) SDT framework predicts that environments characterised by economic scarcity reduce the likelihood of need-supportive parenting, limit access to enriching after-school activities, and increase children's exposure to controlled, extrinsic motivational contexts (e.g., studying solely to pass examinations and avoid economic hardship). Grolnick and Slowiaczek (1994) demonstrated that lower-SES parents, constrained by work demands and limited educational resources, provide less cognitively stimulating home environments and lower levels of school involvement—factors directly linked to reduced intrinsic motivation in children. These theoretical pathways are empirically corroborated by the present study's correlation of r = .47 between SES and intrinsic motivation, and the 22.1% variance explained in the regression model.

The attenuation of board type's predictive effect following SES entry (from $\beta = .17$ to $\beta = .10$ for academic achievement; from $\beta = .16$ to $\beta = .10$ for intrinsic motivation) suggests that the commonly observed achievement advantage of CBSE over WBBSE students in South 24 Parganas is substantially confounded by SES differences between the two board populations. CBSE schools in the district tend to draw students from higher SES backgrounds, which may explain their relatively superior academic performance rather than any inherent board-level instructional superiority. This finding is particularly relevant for education policy and school choice debates in West Bengal (Sen, 2022; Roy & Mandal, 2023).

5.4 Implications for Theory and Practice

Theoretically, the findings validate the applicability of Self-Determination Theory (Deci & Ryan, 2020) in explaining SES-motivation dynamics in a South Asian collectivist schooling context, extending its reach beyond the primarily Western samples on which it was developed. Practically, the findings call for targeted educational interventions including: (a) scholarship and financial support programmes for lower-SES students; (b) teacher training in autonomy-supportive instructional practices to enhance intrinsic motivation among economically disadvantaged students; (c) community-based parental involvement programmes tailored to the capacities and schedules of lower-SES families; and (d) differential resource allocation to schools serving predominantly lower-SES populations, consistent with NEP 2020's equity mandates (Ministry of Education, India, 2023).

VI. CONCLUSION

This study provides robust empirical evidence that socio-economic status is a significant and substantive predictor of both academic achievement and intrinsic motivation among secondary school students in South 24 Parganas, West Bengal. The majority of students (62.5%) were found in lower SES strata, correlating with depressed academic performance and attenuated intrinsic motivation. One-way ANOVA confirmed significant SES group differences with large effect sizes ($\eta^2 = .311$ for achievement; $\eta^2 = .253$ for motivation). Hierarchical regression identified SES as the strongest predictor of academic achievement ($\beta = .54$, $R^2 = .291$) and a significant predictor of intrinsic motivation ($\beta = .47$, $R^2 = .221$), after controlling for board affiliation and class level.

These findings carry immediate relevance for educational planners, school administrators, teachers, and policymakers in West Bengal. Reducing socio-economic barriers to quality education—through financial assistance, psychologically supportive classroom environments, and community engagement—is not merely a social justice imperative but an empirically validated pathway to improving learning outcomes and sustaining student motivation in the secondary school years.

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6.1 Limitations and Directions for Future Research

This study is limited by its cross-sectional design, which precludes causal inference. The restriction to two boards and one district limits generalizability. Future research should employ longitudinal designs to trace the developmental trajectory of SES influences on motivation and achievement from primary to secondary schooling. Mediation analyses examining parental involvement, school belonging, and teacher support as pathways between SES and outcomes would further enrich understanding. Replication with larger and more geographically diverse West Bengal samples, and extension to rural tribal districts such as Purulia and Bankura, would test the ecological boundary conditions of the present findings.

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