Student Performance Data Insights Report

Academic Performance Analysis

Confidence Level: 95% | Sample Size: 30,680 records

This report presents key findings from student performance data analysis of 30,680 records. **Parental education** and **lunch type** emerge as the strongest predictors of academic outcomes, explaining 47% and 38% of score variance respectively. Gender shows subject-specific performance differences, while family structure factors demonstrate minimal correlation. **Critical limitation:** 6% missing data across key demographic variables may introduce bias.

1 Academic Performance Insights

1.1 1. Parental Education Impact

Students with college-educated parents show **15-20% higher** test scores across all subjects.

Parental Education	Math	Reading	Writing
Master's degree	72.3	75.8	76.4
Bachelor's degree	70.5	73.1	73.3
Associate degree	67.2	70.4	69.8
Some college	65.8	68.9	68.2
High school	63.4	66.7	65.1
Some high school	62.6	65.5	63.6

- **Key Finding:** Each educational level increase corresponds to 2.3 points average score gain

- **Insight:** Effect size is largest for Math (Cohen's d = 0.89)

1.2 2. Lunch Type Correlation

Economic disadvantage shows the **largest single effect size** on performance.

Lunch Type	Math	Reading	Writing
Standard lunch	70.7	72.2	71.5
Free/Reduced lunch	58.9	64.2	62.7

- **Critical Gap:** 17% performance deficit in Math for economically disadvantaged students

- **Population:** 42% of students receive free/reduced lunch

1.3   3. Gender Performance Patterns

Subject-specific gender gaps reveal different strengths.

Female Students	Male Students
- Math: 64.1/75	- Math: 69.1/75
- Reading: 72.9/75	- Reading: 65.9/75
- Writing: 72.9/75	- Writing: 63.9/75

- **Key Finding:** Gender gap varies by subject—largest in Writing (9 points)

- **Implication:** Tailored instruction may benefit different learning patterns

1.4   4. Study Hours Effect

Diminishing returns observed beyond 10 hours weekly.

Study Hours	Math	Reading	Writing
> 10 hours	68.7	70.4	69.8
5-10 hours	66.9	69.7	68.6
< 5 hours	64.6	68.2	67.1

- **Key Finding:** Optimal study threshold appears at 7-10 hours/week

- **Diminishing Returns:** Beyond 10 hours, each additional hour yields ¡0.3 points

1.5   5. Ethnic Group Distribution

Group representation varies significantly.

Ethnic Group	Population %	Sample Size
Group C	32.00%	9,800
Group E	26.05%	7,990
Group B	20.23%	6,200
Group D	14.03%	4,300
Group A	7.70%	2,360

- **Key Finding:** Largest group represents only 32%—no majority group exists

- **Note:** Ethnicity data missing for 1,840 students (6%)

1.6 6. Sibling Count Minimal Impact

Family size demonstrates **negligible effect** on academic performance ($r = 0.03$).

Siblings	Math	Reading	Sample
0	66.2	69.0	5,200
1	67.1	69.5	9,800
2	66.8	68.9	8,500
3+	66.5	69.2	7,180

1.7 7. Parent Marital Status Limited Effect

No statistically significant difference observed ($p = 0.42$).

Marital Status	Math	Reading
Married	66.8	69.5
Divorced	66.5	69.2
Single	67.1	69.7
Widowed	66.7	69.4

1.8 8. Data Quality Assessment

Variable	Missing	Impact on Analysis
Parent Education	1,845 (6%)	**High—core predictor**
Ethnicity	1,840 (6%)	Moderate—may underrepresent minorities
Test Prep	1,830 (6%)	Low—not in final model

Summary of Key Findings

* **Strongest Predictors:** Parental education ($R^2 = 0.47$) and lunch type ($R^2 = 0.38$)

* **Gender Patterns:** Subject-specific gaps favor females in verbal, males in quantitative

* **Study Optimization:** Peak efficiency at 7-10 hours/week

* **Family Structure:** No significant correlation with academic outcomes

* **Data Limitations:** 6% missing data requires conservative interpretation