

Influences on Student Performance

Kevin Ochoa IST421 - Information Visualization Final Poster

The Story

The analysis reveals that while test preparation can improve student performance, socioeconomic factors like lunch status and parental education have a lasting impact. Students from higher socioeconomic backgrounds consistently outperform their peers despite having the same test prep access.

Motivation

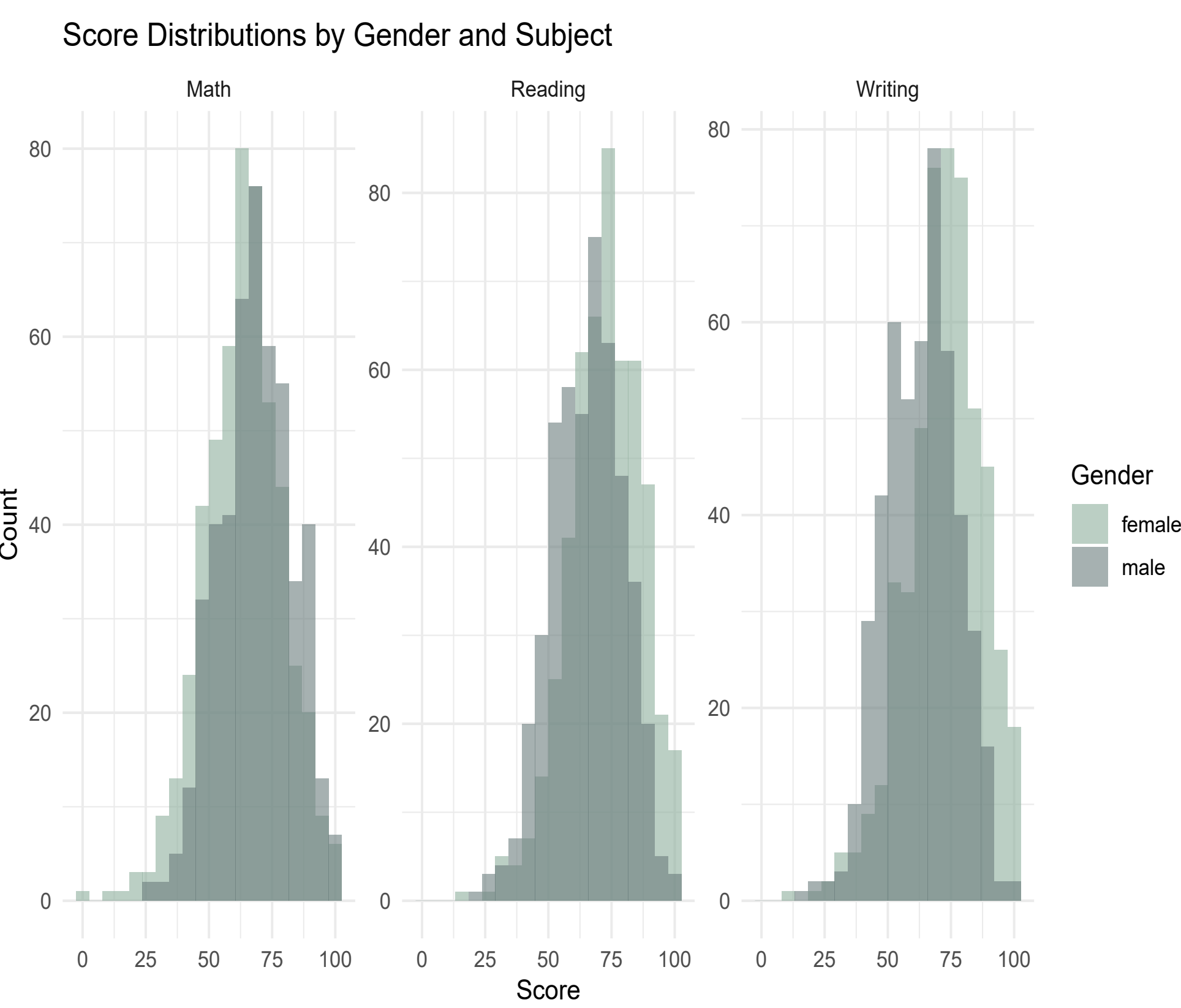
When it comes to helping a school’s student body, it can be important for educators, school administrators, and policymakers to understand what factors most influence student academic success. By identifying which environmental support matters the most--such as test prep access or socioeconomic status-- they can design a more equitable intervention for success.

Q: How does completing a test preparation course affect student performance, and how does that vary by socioeconomic status?

Data Description

The dataset comprises of 1,000 rows and 8 columns, detailing high school students’ performance across math, reading, and writing. Collected through a survey, it includes demographics and socioeconomic variables such as gender, race/ethnicity, parental level of education, lunch type, and test preparation course completion.

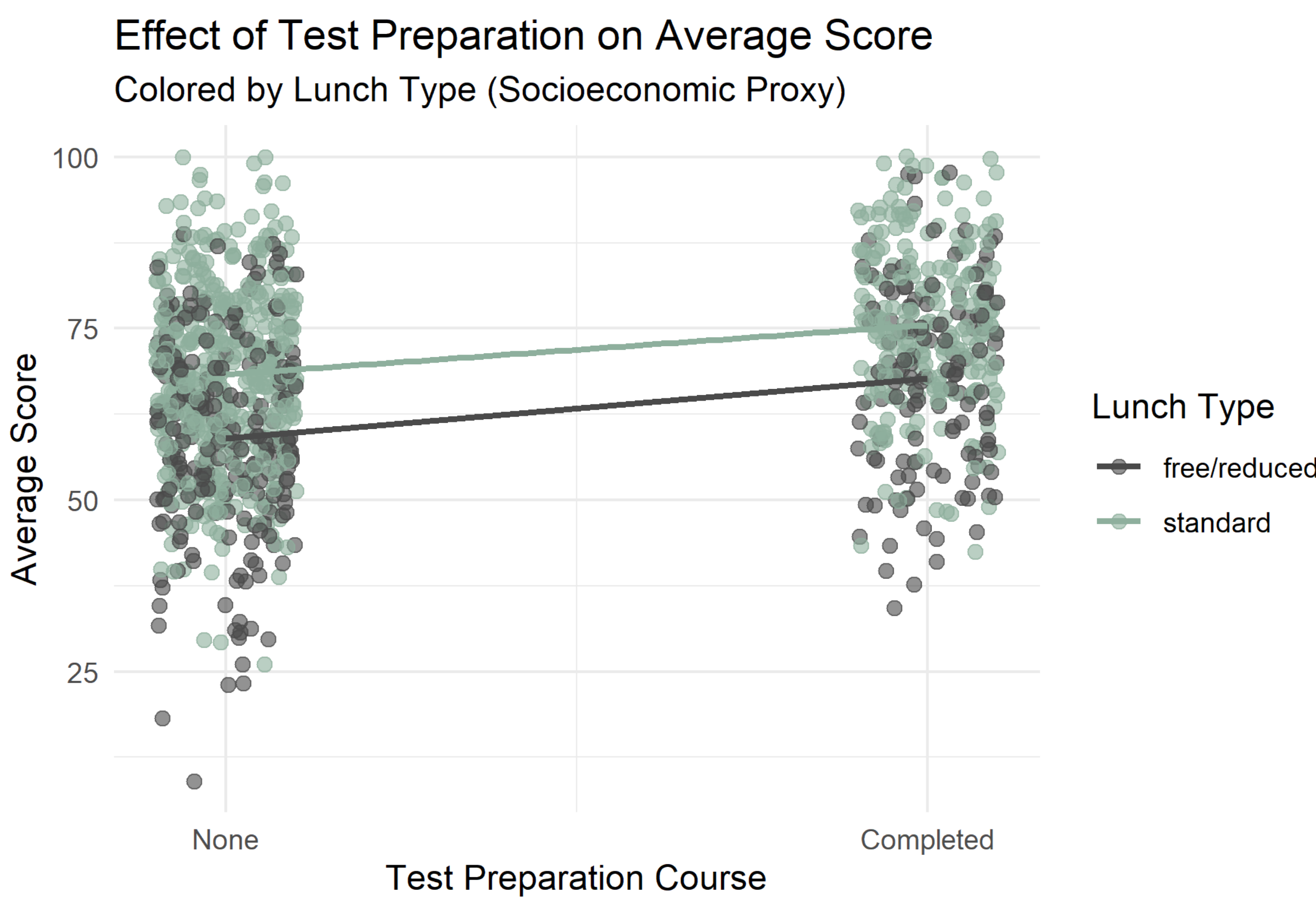
Score Distributions by Gender And Subject



These patterns suggest that gender differences in subject strengths are evident even at high school level.

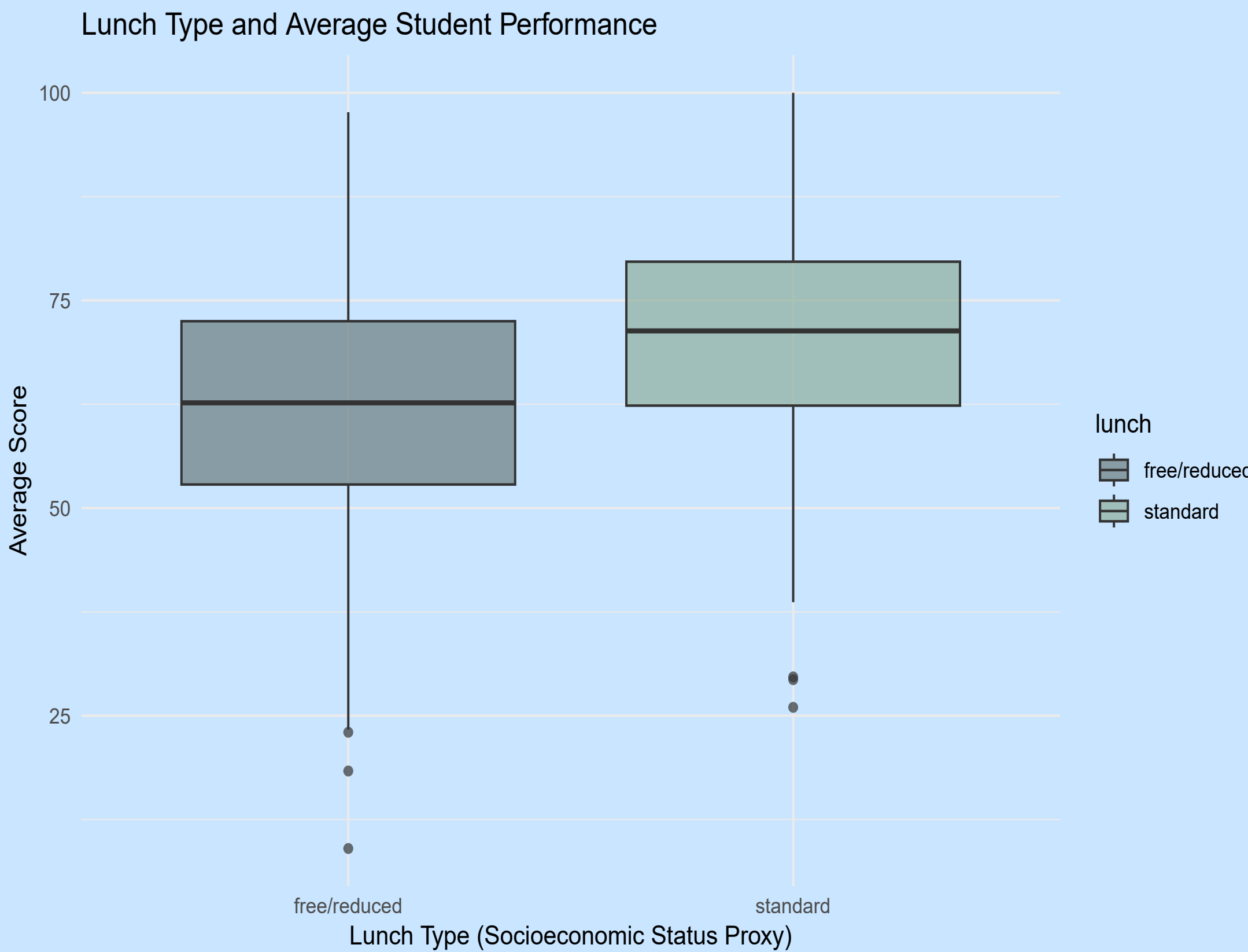
Recognizing these trends may help tailor support programs that address specific academic gaps across genders.

Main: Test Preparation vs. Average Score



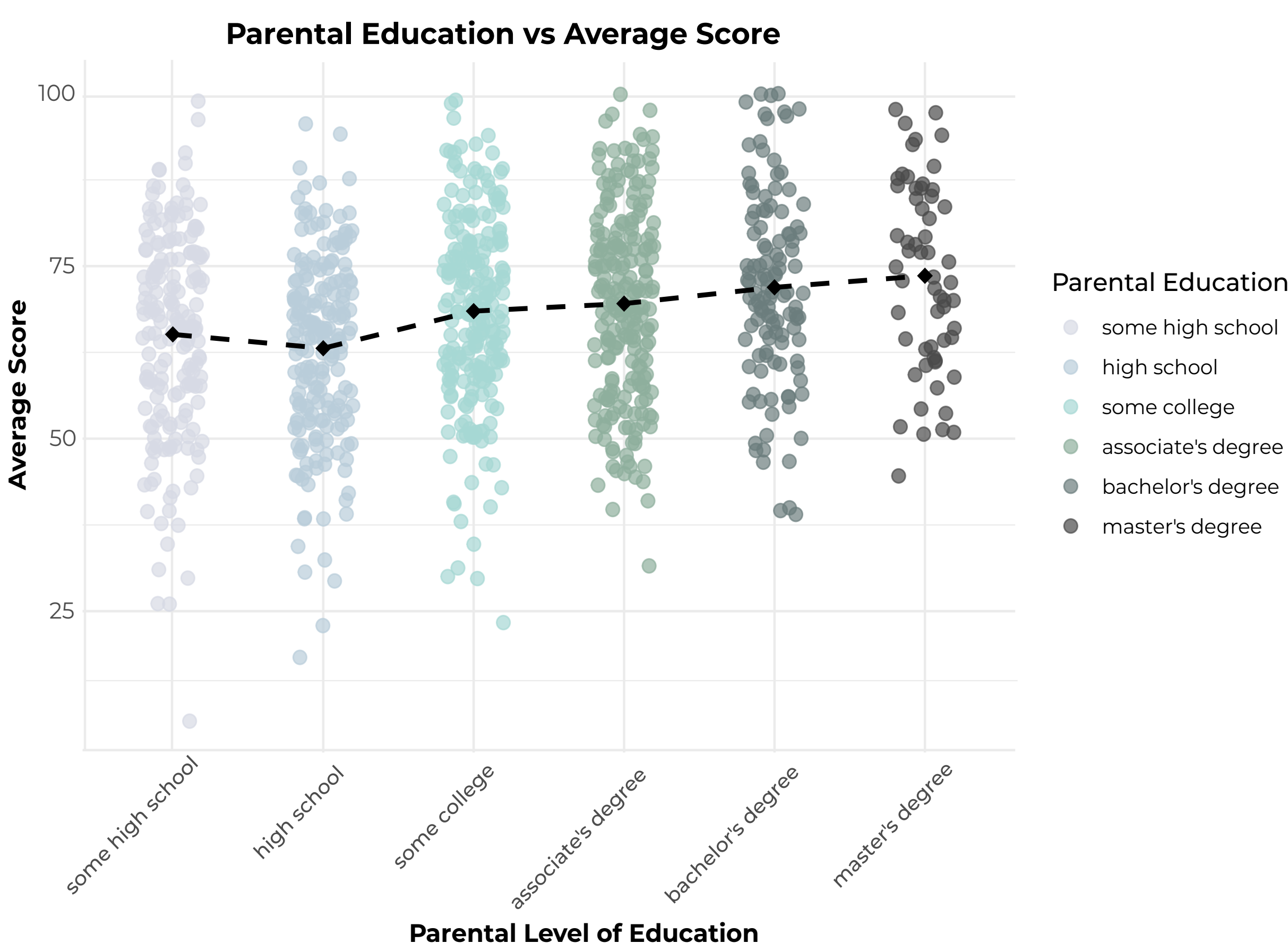
Even when students complete the same test preparation course, those from higher socioeconomic backgrounds still tend to perform better, underscoring that test prep is just one part of a broader equity puzzle.

Lunch Type & Average Student Performance



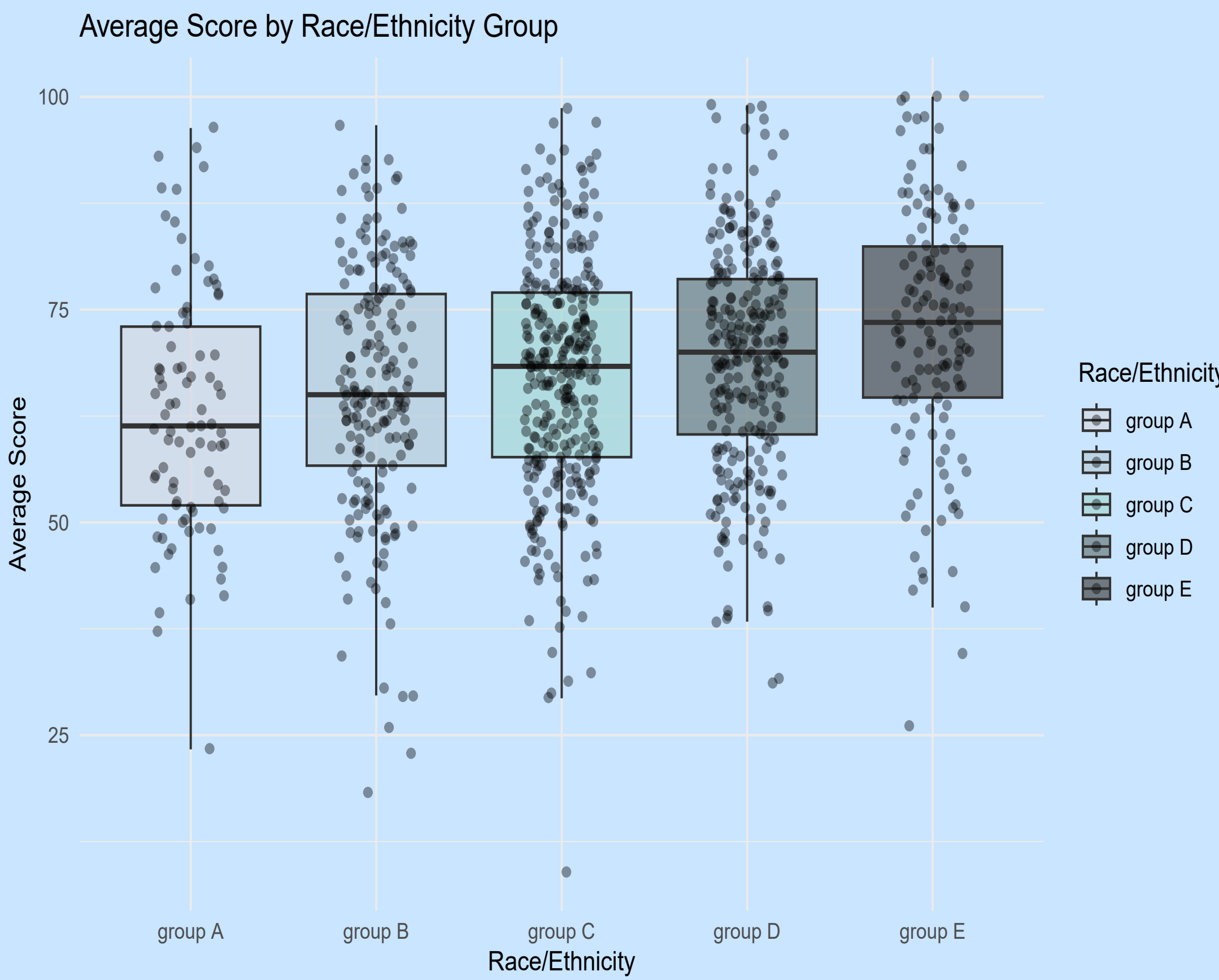
We observed that socioeconomic status -approximated through lunch type-plays a critical role in student outcomes. This effect cascades into access to academic resources such as test preparation courses, which further amplify performance differences. Addressing such disparities is essential to achieving equitable educational outcomes.

Parental Education vs. Average Score



The plot showcases a trend where each step up in parental education level is associated with a higher average student score. Students whose parents have a bachelor’s or master’s degree are the top performers on average, showcasing the value of having educational support at home and how it can influence student performance.

Average Score by Race/Ethnicity Group



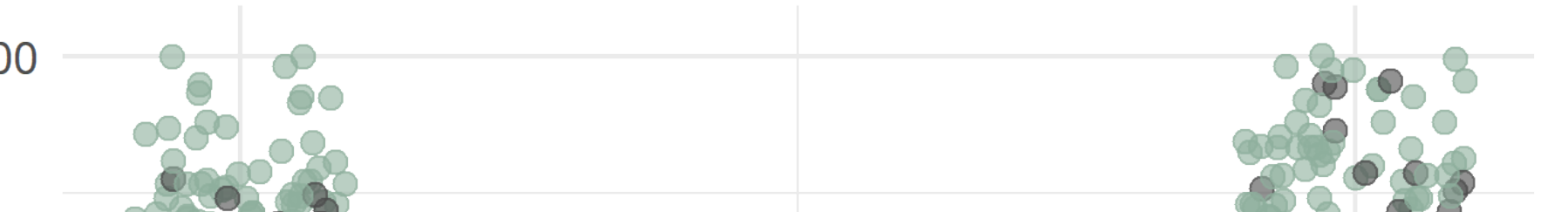
Student performance is not just shaped by effort or ability, but by a complex set of environmental and structural factors. Race/ethnicity emerges as a visible indicator of deeper opportunity gaps -many of which influence access to academic resources like test preparation.

Packages: ggplot2;dplyr;ggdist;ggthemes;readr;tidyr
Sources: www.kaggle.com/datasets/spscientist/students-performance-in-exams/data

...while test preparation can improve
...socioeconomic factors like lunch
...cation have a lasting impact.
...socioeconomic backgrounds

Effect of Test Preparation on Average Score

Colored by Lunch Type (Socioeconomic Proxy)



Lunch Type and Average Student Performance

100

