Research Agenda

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My work centers on educational research, with a particular focus on the relationship between socioeconomic background and educational outcomes among Chilean students in secondary education and in the transition to higher education. Over the last decade, I have studied how individual and family socioeconomic attributes influence performance on national standardized tests, particularly those used for assessing educational quality and higher education admission. More recently, my research has shifted toward the application and refinement of multilevel analysis in educational research. Currently, my primary academic interests include leveraging multilevel analysis to examine educational outcomes in Chile and addressing theoretical and practical challenges in its application. My ultimate goal is to contribute to the refinement of multilevel modeling techniques to enhance the robustness of educational research in Chile.

Research into educational outcomes and socioeconomic attributes is central to discussions on educational segmentation in Chile. Findings consistently indicate that students from higher socioeconomic backgrounds perform better on standardized tests. Additionally, school-level factors, such as public or private administration and restricted or free admission, influence the composition of student populations, leading to structural segmentation in primary and secondary education that extends into higher education. This situation poses challenges to the quality and fairness of education in Chile, limiting equal opportunities for students' academic and social development. In this context, my research has contributed to understanding disparities in test scores for both educational quality assessments and higher education admission.

One of the key findings of my research is the strong correlation between standardized test performance and socioeconomic factors at the student, family, and school levels. For instance, analyses of the SIMCE test, which assesses mathematics proficiency in secondary education, and the mathematics and language admission tests for higher education have revealed significant score disparities. Students from high-income families with parents who attain higher education consistently achieve higher scores. Additionally, private school students tend to outperform their public-school peers. These patterns highlight the persistent influence of socioeconomic background on academic achievement in Chile. These findings, although relevant for diagnosing the problem of educational segmentation in Chile, have an important limitation: their methodology does not accommodate the inherently nested structure of school data—students in schools—which prevents us from knowing the *unique* effect of individual and school information in the analysis of educational outcomes.

The study of educational segmentation benefits from methodological advancements in multilevel analysis, whose statistical models address the nested structure of the data. This methodological framework enhances our ability to evaluate the unique contributions of student and family socioeconomic attributes, as well as school or contextual characteristics, to standardized test performance. Consequently, the application of multilevel modeling advances the understanding of educational segmentation and its implications for student outcomes. In terms of my research interests, this translates into three professional objectives: 1) provide guidelines on the application of multilevel analysis to clustered educational data, 2) participate in research projects that implement quantitative and qualitative methods to offer a comprehensive discussion on educational segmentation, and 3) offer new evidence to help decision-makers design and implement policies that address educational segmentation.

To fully harness the potential of multilevel analysis, researchers must carefully specify model components, particularly fixed and random effects. Recent studies indicate that widely used multilevel

models in the social sciences may suffer from misspecifications in random effects, leading to biased interpretations and incorrect inferences[1]. My master's thesis in Educational Measurement and Statistics at the University of Iowa is addressing this issue by examining how random slopes in multilevel models can inadvertently conflate different sources of variance, distorting our understanding of the model results.

In the future, part of my research will be dedicated to the study of theoretical and practical problems in the implementation and interpretation of multilevel analysis to study educational data in Chile, such as standardized test scores. Specifically, I will be working on two objectives: 1) to show the consequences of the incorrect specification of fixed and random effects in the estimation of coefficients in multilevel models and their potential biases in interpretation, and 2) to propose a framework for the implementation of multilevel analysis in educational data, which can guide researchers and consumers in the use and interpretation of these results.

Refining the specification of multilevel models will help researchers obtain more reliable results, ultimately strengthening studies on educational segmentation and student performance in Chile. In the future, methodological advancements in multilevel modeling will allow for a more precise identification of *unique* individual and school contributions to socioeconomic disparities in standardized test scores. For these reasons, both the applied research and the theoretical research that I plan to carry out on the application of multilevel analysis in educational data will deepen our understanding of how families and schools shape educational outcomes and inform policy makers to promote greater equity in education.

[1] For a detailed discussion of this, you can visit Rights and Sterba (2023) at 10.1080/00273171.2023.2174490