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Socio-economic disparities in academic achievement: A comparative analysis of mechanisms and pathways☆

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ABSTRACT

Research on educational outcomes conceptualizes socio-economic condition as a multidimensional construct. Quantitative empirical investigations are generally based on single, composite indicators. However, the use of single, composite indicators does not reveal what mechanisms determine inequalities. We use multigroup confirmatory factor analysis and alignment optimization to establish comparable indices of socio-economic conditions and used them in structural equation modeling to disentangle the impact of various dimensions of socio-economic condition on academic performance in a comparative perspective. Data from the PISA 2012 study reveals few country differences and that access to cultural and educational resources is at the root of socio-economic inequalities in academic achievement across the world.

1. Introduction

Socio-economic disparities in academic achievement have attracted the attention of researchers and policy makers since the 1960s (see, for example, Coleman et al., 1966; Peaker, 1971; Jencks, 1972; and comprehensive reviews such as White, 1982; McLoyd, 1998; Buchmann, 2002; Sirin, 2005). However, in studies examining how socio-economic status relates to educational attainment and achievement among school-aged children, no consensus has emerged on the conceptual meaning of socio-economic status or on how to measure it (Bornstein & Bradley, 2003). Different variables, or combinations of variables, are used interchangeably to describe social class, poverty and affluence, or a student's or a student's family's ranking on the social ladder (Bornstein & Bradley, 2003; Brooks-Gunn & Duncan, 1997; Coleman, 1988, McLoyd, 1998; Rindermann & Baumeister, 2015; Sirin, 2005).

One of the consequences of the diverse conceptualization and measurement approach is that empirical estimates of socio-economic disparities in academic achievement and performance vary significantly, with some studies indicating that socio-economic status is highly associated with academic performance (Lamdin, 1996; Sutton & Soderstrom, 1999), while others suggest that the relationship is moderate or not significant (see, for example, Ripple & Luthar, 2000; Seyfried, 1998; White, 1980, 1982; White, Reynolds, Thomas, & Gitzlaff, 1993). In addition, the relationship between socio-economic status and academic achievement may vary greatly across countries. For example, Heyneman and Loxley (1983) suggested that "the poorer the country, the greater the impact of school and teacher quality on achievement". Their study indicated that in developing countries family characteristics explained a significantly smaller portion of the variance in achievement than in industrialized countries; and, conversely, school factors played a much more important role in such contexts.

The emergence of large-scale international assessments, such as the Programme for International Student Assessment (PISA), has advanced the understanding of between-country differences in socio-economic disparities in academic performance. The use of homogeneous indicators of socio-economic status has made possible a closer examination of issues of equity in education and how well education systems are able to provide opportunities to all, irrespective of the socio-economic status of students' families. Methodologically, the application of multilevel modeling techniques has revealed the hierarchical nature of most education achievement data (with students nested in classrooms, nested in schools, nested in local education authorities, etc.) — not as a nuisance to be controlled for, but rather as a tool to address substantive education policy questions (Aitkin & Longford, 1986; Lockheed & Longford, 1991; Raudenbush & Bryk, 1986; Riddell, 1989). However, two sets of challenges for empirical investigations on socio-economic disparities in academic achievement remain (Buchmann, 2002; Fuller

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& Clarke, 1994; Hansen & Munck, 2012). First, conceptual issues about what socio-economic status indicators mean. Second, measurement issues about how socio-economic status can be reliably measured across countries, especially countries with different welfare states, at different levels of economic development, and with very different labor markets and education systems.

Many empirical studies examining socio-economic differences in academic performance rely on socio-economic status indicators that incorporate into a single composite one-dimensional variable, measures of parents' income, education and occupation. These components, while correlated, measure different aspects of socio-economic status (Bollen, Glanville, & Stecklov, 2001; Hauser & Huang, 1997) and reflect a conception of socio-economic status as a combination of property, power and prestige (Bradley & Corwyn, 2002). PISA also conceptualizes socio-economic condition as a single, one-dimensional indicator that is operationalized through the PISA Index of Economic Social and Cultural Status, also known as ESCS. The ESCS index has the advantage of synthesizing in one information to: i) examine socio-economic disparities in academic performance, ii) how a country compares with other countries, and iii) monitor progress. Using a composite indicator such as ESCS has more than just an intuitive appeal. It has the benefit of simplicity because it can be treated as a continuous variable in empirical models and, thanks to its standardization ($\mu = 0$; $\sigma = 1$ across OECD countries), reflects performance differences of students who differ in socio-economic background from the average student across OECD countries. Finally, combining all available information about socio-economic background into a single index will reduce measurement error. However, this is true only under the assumption that the index reflects one single latent construct. This paper shows that this assumption is questionable.

The use of a composite ESCS indicator has an intuitive and measurement appeal. However, it also has some important drawbacks. First, it prevents examining whether the roots of socio-economic disparities in different countries stem from different mechanisms and processes. Two countries with a similar performance gap between similarly socio-economically advantaged and disadvantaged students may differ greatly. In country A, for example, socio-economic disparities in performance may stem from restricted access to cultural possessions; in country B, they may stem from poverty or their parents' inability to relate with teachers and education personnel. While observed differences may be the same, policy interventions would differ radically in the two scenarios.

Second, although the PISA study is specifically designed to guarantee cross-country comparability, procedure used in the scaling of the ESCS index does not ensure full cross-country comparability, but rather comparability across time in each country separately (OECD, 2012). Therefore, when comparing socio-economic disparities in performance it is important to ensure that comparisons are valid and stem from real differences across countries rather than statistical artifacts.

Third, the development of a composite index to define socio-economic status will reduce measurement error if all characteristics reported by students reflect the single construct of socio-economic status. However, measurement error will increase where information provided by students reflects different constructs and these constructs play different roles in shaping student achievement across countries. The reliability of the ESCS index is not particularly high — the median scale reliability for the pooled OECD countries is 0.65 (OECD, 2012: 313). The research presented here indicates that the latter case applies to the analysis of socio-economic disparities in academic achievement.

We distinguish two main components of socio-economic status: parents' education and parents' occupation. We also posit that parents' education has a direct effect on occupation and that both education and occupation can affect student achievement either directly or indirectly. Indirectly, socio-economic status facilitates access to financial, educational, and cultural resources. Directly, better-educated parents and parents with high-status occupations have cultural capital; they recognize socially valuable cues and conventions and know how to use them to their advantage (Bourdieu & Passeron, 1977; DiMaggio, 1982; Lareau, 1989). They also understand bridging and especially bonding forms of social capital. For example, highly educated parents and parents with high-status occupations are more likely to be part of informal networks linked by implicit norms of reciprocity and trust, especially such networks that are formed by similarly highly educated and influential individuals (Coleman, 1988; Putnam, 1993, 2000). They are also more likely to establish parent–child ties of high quality, with more time and attention devoted to their children, and an interest and a forward-thinking attitude toward their children's education (Buchmann, 2002). Parents in more prestigious occupations may also act as role models for their children, thus promoting high ambitions and a drive to achieve (Kohn, 1969). Finally, parental educational attainment and occupational status could be associated with the academic performance of their children directly through genetic and socialization influences (Lemos, Almeida, & Colom, 2011; Colom & Flores-Mendoza, 2007). Because individuals with higher intelligence and social skills tend to have better educational attainment and occupational status, parental education and occupation are correlated with parental cognitive aptitude and non-cognitive skills, traits that parents can pass on to their children genetically or though socialization processes and which grow with age (Bouchard, 2009).

This research seeks to develop a new framework for analyzing the relationship between students' socio-economic status and educational achievement cross-nationally. A distinction is thus made between parental capital — measured by the two objective status indicators of parents' education and occupation — and latent resource constructs — wealth, cultural possessions, and educational resources. The cross-national comparability of the educational and occupational indicators has attracted considerable interest and has led to internationally comparable standards and classifications, such as the ISCED and ISCO classifications. The cross-national comparability of the resource indicators is tested empirically across PISA participating countries. Then the processes through which a student's family may determine proficiency are disentangled and differences between countries in the mechanisms driving such relationships are examined.

The aim of this analysis is to examine the relationship between socio-economic condition and student performance, focusing on the direct effects of objective social-status indicators and the indirect effects these may have on access to economic, cultural and educational resources.

The paper is structured as follows: first we discuss the PISA assessment and background questionnaire and the methods that we used to estimate the roots of socio-economic disparities in academic performance in PISA-participating countries. We then develop analyses to examine the nature — roots and mechanisms — that underlie socio-economic disparities in academic achievement. We conclude by developing methodological implications for the analysis of socio-economic disparities in academic achievement and examine policies that could ensure equitable education opportunities for all.

2. Methods

2.1. Sample participants

The PISA 2012 surveys were conducted in 34 OECD and 31 partner countries and economies on two-stage stratified representative samples of students enrolled in lower-secondary or upper secondary institutions and aged between 15 years and 3 months and 16 years and 2 months. The two-stage sampling strategy means that schools are sampled first and then students are sampled within sampled schools (for details, see OECD, 2014 and www.oecd.org/pisa for full documentation on the PISA coverage and technical standards). We focus our analysis on OECD countries (see the online appendix for a list of countries and country specific sample sizes), to be able to examine mechanisms and pathways determining socio-economic disparities in academic achievement among countries with similar levels of economic development. Because we lack information on key variables we exclude Israel and concentrate