Socioeconomic Stratification in STEM Labor Force Entry

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Stratification research has long been interested in how family background affects children's future educational and labor force success. Research shows that individuals from less advantaged backgrounds have less success throughout schooling and once they enter the labor market than those with more resources. For example, individuals with lower levels of socioeconomic status (SES) tend to have lower achievement, take fewer advanced courses, and are more likely to drop out of high school than those with high SES (Bozick and Ingels 2008; Chapman, Laird and Kewal Ramani 2010; Schneider, Swanson and Riegle-Crumb 1997). These students are also more likely to go to a two-year college over a four-year college, have lower college achievement, are more likely to drop out after entering college, and have poorer labor market outcomes, on average, than students with higher levels of SES (Bozick and DeLuca 2005; Chen and Carroll 2005; Goldrick-Rab 2006; Provasnik and Planty 2008; Walpole 2003).

Much less is known about the effect of family background on one's educational and occupation success within specific fields, and given rapid advances in science and technology and a changing global economy, understanding these processes within science, technology, engineering, and mathematics (STEM) may be of particular interest. Many recent studies in the U.S. stress the importance of increasing our STEM labor force to remain competitive in the global market, and demand for highly skilled workers is at an all-time high and increasing (Stine and Matthews 2009; Terrell 2007). The Bureau of Labor Statistics (BLS) projects increases in occupations that generally require a college degree by 2018, with many STEM occupations among the largest increases (Lacey and Wright 2009). While the demand for these jobs is high, many researchers argue that the supply of highly skilled workers is lagging behind. In order to meet these demands, many of these researchers point to increasing the talent pool by drawing from underrepresented groups (Hira 2009).

To date, the literature on underrepresented groups in STEM has focused nearly exclusively on gender and race-ethnicity. Little is known, however, about the possible effects of family background on success in STEM. Gaining a better understanding of how family background affects one's success in STEM is important for several reasons. At the individual level, STEM education provides useful skills that are marketable in the labor force. Individuals with STEM careers tend to have higher salaries and experience less unemployment (Hira 2009; National Science Board 2012), which could increase mobility for the less advantaged. This could, in turn, have other macro-level effects. Increasing mobility through access to these high status and high paying jobs could possibly have an impact on decreasing inequality in the U.S. In addition, ensuring equal access to these jobs could have other implications for the U.S. economy. Just as it is important to increase the STEM talent pool from underrepresented race-ethnicity and gender groups, it is also important to draw from all social backgrounds in order to meet growing U.S. economic needs.

Current research on SES and the pathway through STEM is limited and the findings are mixed. Some research shows that SES matters for success in STEM in specific cases. For instance, a large body of research finds that students from disadvantaged backgrounds have lower achievement in math and science in high school than students from more advantaged backgrounds (Bozick and Ingels 2008). Yet several recent studies find that SES does not significantly or consistently predict STEM aspirations, major choice, or related degree attainment (Riegle-Crumb et al. 2012).

STEM Labor Force Entry

No research, to my knowledge, looks at SES effects on the transition from STEM degree to the STEM labor force. Despite substantial growth in STEM jobs and the seemingly high demand for workers with STEM degrees over the past several decades, not all STEM degree recipients enter the STEM labor force. Given that STEM employees earned over double the median earnings of the overall workforce in 2010 and tend to have lower levels of unemployment than other fields (National Science Board 2012), it is important to see who gets these jobs.

Considering the role of SES in STEM Labor Force Entry

There is evidence that SES matters in the labor market, above and beyond the accumulation of skill. Even after college completion, low SES students face several disadvantages when entering the labor market. For example, some research shows that individuals with lower levels of SES have greater difficulty finding high prestige jobs, tend to have lower incomes after college, and are also more likely to experience unemployment (Caspi et al. 1998; Lin, Ensel and Vaughn 1981; Walpole 2003). There is no research, however, on whether these findings apply more or less to those with STEM degrees.

It is possible that SES does not affect one's labor market opportunities upon degree completion. This is consistent with human capital theory, which suggest that labor force success is primarily based on an individual's skills (Becker 1975). If strong sorting occurs early on, and SES may no longer matter after one's final educational attainment. In other words, SES may affect one's ability to obtain a given educational credential, but once it is obtained, SES may no longer matter.

However, it is also possible that SES still has an effect at this point in individual trajectories Research points to several reasons that SES matters for success in the labor market. Signaling and credential theories counter human capital theory, suggesting that because of imperfect information on their possible employees, employers often rely on signals and credentials (Kerckhoff, Raudenbush and Glennie 2001). Often these are tied to unrelated characteristics like SES and contribute to broader stratification. Since STEM fields are often among the most difficult majors with the highest failure rates, these processes may be especially pronounced in these fields, and poor performance and less experience may be especially detrimental in these fields.

In this study, I will focus on social class differences in labor force entry. First, I will focus on STEM majors and explore whether SES affects one's likelihood of entering the STEM labor force soon after college, as well as, whether SES affects one's level of success upon entry into the STEM labor force. I will also explore whether there are social class differences in the likelihood of entering the STEM labor force among non-STEM degree holders. It is possible that more disadvantaged students may be more likely to take unconventional pathways into the STEM labor force and may accumulate STEM knowledge and skills without obtaining a STEM degree. Possible mechanisms include college grades, course work, academic integration, STEM-related employment, and non-traditional pathways through college. Addtionally, I will also look at race-ethnic and gender differences in these SES effects on labor force entry.

Data

NLSY 97

To explore possible SES differences in STEM labor force entry, I will use the National Longitudinal Survey of Youth (NLSY). NLSY is a nationally representative sample of 8,984 individuals between the ages of 12 and 18, born between 1980 and 1984, with an oversample of Hispanic or Latino and black youth. Follow ups have been administered roughly every year with a total of 13 rounds of data. The 13th round was administered in 2009-2010 when respondents were approximately 24-30 years old. This data set is especially well suited to look at young adult labor market outcomes because it provides detailed employment information soon after most individuals graduate from college.

Measures

Dependent Measure

My dependent variable will be STEM labor force entry. This will be a dichotomous measure of whether the respondent's job the first wave after college completion is a STEM occupation. Occupation is coded using U.S. census occupation codes. I use conventional classifications of STEM occupations, and also explore possible differences by physical sciences and engineering versus biological sciences.

Independent Measures

SES

My primary independent variable will be SES. NLSY provides parent education and family structure. Parent occupation will be coded as high school completion versus less than high school degree, some college, and college degree or higher. Family structure will be both biological parents versus stepfamily, single mother, single father, or other.

Academic Measures

To explore possible mechanisms between SES and STEM labor force entry, I will also consider several academic measures. I will include measures of high school GPA, test scores, college GPA, and academic-related employment during college.

Other Demographic Variables

I will also control on race-ethnicity and gender and explore possible interactions with SES. Race-ethnicity will be measured as black, Hispanic, Asian or Pacific Islander, or Other versus white as the reference group, and gender will be measured as female versus male as the reference.

Analytic Plan

First, I will use logistic regression to see possible SES differences in the likelihood of entering the STEM labor force among STEM degree earners. I will then look at college GPA, coursework, and STEM-related work experience as possible mechanisms. I will consider race-ethnicity, gender, and non-traditional pathways, including delayed entry into college, two-year college attendance. I will also look at degree-job matching among all degree earners to see if the effect of SES on degree-job match differs by field.

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