Enduring Effects of Education

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ABSTRACT

Social scientists have found strong and persistent causal effects of education on various outcomes over the life course, even after using various methods to control for pre-existing selection into educational treatments. Research suggests that educational attainment is an important causal factor in determining labor market outcomes, social status, physical and mental health, marriage and fertility, civic participation, and social attitudes. As education plays a central role in the causal processes of so many outcomes of interest, understanding the effects of education is a primary concern to social scientists. The effects of education are complex and vary across demographic groups, appearing greatest for marginal students. Furthermore, after controlling for individual educational attainment, aggregate levels of education can affect economic and non-economic outcomes at both the aggregate and individual level. Building on the literature on the effects of education, we suggest promising areas for future research, including: assessing effect heterogeneity across individual and contextual characteristics; rigorously identifying and testing causal pathways and mechanisms that link education to associated outcomes; and attending to equilibrium effects, where aggregate levels of education may influence the relationship between individual education and a variety of individual outcomes.

INTRODUCTION

Education is a fundamental explanatory variable in contemporary sociology, occupying a pivotal role in the causal processes that determine important social phenomena. Early work in this area was mainly concerned with education's effect on social status and labor market outcomes (Becker, 1962; Blau & Duncan, 1967; Mincer, 1958). While much of that research continues today, scholars have also investigated how educational attainment impacts non-economic outcomes such as health, family, social participation, and attitudes. These effects remain significant after applying various methods to control for selection bias. More recently, social scientists have worked to disaggregate average effects of individual educational attainment on individual outcomes by investigating effect heterogeneity using new methodologies. Another trend in research on education has attended to the estimation of causal effects of aggregate levels of education on both group outcomes, such as economic growth, and individual outcomes, such as wages. In the following, we outline foundational research on the enduring effects of education, followed by a review of innovative current research, and conclude with directions for future work. Most of our discussion focuses on the U.S. context.

FOUNDATIONAL RESEARCH

Over the last century, the effects of educational attainment in the U.S. have not only endured, but also grown in strength. The association between education and labor market outcomes has increased since the early 1970s, with the gap in average earnings between high school and college graduates doubling over the past 40 years (Fischer & Hout, 2006; Goldin & Katz, 2009). Education's effects on non-economic outcomes have also increased. Rising rates of

educational homogamy suggest that education plays an increasing role in family formation (Schwartz & Mare, 2005). Widening educational disparities in mortality and morbidity also suggest increasing health effects of educational attainment (Meara, Richards, & Cutler, 2008). Taken together, these trends suggest the substantial, and rising, effects of educational attainment on a range of outcomes throughout the life course.

Economic Effects

An extensive body of literature has shown that education has strong and persistent economic effects over the life course. The most studied effects of education deal with individual economic outcomes, such as earnings, employment, and occupation. Economists and sociologists have found strong positive effects of education on earnings (see Card, 1999; and Hout, 2012 for reviews). Questioning whether the effect of education on earnings is indeed causal, i.e., whether attributes such as mental ability and work habits bias the observed association between higher education and higher earnings, some scholars have turned to instrumental variable regressions. Angrist and Krueger (1991; 1992), however, found larger, rather than smaller, effects of education using instrumental variable methods relative to OLS estimates, potentially indicating effect heterogeneity.

Research on the effects of education has also investigated the link between education and employment. The employment patterns of college graduates indicate greater stability than those of non-college graduates, especially in economic recessions (Farber, 2003). The likelihood and consequences of experiencing job displacement also vary by education. After experiencing a job displacement, workers with less education have higher rates of unemployment and work fewer

hours than more educated workers, though education's protective effect against job loss has weakened in the most recent recessions (Farber, 2003).

The status attainment tradition illustrated that education has direct, indirect, short-, and long-term positive influences on occupational status. Blau and Duncan (1967) quantified education's effect on occupational status after controlling for socioeconomic background, finding that education increased the occupational status of men's jobs. The Wisconsin model of status attainment (Sewell, Haller, & Portes, 1969) expanded status attainment research by including social psychological mechanisms that mediated the relationships between socioeconomic background, education, and socioeconomic outcomes. Their findings confirmed the strong direct effect of educational attainment on later occupational status.

Non-Economic Effects

While many view education primarily as a pathway toward labor market success, there is also a large literature on how educational attainment affects non-economic outcomes. In fact, the original goals of mass education had little to do with individual economic returns, and were instead concerned with the philosophical, moral, and civic benefits education was thought to impart (Kohlberg, 1966). In the following, we review foundational research on how education affects a few of these life outcomes, including marriage and fertility, physical and mental health, social participation, and attitudes.

Education affects marriage and divorce rates, choices of marital partners, and fertility. College graduates are on average more likely to get married and stay married than others, and they are more likely to have and raise their children in marriage (Musick, Brand, & Davis, 2012). Moreover, educational homogamy—where similarly-educated people marry one another—has

increased since the 1960s (Mare, 1991), and this patterning results in fewer divorces (Schwartz, 2010). There is also a well-documented negative association between education and fertility, with educated women more likely to delay their first birth and have fewer children overall (Rindfuss, Morgan, & Offutt, 1996). This discrepancy may emerge because of differences in unplanned births instead of differences in opportunity costs or child-bearing desires (Musick, England, Edgington, & Kangas, 2009).

Education is also positively associated with health (Kitagawa, 1973). Even after controlling for income and employment, education reduces mortality and has been increasing in importance since the 1960s. Education affects health through its association with work and economic conditions (employment, income, work fulfillment), social-psychological resources (sense of control, social support), and health lifestyle (smoking, exercise, preventative care) (see Ross & Wu, 1995 for a review). The most critical role that education plays in decreasing mortality may be its effect on delaying the onset of illness. Following the onset of disease, education mainly works through income to slow its progression (Herd, Goesling, & House, 2007). Education also protects against stress and depression by providing people with a sense of control over their lives, by teaching skills that prove valuable, such as how to seek out and synthesize information, and by improving their work experiences (Chevalier & Feinstein, 2006). Nonetheless, the causal direction between education and health is often unclear, as those predisposed to better health may obtain more education. Education may also have conflicting effects on health since it might correlate with both negative (e.g., high-stress occupations) and positive (e.g., income) factors. While the literature generally suggests that educational attainment improves individual physical and mental health, the complexity of this relationship require further study.

Education also increases civic participation, including voting and participating in voluntary organizations, even after adjustments are made for factors influencing selection into higher education (Milligan, Moretti, & Oreopoulos, 2004; Nie, 1996; Putnam, 2001). Several mechanisms may account for this association. First, education may provide individuals with resources that facilitate civic participation, such as cognitive ability, knowledge, and privileged social positions. Second, educational institutions may socialize students to adopt civic norms and responsibilities (see Brand, 2010 for a review). Third, civic groups may purposefully recruit educated members to increase the efficacy of their efforts (Hauser, 2000). Finally, education might increase civic participation indirectly through income and occupational status.

Finally, education is positively associated with liberal social attitudes, such as support for civil liberties (Hyman, 1979), political tolerance (Bobo & Licari, 1989), and tolerance of minorities (Phelan, Link, Stueve, & Moore, 1995). There are three dominant explanations for the observed correlation between liberal social attitudes and education: development, where education enhances cognitive growth, leading to pro-social attitudes; socialization, where schools socialize students into the "official institutional culture"; and ideological refinement, where liberalism is confined to issues that serve the educated group's self-interest. While education was associated with conservative economic views, suggesting evidence for the socialization hypothesis, many of the mechanisms linking education and political attitudes remain unidentified (Phelan et al., 1995).

Horizontal Differentiation

Although most research on the effects of education has focused on vertical stratification, or the amount of education one obtains, there is also a growing literature investigating horizontal

educational stratification, or differences in institutional quality, institutional type (e.g., 2-year college vs. 4-year college), or field of study.

There is conflicting evidence regarding the effects of college quality. Although early research on the topic concluded that attending an elite college yielded an increased economic return, recent research has found few effects of elite colleges on career outcomes, but positive effects on the probability of completing college and obtaining an advanced degree (Brand & Halaby, 2006; Dale & Krueger, 2002). There is more consensus on the effects of attending 2-year colleges, with those beginning at community colleges earning fewer bachelor's degrees and less income net of background and aspirations (Dougherty, 1994). While students on average fare better at 4-year universities, community colleges increased overall educational attainment by widening access to higher education (Rouse, 1995). The estimated effect of community college attendance depends crucially on the assumed counterfactual state – whether community college students are compared to those who do not attend college or those who attend four-year colleges (Brand, Pfeffer, & Goldrick-Rab, 2012). Finally, college major has also been shown to affect economic outcomes. Students majoring in business, math/engineering, and the natural sciences see greater returns to education after controlling for student background. Differential effects by field of study may also help to explain some of the differential returns to education by different sociodemographic groups (Gerber & Cheung, 2008).

Differential Effects by Demographic Characteristics

Research has also demonstrated differences in effects of college by individual characteristics such as race and gender. In the 1960s, black men received lower returns to education than white men. However, after controlling for work experience and cognitive ability,

blacks and Hispanics experienced higher returns to education than whites in recent decades (Card, 1999), suggesting that minorities are penalized more than whites for being uneducated (Averett & Dalessandro, 2001). There is also a significant interaction between gender and education on wages (review in Gerber & Cheung, 2008), such that women receive lower returns to their educational investment. Much of the wage differential is mediated through occupational and educational segregation. Women are overrepresented in academic majors that produce low returns and in lower-paying occupations. After adjusting for field specialization, large residual effects of both race and gender remain, suggesting labor market discrimination.

NEW RESEARCH

Education is a central research topic across the social and behavioral sciences, and much innovative work is being conducted. In this paper, we identify two themes in current research that suggest promising directions for the future of the field. First, work investigating heterogeneous effects of education has benefited from recent methodological innovation and access to high quality longitudinal data. This research has disaggregated average effects, lending insight into both effect heterogeneity and selection processes. Second, we highlight how aggregate trends in education affect both economic and non-economic outcomes net of individual education.

Heterogeneous Effects

There are two types of selection bias using observational data of the effects of education (Brand & Xie, 2010). The first type is due to heterogeneity in preexisting conditions, or attributes that are associated with both education and its various outcomes, which we have discussed above

as a possible explanation for the observed associations between education and each outcome. The second type of selection bias is due to heterogeneity in education effects, or systematic differences between individuals who do and do not attain a college education in the causal effect of education on various outcomes. Brand and Xie (2010)use a new approach to examine college effect heterogeneity, in which they estimate effects of college by propensity score (i.e., probability of college completion based on observed covariates) strata and evaluate the trend in effects in a multilevel model. Using this approach, they found that the return to college completion is greatest for those least likely to obtain it, a pattern they term "negative selection." This stands in contrast to some previous work based on rational choice theory which claimed that students who benefit most from college were most likely to attend (Willis & Rosen, 1979), and some recent work using instrumental variables likewise suggesting positive selection (Carneiro, Heckman, & Vytlacil, 2011). The pattern of negative selection is, however, consistent with work suggesting that students from disadvantaged racial groups experience greater returns to college and with work using instrumental variables suggesting greater returns to students on the margin of school continuation (Card, 2001).

Extensions of this work have found negative selection to be a somewhat general pattern, with college affecting a range of individual outcomes most strongly for those least likely to receive a college education. For example, the effects of college on fertility and civic participation were greatest for those who were least likely to attend (Brand, 2010; Brand & Davis, 2011). Recent research has also disaggregated effects of education by decomposing outcomes. For example, Miech et al. (2011) found that the effect of education on mortality is dynamic, increasing in importance for some causes of death and decreasing for others over time.

Effects of Aggregate Education

Another trend in educational research investigates how aggregate levels of education affect both individual and aggregate outcomes. For example, increasing the average educational attainment in a country by one year increased the average output of workers by 5 to 15 percent (Topel, 1999). Individuals living in neighborhoods with high levels of education also have better health net of individual education because those areas have better infrastructure (e.g., clinics, parks, grocery stores), cause less stress, provide social support, and have prevailing attitudes that encourage healthy behavior (Pickett & Pearl, 2001). These "societal returns" to education are also heterogeneous; although all individuals benefit from educated societies, the less-educated benefit most from rising average levels of education (Moretti, 2004).

KEY ISSUES FOR FUTURE RESEARCH

The new lines of research we highlight above elaborate on the traditional understanding of education's effects by either disaggregating average individual effects of education or looking at how group-level education affects a variety of outcomes. Building from this work, we identify three broad issues that future work should address. First, scholars should continue to disaggregate effects of education by individual and contextual characteristics. Second, scholars should systematically identify causal mechanisms that link education to the outcomes discussed above, rigorously attending to the causal processes underlying each of the proposed mechanisms. Finally, research should attend to distributional, or equilibrium, effects, where aggregate levels of education may affect the relationship between individual education and outcomes.

Disaggregating Average Effects

Future research should continue to disaggregate effects of education in several ways. First, it should continue to investigate patterns of effect heterogeneity by individual characteristics. Second, it should specify variation in effects by contextual conditions. Third, researchers should continue investigating effects of qualitative differences in education, such as field of study and institutional quality.

Future work in effect heterogeneity could expand to investigate a range of both treatments and outcomes. For example, researchers might use propensity score methods to investigate heterogeneous returns to secondary or graduate school, or to different fields of study. They might also examine the heterogeneous effects of education on outcomes like health or pro-social attitudes. Researchers should also report how different methodological strategies affect estimates of the effects of education. For example, while early models of heterogeneous effects assumed a linear form, recent innovations allow those assumptions to be relaxed (Xie, Brand, & Jann, 2012). There are also different methods of matching or stratifying the sample following propensity score estimation. The consequences of these decisions on estimates of treatment effects should be fully explored as these methods mature, and compared to heterogeneous effect estimates obtained using instrumental variables.

Another way to disaggregate effects of education is to assess how effects differ across time, place, and other contexts. Average effects of education should also be disaggregated across economic contexts (i.e., recessions vs. expansions). College graduates who graduate during economic contractions earn significantly lower wages for many years compared to college graduates who graduate during expansions (Kahn, 2010), but little is known about how the effects of education vary across economic conditions. While new college graduates were underemployed during the Great Recession, the worst effects were felt by the least educated

segments of the population (Hout, Levanon, & Burak, 2011). However, these analyses have not adequately controlled for selection; establishing rigorous estimates of how causal effects of education change with the macroeconomic context is important to establishing how structural factors interact with individual education. Comparative work may also allow researchers to consider how inequality and the welfare system impact who benefits most from education.

Future research should also disaggregate average effects of education by continuing to research horizontal differentiation in education. Though this area of research is not new, there is relatively less consensus on the effects of qualitative differences in education, particularly with regard to college quality. However, as educational attainment rises, one way that social inequalities might persist is through horizontal differentiation, such as school quality or field of study. Research should also continue to explore the non-economic effects of college quality, and how these effects vary across the population of elite college goers. Research on horizontal differences in education should also continue to investigate trends in how different fields of study are rewarded in the labor market and on non-economic axes, such as health. For example, while labor market discrepancies by college major are well documented, it is unclear if similar effects exist for non-economic outcomes. This research should also attend to how these effects differ by gender, race, and other subgroups of the population.

Identifying Causal Mechanisms

A second avenue for future research is to continue identifying mechanisms that link education to the outcomes discussed above. While many of the mechanisms for labor market outcomes have been studied, the mechanisms for non-economic outcomes are less clear. However, some recent examples of identifying causal mechanisms could guide future work in

this area. For example, the protective effect of education on divorce is primarily mediated through labor market experiences, suggesting cultural factors do not primarily facilitate the relationship between education and divorce (Harknett & Kuperberg, 2011). A subject that might benefit from this type of inquiry is the association between education and health. While education is negatively correlated with dementia and Alzheimer's, mechanisms explaining this relationship remain underdeveloped. Education may affect resistance to Alzheimer's by positively impacting brain functioning throughout the life course, or by impacting social factors, such as exposure to unhealthy working conditions, access to quality healthcare, having stable family lives, or participating actively in social life.

Researchers should also explore the mechanisms that explain effect heterogeneity. For example, it remains unclear why the pattern of negative selection exists in its current form for economic outcomes. It could be that advantaged individuals who do not persist in formal schooling have access to social networks that facilitate labor market success. Alternatively, low propensity college goers may be more economically motivated than students from wealthy backgrounds.

Methodologists have long warned that conditioning on an intermediate variable that has been affected by the treatment can lead to endogenous selection bias. While we believe future work should attend to the mechanisms linking education to a variety of outcomes, we caution that the effects of mediators on later outcomes, often estimated by simply including such variables in expanded regression models, seldom warrant causal interpretations and can lead to erroneous conclusions regarding both the intermediary and main effects. Rather, each potential mechanism's effect on the outcome of interest requires focused attention to that causal process.

Distributional Effects

Finally, social scientists should augment the research on individual effects of education by taking into account distributional effects, where effects of education on individuals depend upon the population. Individuals are not atomized. As a greater proportion of the population attain higher levels of college, for example, certain benefits of education might decline or rise for any given individual. For example, one way that education improves health is through neighborhood context. Educated people tend to live in areas that facilitate better health (e.g., through easy access to healthy foods). If neighborhood levels of educational attainment increase, less-educated people in these neighborhoods still reap the benefits of education on health simply by living in educated neighborhoods. Therefore, the individual effects of education on health may decrease because the positive effects of higher aggregate education accrue to the less educated. Conversely, if rising overall levels of education cause increased residential segregation by education, the measured effect of education may increase because less-educated individuals may be increasingly isolated in neighborhoods that cause worse health. Considering how the distribution of educational attainment across families may inhibit or exacerbate its effects is a complex, yet important, avenue of future research.

CONCLUSION

Research on the effects of education is a strong and vibrant area of study. Education is an invaluable explanatory variable for social scientists because it contributes to a diverse range of important outcomes. The weight of empirical evidence suggests that educational effects are more than just artifacts of selection; education is a causal factor in many economic (e.g., employment, income, occupational status) and non-economic (e.g., marriage, fertility, health, civic

engagement) outcomes. Furthermore, education's causal effects persist throughout the life course and have generally grown over time, although broad generalizations may oversimplify some variability. Recent work implements sophisticated methodology to better estimate causal effects and to parse out effect heterogeneity. However, many of the patterns of heterogeneous effects of education, variability in effects by contextual conditions, and mechanisms that explain these effects remain elusive, providing challenging yet rewarding areas for future research. Researchers in this area should also investigate how the changing level and distribution of education affects both collective and individual returns to education. Education has been a central concern for social scientists because it affects a wide range of outcomes over the life course. As new research continues to identify important effects of education, building on this tradition is imperative to a bettering understanding of the social world.

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