CHAPTER

9

Education and crime

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Introduction

There is a strong connection between education and crime. In the US, 75% of state and 59% of federal prison inmates in 1997 did not have a high school diploma (Harlow, 2003). Similar patterns have been documented in other periods and in countries around the world (Buonanno & Leonida, 2009; Machin, Marie, and Vujic 2011; Hjalmarsson, Holmlund, and Lindquist, 2015).

This article begins with a brief discussion of the relationship between education and crime from an economic perspective. It then surveys recent evidence on the impacts of educational attainment and school quality on adult crime, including analyses of the contemporaneous effects of school attendance on crime. Studies on the effects of juvenile arrest and incarceration on schooling behavior are also discussed. Finally, this article concludes with a number of policy lessons related to education and its potential role as a crime-fighting strategy.

The economics of education and crime

Why does education reduce crime, and which types of crime are likely to be most sensitive to education policies? An economic perspective provides several useful insights on these questions.

Lochner (2004) emphasizes the role of education as a human capital investment that increases future legitimate work opportunities, which discourages participation in crime. This is consistent with numerous studies documenting that higher wages reduce crime (e.g. Gould, Mustard, & Weinberg, 2002; Grogger, 1998; Machin & Meghir, 2004) and decades of research in labor economics showing that education increases wage rates (see, e.g., Heckman, Lochner, & Todd, 2006, chap. 12). If human capital raises the marginal returns from work more than crime, then human capital investment and schooling should reduce crime. Thus, policies that increase schooling (or the efficiency of schooling) should reduce most types of street crime among adults; however, certain types of white collar crime (e.g. embezzlement, fraud) may increase with education if they sufficiently reward skills learned in school.

Education may also teach individuals to be more patient (Becker & Mulligan, 1997). This would discourage crime, since forward-looking individuals place greater weight on any expected future punishment associated with their criminal activities. To the extent that time preferences are affected by schooling, crimes

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associated with long prison sentences (or other long-term consequences) should be most affected. Education may also affect preferences toward risk. If schooling makes individuals more risk averse, it should discourage crime with its greatest effects on offenses that entail considerable uncertainty in returns or punishment. Finally, schooling may affect who individuals interact with on a daily basis at home, school, work, or their neighborhoods. Due to assortative mating (Becker, 1991), more educated men tend to marry more educated women. This can affect family resources, fertility behavior, and family stability, which can all impact decisions to engage in crime. More generally, if more educated people interact more with other educated people who are less inclined to engage in crime, this is likely to compound any reductions in crime associated with schooling. In most cases, mechanisms related to changes in preferences or social interactions suggest that educational attainment is likely to reduce most types of crime among adults.

Evidence on education, school quality, and crime

There is growing evidence from around the world on the effects of educational attainment on subsequent criminal outcomes. A similar picture - that more education leads to less crime - emerges from most of these studies. A few studies also examine the effects of school choice and quality on criminal behavior; however, there is less consensus here. Finally, several recent papers analyze the contemporaneous relationship between school attendance and crime. These studies reveal a complex relationship that depends critically on context. This section briefly summarizes the current state of evidence on these issues. Lochner (2010, chap. 10, 2011, chap. 2) and Hjalmarsson and Lochner (2012) provide more comprehensive surveys.

Effects of educational attainment on crime

Early studies of the relationship between education and crime focused on their correlation conditional on measured individual and family characteristics using standard regression methods (Ehrlich, 1975, chap. 12; Witte, 1997, chap. 7). These studies must be interpreted with caution, since a negative cross-sectional correlation between education and crime, even after controlling for measured family background and neighborhood characteristics, does not necessarily imply that education reduces crime. First, unobserved individual characteristics like patience or risk aversion are likely to directly affect both schooling and criminal decisions. Individuals who choose more schooling (even after conditioning on observable characteristics) might also choose less crime regardless of their education level, in which case regression-based estimates do not identify a causal effect. Second, using variation in crime and education across states or local communities may also produce biased estimates. Governments may face a choice between funding police or good public schools, producing a spurious positive correlation between education and crime. Alternatively, unobserved characteristics about communities may directly affect the costs or benefits of both education and crime. Third, reverse causality is another important concern. Individuals who plan to heavily engage in crime (e.g. because they are particularly good at it, enjoy it, or live in areas with plenty of illicit opportunities) are likely to choose to leave school at a young age (Lochner, 2004). Arrests or incarceration associated with juvenile crime may also cause some youth to drop out of school early (Aizer & Doyle, 2015; Hjalmarsson, 2008).

Recent empirical studies generally estimate the effects of educational attainment on arrest, conviction, or incarceration rates. To address concerns with endogeneity and unobserved heterogeneity, researchers have typically exploited exogenous changes in state or national rules

that affect schooling decisions, examining the effects of these policies on subsequent crime. This ensures that estimates reflect causal effects of education on crime and not simply spurious correlations.

Lochner and Moretti (2004) examine state-level male arrest rates by criminal offense and age from the FBI's Uniform Crime Reports (UCRs) for the US in 1960, 1970, 1980, and 1990. These data is linked to 1960-90 decennial US Census data on educational attainment and race. The main methodological contribution of Lochner and Moretti (2004) is the use of changes in state-specific compulsory schooling laws over time as instrumental variables for schooling. Intuitively, this strategy measures the extent to which an increase in a state's compulsory schooling age leads to an immediate increase in educational attainment and reductions in subsequent crime rates for affected cohorts. Because the laws only affect schooling at low levels (mainly grades 8−12), their instrumental variable (IV) estimates reflect the impact of an additional year of high school on crime.

Lochner and Moretti (2004) find that, for men, a one-year increase in average education levels in a state reduces state-level arrest rates by 11% or more. These estimated effects are very similar to the predicted effects derived from multiplying the estimated increase in wages associated with an additional year of school by the estimated effects of higher wage rates on crime (from Gould et al. 2002), which suggests that much of the effect of schooling on male crime may come through increased wage rates and opportunity costs. Given the strong relationship between high school completion and incarceration, Lochner and Moretti (2004) also estimate specifications using the high school completion rate as a measure of schooling. These estimates suggest that a ten percentage point increase in high school graduation rates would reduce arrest rates by 7−9%.

Lochner and Moretti (2004) also use ordinary least squares (OLSs) to estimate separate effects of education for different types of crime. These results suggest similar effects across the broad categories of violent (murder, rape, robbery, and assault) and property (burglary, larceny, motor vehicle theft, and arson) crime - a one year increase in average years of schooling reduces both property and violent crime by about 11−12%. However, the effects vary considerably within these categories. A one-year increase in average years of schooling reduces murder and assault by almost 30%, motor vehicle theft by 20%, arson by 13%, and burglary and larceny by about 6%. Estimated effects on robbery are negligible, while those for rape are significantly positive. Additional specifications suggest similar effects for a 10−20% point increase in high school graduation rates. Following a similar approach, Lochner (2004) estimates positive, though statistically insignificant, effects of schooling on arrest rates for white collar crimes (forgery and counterfeiting, fraud, and embezzlement).

Lochner and Moretti (2004) also use individual-level data on incarceration and schooling from the 1960, 1970, and 1980 U.S. Censuses to estimate the effects of educational attainment on the probability of imprisonment separately for black and white men (ages 20−60). Their estimates control for age of the respondent, state of birth, state of residence, cohort of birth, and state-specific year effects. Analogous to their analysis of state-level arrest rates, they use state-level changes in compulsory schooling ages as an instrument for educational attainment. That is, identification comes from the fact that in any given state and year, different age cohorts faced different compulsory schooling laws during their high school years, causing them to acquire different levels of schooling and to commit crime at different rates. Both OLS and IV estimates are very similar and suggest that, on average, an extra year of education reduces the probability of imprisonment by slightly more than 0.1% point for whites and by about 0.4% points for blacks. Given average

incarceration rates for dropouts, this translates into a 10–15% reduction in incarceration rates for both white and black males associated with an extra year of completed schooling. These estimated effects are comparable to those for arrest rates described earlier. OLS results suggest that completion of the 12th grade causes the greatest drop in incarceration, while there is little effect of schooling beyond high school.

Machin, Marie, and Vujić (2011) exploit a 1972–73 increase in the minimum schooling age (from age 15 to 16) in England and Wales to estimate the effects of schooling on criminal convictions for property and violent crimes over the period 1972–96. Using both IV and regression discontinuity methods, identification effectively comes from cohort-level changes in schooling attainment and crime for cohorts turning 15 immediately before and after the law change. Among men, they estimate that a one-year increase in average schooling levels reduces conviction rates for property crime by 20–30% and violent crime by roughly one-third to one-half as much, although the latter estimates are statistically insignificant. Compared to estimates for the US by Lochner and Moretti (2004), the impacts of education on property crime appear to be greater in the United Kingdom, while the effects on violent crime are weaker.

Hjalmarsson, Holmlund, and Lindquist (2015) use administrative micro-data and Swedish schooling reforms to identify the causal effect of education on crime. The Swedish reforms primarily extended compulsory schooling from seven to nine years and were implemented at different times across municipalities during the 1950s and 1960s. As such, Hjalmarsson, et al. (2015) compare individuals who were exposed to two different school systems, but who were from the same birth cohort and worked in the same labor market. Exposure to the reforms significantly increased average educational attainment by 0.33 years for males and 0.20 years for females. Estimated effects on female crime are imprecize; however, estimates for males suggest that one additional year of schooling reduces the likelihood of criminal conviction by 7% and the likelihood of incarceration by 16%. Looking across offense categories, an additional year of schooling decreases the likelihood of a property crime conviction by 14%, a violent crime conviction by 10%, and a conviction of other types of crime by 6% - similar in magnitude to estimates for the US (Lochner & Moretti, 2004).

Meghir, Palme, and Schnabel (2014) show that the Swedish schooling reform also affected the criminal activity of the next generation. Their estimates suggest that the reform led to a 0.8% point reduction in criminal conviction rates (about one-third of baseline rates) among the sons of fathers exposed to the schooling reform. Impacts were mostly concentrated among violent crime, serious traffic crimes, and fraud (including tax evasion). By contrast, they find no effect of the reform on conviction rates among the sons of women exposed to the reform, despite similar effects on their schooling.

Buonanno and Leonida (2009) estimate the effects of educational attainment on crime rates using a panel of 20 Italian regions 1980 to 1995. Using OLS, they control for region and time fixed effects, along with region-specific quadratic time trends, and a rich set of time-varying region-specific covariates. Their estimates suggest that a ten percentage point increase in high school graduation rates would reduce property crime rates by 4% and total crime rates by about 3%. (Effects on property crime are statistically significant, while effects on total crime are not.) They find no evidence to suggest that university completion reduces crime.

A final study examines the effects of an explicit education subsidy on youth burglary rates in England. Between 1999 and 2002, England piloted Educational Maintenance Allowances (EMAs), which provided subsidies of up to £40 per week (plus bonuses for completion

of course-work) for low-income 16–18 year old youth to attend school. The program was administered in 15 local areas with low schooling participation rates. During the same time period, the Reducing Burglary Initiative (RBI) funded 63 different local burglary reduction schemes as a separate pilot project. Roughly half of all EMA pilot areas were also selected for the RBI. Sabates and Feinstein (2008) use a differences-in-differences strategy to identify the effects of each pilot program as well as the combination of the two on burglary. Their findings suggest that the combination of both the EMA and RBI significantly reduced burglary rates by about 5.5% relative to 'matched' comparison areas. Effects of the EMA alone were slightly lower but still significant.

Effects of education on female crime

Much of the literature has focused on males given their much higher crime rates. Cano-Urbina and Lochner (2019) provide some of the first evidence that educational attainment can reduce female crime. Using a similar IV approach (and data) to that of Lochner and Moretti (2004), they show that an additional year of schooling reduces the probability of incarceration by 0.05–0.09 percentage points among white American women (from 1960 to 1980), while a one-year increase in average schooling levels reduces female arrest rates for both violent and property crime by more than 50% (from 1960 to 1990). There is little impact of additional schooling on white collar crime.

Analogous IV estimates of the impact of an additional year of schooling on the probability of incarceration are about four times higher for men than women, while baseline incarceration rates are roughly 20 times higher for low-educated men versus women. Thus, the impact of education on imprisonment is much stronger for women in percentage terms. This is also true for arrests.

As discussed above, most of the effect of education on crime among men can be explained by increases in wages and greater labor market participation. Cano-Urbina and Lochner (2019) show that this is unlikely to be the case for women (at least for 1960–80), since they estimate little effect of schooling on female labor supply behavior. Instead, education appears to improve the marital prospects of women. The accompanying increases in marriage likely reduce crime by strengthening family bonds, while increases in spousal education and family resources may limit the incentives for women to turn to crime in order to support their families. Still, education reduces female incarceration even when conditioning on marital status, so other channels are also important. Cano-Urbina and Lochner (2019) estimate that increased schooling also causes women to have more children, which may discourage crime by raising the personal costs of time in prison and strengthening family/social bonds. Of course, the channels through which education impacts female crime may have changed in more recent decades as women have increasingly entered the labor market, reduced their time at home, and raised fewer children.

Effects of school choice and quality on crime

A few studies suggest that improvements in school quality may lead to reductions in criminal activity during early adulthood. Using randomized school admission lotteries, Cullen, Jacob, and Levitt (2006) and Deming (2011) find that students who 'win' the opportunity to attend better-performing public schools do not necessarily perform better academically, but they commit significantly less crime during school and the first few years after leaving school. Weiner, Lutz, and Ludwig (2009) show that desegregation initiatives in some US states led to substantial improvements in school quality

for blacks. Among blacks experiencing desegregation, high school graduation rates increased by a few percentage points and homicide arrest rates declined by one-third at ages 15–19.

By contrast, the analysis of Cano-Urbina and Lochner (2019) offers mixed evidence regarding the effects of school quality (as measured by pupil-teacher ratios, term length, and teacher wage rates) on female crime. In particular, estimated direct effects of school quality improvements (holding educational attainment fixed) are inconsistent across measures of both quality and crime. Because school quality improvements lead to increases in educational attainment and the estimated effects of schooling attainment on crime are strong, the indirect effects of quality improvements (on both arrests and incarceration) through increased schooling are positive, though modest, for all observed quality measures.

Contemporaneous schooling and crime

There are three main ways in which altering youths' schooling attendance is likely to affect their contemporaneous engagement in crime. First, school may have an incapacitation effect - youth cannot be in two places at once, and many criminal opportunities are more limited in school than on the streets. This effect depends, in part, on the ease with which youth can engage in crime during non-school hours. Second, longer periods of school attendance should increase labor market skills and improve future employment prospects as emphasized above. This should make juvenile arrests and long periods of detention more costly, reducing incentives to engage in crime while enrolled in school. Third, schools bring hundreds of adolescents together for the day. The social interactions from this could lead to altercations and more general group-based delinquency. The incapacitation and human capital effects are likely to imply negative effects of school attendance on crime, while the social interaction effect could be positive or negative.

A few studies shed light on these effects by estimating the impacts of different 'interventions' that directly affect youth schooling attendance. Anderson (2014) and Brilli and Tonello (2018) examine the effect of increasing compulsory schooling ages (i.e. forcing some youth to stay in school), while Jacob and Lefgren (2003) and Luallen (2006) study the effect of extra days off from school due to teacher in-service days or teacher strikes (i.e. keeping all youth out of school). These interventions differ in two important respects. First, increases in compulsory schooling ages typically 'require' that students stay in school at least one additional year and sometimes more, whereas teacher in-service days and strikes are of very short duration. Second, while teacher strikes and in-service days release all students from school, changes in compulsory schooling laws typically affect a small set of marginal students. All three potential effects of school attendance on crime are likely to be relevant to changes in compulsory schooling, while the effects of in-service days and teacher strikes are likely to be limited to incapacitation and social interactions. Social interaction effects are likely to be magnified in the latter cases due to the universal nature of the 'policies'.

Anderson (2014) estimates that increases in US state compulsory schooling ages from 16 to 18 significantly reduce arrests at the affected ages by about 17%, with similar impacts on both violent and property crime. (Effects are similar, though statistically insignificant, for drug crimes.) Using Italian administrative data on offending rates by age, year, and province, Brilli and Tonello (2018) study the effects of increasing the minimum schooling age from 14 to 15 years in 1999. While school enrollment increased by about 4% points at ages 14–17, offending rates declined by about 2 incidents per 1000 youth at age 14 only. They estimate no evidence of displacement to other times of

the day/year when school was not in session; however, there did appear to be an increase in the probability violent crime victimization while at school. These results suggest a combination of general incapacitation effects (reducing crime outside of school) and social interaction effects leading to additional violent crime during school.

Additional support for conflicting incapacitation and interaction effects of school attendance is provided by Jacob and Lefgren (2003) and Luallen (2006), who estimate mixed effects of extra days off from school on crime due to teacher in-service days or strikes. Their estimates suggest that in urban areas an additional day of school reduces juvenile property crime by 15–30%; however, it increases violent crime by roughly 30%. Furthermore, Luallen (2006) finds that the impacts of an extra school day are insignificant in rural and suburban areas, suggesting that the incapacitation and social interaction effects of school attendance are particularly strong in urban areas and negligible (or offsetting) elsewhere.

Brief comment on measures of criminality

One potential concern with most of these studies is their reliance on arrest, conviction, and incarceration as measures of crime. It is possible that education improves the chances that someone evades arrest or conviction or that judges tend to give more educated defendants lighter prison sentences. While there is little direct evidence on these issues, Mustard (2001) finds negligible effects of defendant education levels on the sentence lengths they receive. Furthermore, results using self-reported measures of criminal activity in the National Longitudinal Survey of Youth support the case that education reduces actual violent and property crime, not just the probability of arrest or incarceration conditional on crime (Lochner, 2004; Lochner & Moretti, 2004).

The effects of arrest and incarceration on education

Two studies reach similar conclusions about the effects of youth arrest and incarceration on educational outcomes.

Studying the US, Hjalmarsson (2008) estimates the effects of juvenile incarceration on high school completion controlling for youth cognitive achievement, criminal and arrest records, and family background. She also considers specifications that account for state or family fixed effects to account for differences in state-level juvenile enforcement and education policies as well as differences in family (and, therefore, neighborhood) environments. Her regression-based estimates suggest that youth who become incarcerated, holding their juvenile criminal activity and arrest rates constant, are roughly 25 percentage points less likely to complete high school. Incarceration has its greatest effects on high school graduation when the sentence overlaps with the school year; however, the length of the sentence does not affect the graduation probability. Finally, she finds that incarceration has substantially larger effects on high school completion in states that require the justice system to notify schools of an arrest, suggesting that teachers and/or administrators may treat students differently if they are known to have been incarcerated. Juvenile incarceration may carry a negative stigma in schools, just as it does in the labor market.

Aizer and Doyle (2015) address concerns about unobserved factors that may affect both schooling and crime/arrest/detention using a novel natural experiment: the random assignment of case judges within the Chicago juvenile court system. Exploiting the variation across judges in the likelihood that they assign youth to detention (conditional on their criminal record, background, etc.), Aizer and Doyle (2015) estimate that juvenile incarceration reduces high school graduation by 13 percentage points

and increases adult incarceration by 23 percentage points. Despite the fact that most youth only spend a few months in detention, very few ever return to school afterward.

Conclusions and policy lessons

Current evidence provides several important policy lessons regarding education and crime.

First, school-based policies can yield sizable social benefits from crime reduction. Lochner and Moretti (2004) calculate that the social savings of a one percentage point increase in male US high school graduation rates (from reduced crime alone) in 1990 would have amounted to more than $2 billion. This represents more than $3000 in annual savings per additional male graduate. In the UK, Machin et al. (2011) estimate a social savings of over £10,000 per additional student qualification (similar to high school completion in the US) from reductions in property crime alone.

Second, policies that encourage high school completion seem to be most promising in terms of their impacts on crime. Crime rates are already quite low among high school graduates, so policies that encourage post-secondary attendance or completion are likely to yield much smaller social benefits from crime reduction.

Third, policies designed to encourage schooling among more crime-prone groups are likely to produce the greatest benefits from crime reduction. Deming (2011) estimates that improved school choice for middle and high school students leads to significant reductions in arrests for high-risk youth but not for others. Consistent with this, the school-age Fast Track program appears to have reduced juvenile crime only among very high-risk children, showing little impact on even moderately high-risk children (CPPRG 2007, 2010).

Fourth, education policies can reduce both property and violent crime. In both the US and Sweden, the estimated effects of educational attainment or school enrollment on property and violent offenses are similar in percentage terms (Anderson, 2014; Hjalmarsson et al. 2015; Lochner & Moretti, 2004). Even murder appears to be quite responsive (Lochner & Moretti, 2004; Weiner et al. 2009).

Fifth, the effects of education on crime for men can be largely explained by improvements in wages and labor market opportunities; however, this is not the case for women.

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