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Priceless: The Nonpecuniary Benefits of Schooling

Philip Oreopoulos and Kjell G. Salvanes

Economists usually view schooling as a financial investment: that is, individuals spend money and time to acquire (or perhaps signal) human capital, in hopes of greater lifetime wealth and consumption in return. This approach has been hugely successful in explaining labor market behavior. It has helped simplify macro and micro models by reducing the number of required parameters, making it easier to estimate them with readily available data and computing power. Focusing on schooling as a financial investment has also encouraged the development of innovative empirical techniques for convincingly estimating average monetary returns from additional high school or college.

With basic theoretical and empirical findings on the financial returns to schooling well-established (or at least well-debated!), researchers are now paying more attention to what schooling actually does. In the traditional investment model, schooling itself is often treated as a black box: individuals enter, something happens, and productivity (usually defined in terms of one-dimensional skill) increases. A look inside the box, however, reveals that schooling generates many experiences and affects multiple dimensions of skill that, in turn, may affect central aspects of individuals' lives both in and outside the labor market. For example, schooling may

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not only affect income but also the degree to which one enjoys working or the likelihood of not being able to find work. Schooling could also lead individuals to make better decisions about health, marriage, and parenting style. It may have significant consumption value too. And, as we argue in this paper, schooling may affect preferences in a way that makes individuals more patient, more goal-oriented, and less likely to engage in risky behavior. In short, schooling may have important nonpecuniary returns.

Research on nonpecuniary effects of schooling is at an exciting and potentially productive stage. An accumulation of evidence suggests many ways, in and out of labor markets, that nonpecuniary effects of schooling might be quantitatively important. However, this suggestive evidence is plagued by two difficulties in drawing causal inferences. One difficulty, which is endemic in the literature on effects of schooling, is that a higher amount of schooling may be correlated with a wide array of other factors, like persistence, family background, perhaps even genetics. A persuasive argument about identifying the causal effects must find a way to disentangle the effect of schooling alone. A second difficulty, which is specific to the study of nonpecuniary effects, is that more schooling generates more income, and higher income will affect people's lives as well. Thus, in thinking about nonpecuniary effects of schooling, it's necessary to separate the effects taken alone from the effects of the higher incomes brought about by schooling.

The structure of this paper reflects this existing division in the literature, between research in which the comprehensive nonpecuniary effects of schooling are suggested by the available evidence but the causal connection is not yet clearly estimated, and research in which the causal effect is more clearly identified but the available data on nonpecuniary effects of schooling in the applicable data sets is weaker.

In the next major section of the paper, we focus on the suggestive evidence that nonpecuniary effects of schooling are important. We discuss nonpecuniary returns both in and outside the labor market. To assess returns inside the market, we look at measures of job characteristics and job satisfaction and changes in unemployment. In considering returns outside the labor market, we explore the effects on health, marriage, and parenting; the encouragement of behaviors that are better in the long-term; and even the possible consumption benefits of schooling. We draw on the existing literature, but also offer some specific illustrative results based on a sample from the U.S. General Social Surveys.

As a summary example of this approach, Figure 1 presents differences in self-reported adult happiness across school attainment levels, with and without conditioning on family income. The black bars in Figure 1 graph the fraction of 25 to 45 year-old Americans in the 1972 to 2000 General Social Surveys, aged 14 in 1970 or later, who self-report being overall happy or very happy with life after conditioning for a large set of family background controls. We use the fraction of overall happy respondents among high school graduates (89 percent) as the baseline for the graph. High school graduates with no additional schooling report being happy 8 percentage points more often than high school dropouts. College graduates report being happy 5 percentage points more often than high school graduates. The white bars in Figure 1 show the same relationship between schooling and happiness, but

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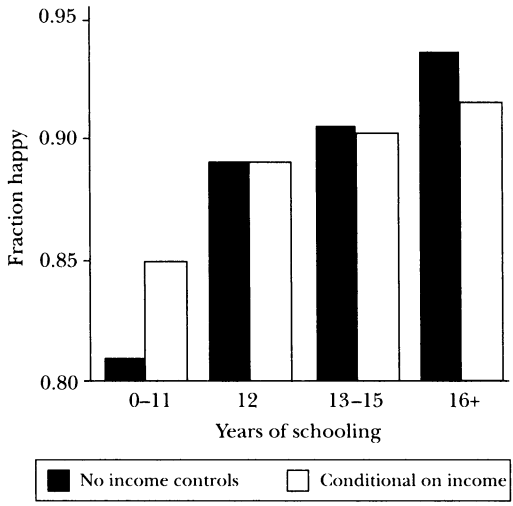
Figure 1
Fraction Happy about Life by Years of Completed Schooling before and after Conditioning on Income



Notes: The sample includes all 25–45 year-olds from the 1972–2000 General Social Surveys, aged 14 in the United States in 1970 or later. The graph reports relative differences in average self-reported happiness by whether an individual's highest level of schooling is less than high school (displayed as 0–11 years of schooling), high school (12 years), some college but no bachelors degree (13–15 years), or at least a bachelors degree (16+ years). Before conditioning for income, the outcome variable, whether an individual self-reports being happy or very happy about life overall, is regressed on age, year, gender, race, state of birth, and year of birth fixed effects, as well as family composition at age 16, mother and father's education, mother's working status, family's relative income at age 16, and the schooling attainment categories (less than high school (0–11), high school (12), some college but no bachelor's degree (13–15), and at least a bachelor's degree (16+), with those reporting high school as their highest level of schooling omitted. The coefficients are presented relative to the overall high school graduate mean. The results after conditioning for income include fixed effects for self-reported income categories in each dataset year.

now after adding the family income bracket that an individual reports in a given survey year as an independent variable. The relationship weakens, but only by about half. That is, after reporting having roughly the same annual household income, high school graduates still report being happy about 4 percentage points more often than high school dropouts, and college graduates report being happy slightly more than 2 percentage points more often than high school graduates. Castriota (2006) further reviews the literature linking schooling and happiness.

We recognize the obvious difficulties with relying on these kinds of coefficients to demonstrate that schooling alone causes these nonpecuniary changes. The estimates from these kinds of regressions are best understood as conditional means: they describe average differences across the sample by schooling levels for people with many similar observable family background characteristics. However, we also believe these kinds of results make a prima facie case that schooling might well affect individual well-being through additional channels other than through income in

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a way that should encourage further investigation. Indeed, we will mention and demonstrate some of our own studies that have used more sophisticated empirical approaches to try to disentangle these effects.

In the next major part of the paper, we address issues of how to interpret these relationships and attempt to provide more convincing evidence that they are causal. We offer some illustrative results from Norwegian data on twins and siblings, which can be viewed as a way of controlling to some extent for family background. We also offer some evidence using changes to U.S. compulsory schooling laws over time as a source of exogenous pressure for would-be-dropouts to stay in school longer.

Future work on nonpecuniary returns to schooling should aim to bring together the broad array of evidence on these nonpecuniary outcomes with new methodological approaches that can provide convincing cause and effect estimates. The possibility that schooling affects preferences, we believe, is a particularly worthy avenue for future research. We conclude by discussing some implications that arise from the finding that the combined pecuniary and nonpecuniary benefits from additional schooling are very large.[1]

What Does Schooling Do?

Nonpecuniary Returns to Schooling in the Labor Market

Much of daily life involves work. Schooling affects not only how much we earn, but how we do it. Some jobs offer more rewarding challenges and experiences. Some offer more opportunities for more enjoyable social interactions. The Occupational Information Network or O*NET (which is created for the U.S. Department of Labor) measures these kinds of characteristics for each occupation in the United States at ⟨www.onetcenter.org⟩. In particular, the O*NET defines a set of "Work-Value Descriptors" that measure aspects of work "important to a person's satisfaction." The first panel of Figure 2 graphs the relationship between schooling and one of these variables: "Achievement," which is a measure of accomplishment that employees may feel while on the job. The variable is rated on a seven-point scale, with seven being the highest level. We match the descriptor score to corresponding 1980 standard occupation codes, and then to workers in these occupations, using the same sample as for Figure 1. The black bars show estimated differences by schooling level after first conditioning on a large set of family background controls, using the mean value among high school graduates as the baseline. The white bars show the same estimates after also conditioning on family income bracket reported in the same survey year (the only measure of respondent income in the General Social Survey). The pattern is clear: workers from similar observable family backgrounds but with more schooling are in jobs that offer more sense of accomplishment. When income is included as an

[1] In this essay, we deliberately restrict our discussion to private returns to education. Additional effects of higher aggregate schooling on outcomes such as economic growth, innovation, city crime, tax revenue, and other externalities are beyond the scope of this paper. Readers interested in these subjects might begin with the review articles by Moretti (2004), Hanushek (2002), and Lange and Topel (2006).

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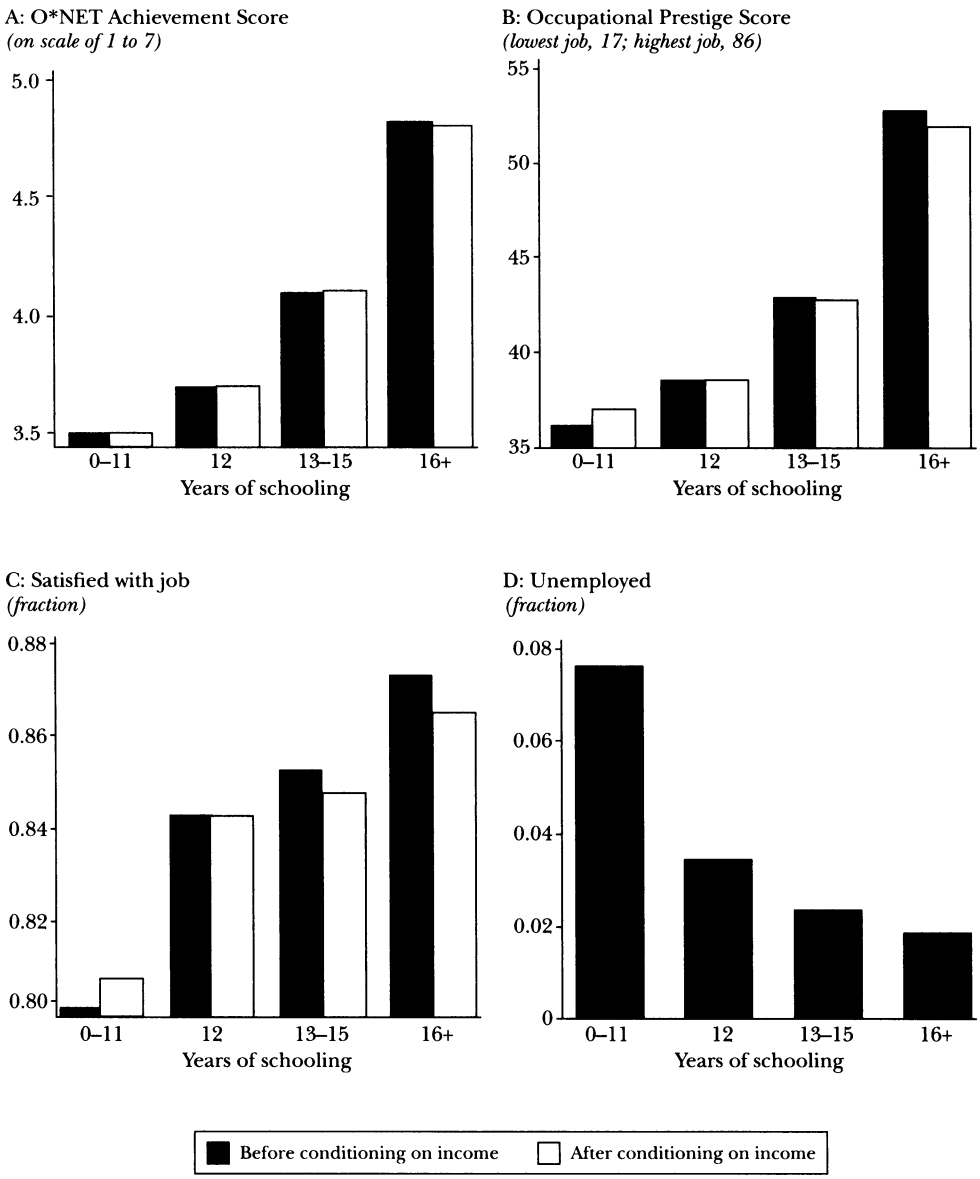
Figure 2

Labor Market Outcomes by Years of Completed Schooling before and after Conditioning on Income



Notes: "Achievement Score" comes from the Work-Value Descriptors in the Occupational Network (O*NET) Database. Occupational Prestige scores were reported in the General Social Surveys. "Satisfied with Job" is an indicator for whether individuals responding to the General Social Survey claim to be fairly, very, or completely satisfied with the jobs they are in. Samples, definitions, and methodologies follow similarly to those used for Figure 1, except that the samples are restricted to working individuals for panels A–C, and those working or looking for work in panel D. See online data appendix at ⟨http://www.e-jep.org⟩ for more details.

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explanatory variable, the pattern remains very similar. The pictures look the same when looking at the four other "work value" variables in the O*NET: "Independence" (a measure of an occupation's autonomy and opportunity for creativity), "Relationships" (a measure of how much social interaction occurs on the job), "Recognition" (inside and outside the firm), "Support" (from managers and co-workers), and "Working Conditions" (including job security).[2]

Nonpecuniary returns arise from how work affects individuals on *and* off the job. Work provides a reference by which individuals define themselves relative to others. As Robert Solow (1990, p. 9) put it: "We live in a society in which social status and self-esteem are strongly tied both to occupation and income. Of course occupation and income are correlated, but not perfectly correlated. It seems undeniable to me that both occupation and income are significant variables. The way others look at us, and the way we look at ourselves, are both income related, and both are job related at given income."

Panels B and C of Figure 2 show the relationship between schooling and overall measures of job satisfaction using the same data. Occupational Prestige scores as reported in the General Social Surveys are calculated by compiling subjective prestige rankings of occupations from a nationally representative sample and matching overall scores to workers' jobs. The lowest-prestige job had a score of 17 (miscellaneous food preparation occupations); the highest-prestige job had a score of 86 (physicians); the standard deviation of the job scores was 13.6. The second panel in Figure 2 shows that workers with one to three years of college with similar family background are in jobs that measure, on average, 4.5 points higher in occupational prestige than high school graduates without college (the overall standard error is 10.5). Workers with four or more years of college have jobs that rank almost 10 points higher. These differences remain about the same after adding additional controls for family income.

The same pattern arises when looking at self-reported job satisfaction (Panel C of Figure 2). While few workers say they are a little or very dissatisfied with their job, about 4 percent more of high school graduates without college do so compared to college graduates, and 4 percent more of high school dropouts do so compared to high school graduates. The gradient of this overall relationship falls by about 30 percent when adding family income controls.

Effects from schooling on the probability of being unemployed or on welfare are in addition to effects on workers' earnings (because earnings effects are almost always measured among individuals already working). Long-term unemployment and welfare receipt are linked to depression and low self-esteem (for example, Sheeran, Abrams, and Orbell, 1995). Time series data show that unemployment shocks precede worsening mental health (Bjorklund and Eriksson, 2007) and that

[2] Workers in jobs with less-desirable traits may implicitly be compensated with higher wages compared to similarly skilled workers in more enjoyable jobs. If compensating wage differentials were associated with the observed schooling–occupational-quality relationship, the corresponding schooling–income relationship should be negative. Clearly this is not the case. Pecuniary and nonpecuniary effects for individuals with more schooling and more skills are additive rather than offsetting.

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the nonpecuniary effects appear to be much larger than the effect that stems from the associated loss of income (Winkelmann and Winkelmann, 1997). Added stress and worsening mental health may also explain why job loss is related to lower life expectancy (Sullivan and von Wachter, 2009). Schooling strongly relates to unemployment. The fourth panel of Figure 2 shows this with our data from the General Social Survey. The same holds true when looking at welfare receipt (not shown). Schooling also relates to how quickly the unemployed find work (Riddell and Song, 2008).

Finally, studies that measure returns to schooling typically do not account for fringe benefits. Thus, another place to look for strictly nonmonetary returns to schooling is fringe benefits, paid by employers on top of earnings. These benefits include medical insurance, pension contributions, paid vacations, stock options, and so on, and they tend to flow substantially more to workers with more schooling. Haveman and Wolfe (1984) cite studies that suggest monetary equivalent returns to schooling are 10 to 40 percent higher when factoring in these indirect gains. Recent work by Pierce (2001) and Hammermesh (1999) hint that the returns are even higher among more recent cohorts.

Nonpecuniary Returns outside the Labor Market

One key purpose of schooling is to develop skills. Skills taught in medical school, for example, improve doctors' abilities to treat the sick. McPeck (1994) calls these "knowledge-based" skills because their "general range of applicability is limited by the form of thought being called upon." Knowledge-based skills would help one perform well at "Trivial Pursuit." Critical thinking and social skills, while less tangible, are also important. Critical thinking helps individuals "select pertinent information for the solution of a problem [and] formulate relevant and promising hypotheses." In other words, it helps individuals process new situations or problems and make better decisions. Social skills facilitate interaction and communication with others. They help individuals distinguish between acceptable and unacceptable behavior in different settings.

The education literature is remarkably unclear about how critical-thinking and social skills are acquired. It does seem clear that these two sets of skills are strongly and positively correlated with schooling (Cascio and Lewis, 2006; Soskice, 1993; Heckman, 2006; Glaeser, Ponzetto, Shleifer, 2005; Green and Riddell, 2003). Perhaps students learn them over time while writing essays or interacting with schoolmates outside of class. Or perhaps individuals with these traits excel at school and thus find it easier to increase such skills.

Grossman (2006) formulates the two general models that most economists have in mind to describe how better skills generate nonpecuniary returns outside the labor market. The "productive efficiency model" suggests that improved skills act as factor-augmenting technical change; in other words, individuals are able to get more done in the same amount of time or for the same amount of money. Perhaps this outcome occurs from improved multitasking or time management skills. In contrast, the "allocative efficiency model" pertains to situations in which the more skilled choose a different mix of inputs in trying to maximize the household

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production function. In other words, individuals with better skills make better decisions when faced with similar circumstances.

Good health is often singled out as a key nonpecuniary benefit from additional schooling. Using the same sample as in Figure 1, the first panel of Figure 3 shows the strong positive correlation between schooling and subjective health, whether conditioning on income or not. Many studies find similar relationships between schooling and health outcomes, and between schooling and healthy activities. The underlying reasons for these correlations are mixed. Wagstaff (1993), for example, concludes that schooling improves health while simultaneously reducing the number of physician visits, supporting the productive efficiency hypothesis. However, Glied and Lleras-Muney (2008), Chen and Lang (2008), Kenkel (1991), and de Walque (2004a, 2004b) provide evidence that new information on health induces faster and more pronounced responses for those with more schooling.

Some economists believe that more schooling not only makes individuals more attractive to employers, but more attractive in other settings, too. Men and women with more earnings potential or with more prestigious jobs become more appealing in a competitive marriage market (Becker, 1973; LaFortune, 2010; Chiappori, Iyigun, and Weiss, 2009). Indeed, Goldin (1992) concludes that the main purpose of going to college for women in the mid-twentieth century was to attract a college-educated husband. Numerous empirical studies document a tendency for persons to choose partners of similar schooling attainment (Rockwell, 1976, Chadwick and Solon, 2002), and this tendency appears to be increasing (Mare, 1991).

Improved allocative efficiency from schooling may also translate to more stable marriages. Critical thinking and social skills that help one succeed in the labor market also probably help in the marriage market. The second panel of Figure 3 shows substantially lower ever-divorced rates among those with more completed years of schooling of similar age and family background. Adjusting for income makes the gradient steeper, but not by much.

Overwhelming empirical evidence shows that women with more schooling have fewer children (for example, Jones and Tertilt, 2008). The dominant explanation for this, which traces back to Becker and Lewis (1973) and Becker and Tomes (1976), is a trade-off between number of children and parental investment per child. The idea is that, because more-educated parents tend to work more, they also parent fewer children to avoid spreading their time too thin. Recent evidence on this hypothesis is mixed (for example, Black, Devereux, and Salvanes, 2005a; Angrist, Lavy, and Schlosser, 2006; Qian, 2009; Black, Devereux, and Salvanes, 2010). The flip side of the coin is that individuals who prefer fewer children may also enjoy more schooling *and* career opportunities (Jones, Jones, Schoonbroodt, and Tertilt, 2008). Another possibility is that more educated people are more likely to use contraceptives to prevent unwanted pregnancies, in line with the allocative efficiency hypothesis.

For couples with children, parental schooling strongly relates to children's development and socioeconomic success throughout life. Health, social integration, test scores, and labor market outcomes all correlate positively with both mother and father's educational attainment. Differences in income may explain some of these relationships. For example, limited resources and an aversion to or lack of

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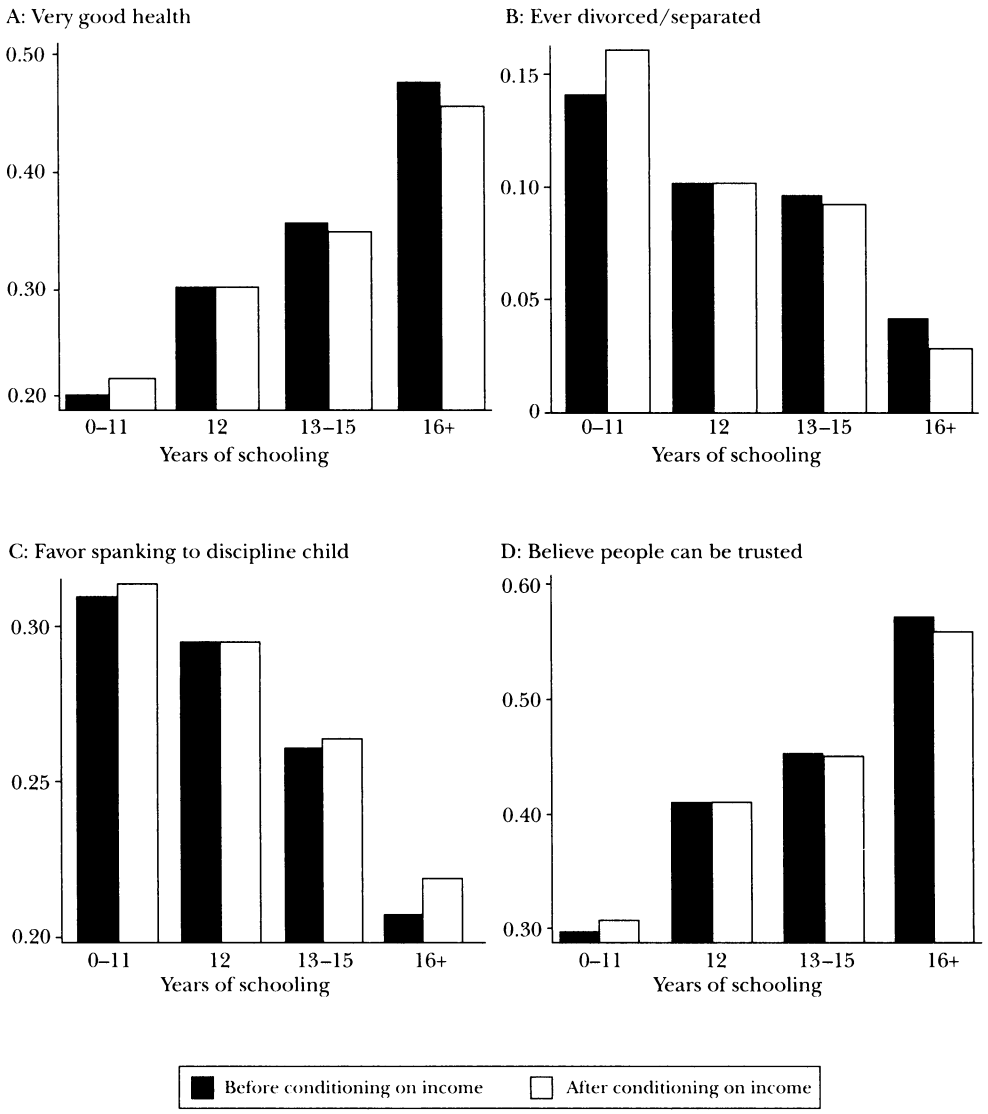
Figure 3

Non–Labor Market Outcomes by Years of Completed Schooling before and after Conditioning on Income

(fraction of respondents)



Source: Based on data from the General Social Survey.

Notes: "Very good health" is an indicator variable for whether an individual responds to be in very good health overall at the time of the interview. "Favor spanking to discipline child" indicates whether an individual strongly agreed that "It is sometimes necessary to discipline a child with a good hard spanking." The "People can be trusted" indicator is derived from the question, "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people." Samples, definitions, and methodologies are similar to those used for Figure 1. See data appendix for more details.

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knowledge about financial aid may limit a child's access to college (for example, Belley and Lochner, 2007). Differences in birth weight or infant mortality could arise from poor mothers not being able to afford good health habits (Currie and Moretti, 2007). Conditioning on income does not eliminate these kinds of intergenerational relationships (see the example below for grade repetition).

Just as schooling may improve skills to help with marriage, it may do the same for parenting. Recent research on the determinants of human development underscores parenting as the most important determinant for children's cognitive and noncognitive development, even among families with similar incomes (Cunha and Heckman, 2009). Kalil, Ryan, and Corey (2010) find support from time use surveys that there is a strong maternal education gradient in time spent with children. Panel C of Figure 3 provides at least some evidence that parenting styles differ by school attainment. The fraction of parents in our General Social Survey sample who strongly agree that "it is sometimes necessary to discipline a child with a good hard spanking" is substantially lower for respondents with college experience, with and without additional controls for family income.[3]

Several studies also suggest that schooling fosters trust. Social scientists place great emphasis on the importance of trust in improving social interaction and fostering community involvement. A more trusting society is often used to justify public subsidies to schooling (as discussed in Hanushek, 2002), but these traits offer private returns too. Arrow (1974) notes that in the face of transaction costs, trust underlies almost every economic transaction. Its individual importance arises in situations where trust promotes reciprocity. Lab experiments and ethnographic studies suggest that a willingness to engage and work or help others often leads to others being nicer and more cooperative in return (Fehr and Gachter, 2000; Uslaner, 2000). Schooling is one of the most important predictors of trust. Helliwell and Putnam (1999) point out that a causal relationship could occur for relative reasons (perhaps schooling raises social status for some individuals while holding down status of others), additive reasons (schooling teaches people how to interact successfully with others), or superadditive reasons (raising overall education attainment levels makes everyone more trusting). Panel D of Figure 3 shows a positive relationship between schooling and trust using the same General Social Survey sample as before. Individuals with similar family backgrounds but more schooling are more likely to agree that, generally speaking most people can be trusted. Conditioning on reported family income bracket does not alter the differences by attainment levels substantially.

Effects on Preferences

There are many possible channels by which schooling might change people's preferences. One may be through greater patience. As Becker and Mulligan

[3] We use this variable to demonstrate differences in parenting styles by school attainment. The effectiveness of corporal punishment on children, and under what conditions, remains unclear. Many countries legally prohibit it. The American Academy of Pediatrics states: "Corporal punishment is of limited effectiveness and has potentially deleterious side effects" (Stein and Perrin, 1998).

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(1997, pp. 735–736) put it: "Schooling focuses students' attention on the future. Schooling can communicate images of the situations and difficulties of adult life, which are the future of childhood and adolescence. In addition, through repeated practice at problem solving, schooling helps children learn the art of scenario simulation. Thus educated people should be more productive at reducing the remoteness of future pleasures." Another channel by which schooling affects preferences may be through reducing myopia. Whereas impatient people make decisions that still fully account for time trade-offs, myopic people do not. A myopic person is more likely to engage in immediate gratification or overemphasize immediate costs, and thus is more likely to make behavioral mistakes which lower lifetime well-being. A third channel by which schooling might affect preferences is by adjusting people's expected enjoyment (or distaste) from particular experiences. Knowing how to read, for example, leads to greater enjoyment from looking at a book. Knowing how to speak French may lead to greater enjoyment from traveling to France. Schooling might also provide new information about one's existing preferences (Malamud, 2009).[4]

In the General Social Survey, respondents were asked whether they agree to the statement, "Nowadays, a person has to live pretty much for today and let tomorrow take care of itself." We treat this as a proxy for time preference (indicating either patience or myopia). The first panel of Figure 4 shows a distinct declining relationship between agreement with this statement and schooling, again holding various observable family background variables constant. More than half of high school dropouts agree with this statement while less than 30 percent of college graduates do. Conditioning on reporting the same family income bracket in the same survey year reduces the gradient of this relationship, but not by much.

The last three panels of Figure 4 consider some outcomes that may result from living only for today.[5] Teen fertility, criminal activity, and smoking are risky behaviors often considered driven by "affective" thinking (a focus on immediate feelings) rather than "cognitive" thinking (a focus on long-term benefits and costs). Efforts to reduce these behaviors aim to improve conditions later on in life. Figure 4 shows all three outcomes negatively correlate with years of completed schooling. A number of studies that pay greater attention to identification strategies for causal inference find similar results, including Black, Devereau, and Salvanes (2008), Lochner and Moretti (2004), and Lee and McCrary (2005), who discuss evidence that young offenders are myopic. Ross and Mirowsky (1999) discuss how schooling, by developing patience and control, may help encourage healthier lifestyles.

[4] These three channels can be described more formally by considering the intertemporal utility function, $U = u_0(x) + \beta(S)\sum_{t=0}^{T} \delta(S)^t\, u_t(x, S)$, where u_t is the utility function from experiencing or consuming x in period t; S is schooling; δ is the geometric time discount rate (between 0 and 1) and describes an individual's patience level; and β is the hyperbolic discount rate (between 0 and 1) and describes an individual's degree of myopia. Schooling might affect any of these channels.

[5] Black, Devereau, and Salvanes (2008) suggest two additional nonpecuniary ways schooling could affect teen fertility and crime. First, staying in school could reduce the amount of time and opportunity for engaging in risky behavior. Second, schooling may increase both current and expected future earnings and thus increase the opportunity cost of engaging in risky behavior. Also, as mentioned above, schooling could lead to more efficient contraceptive use.

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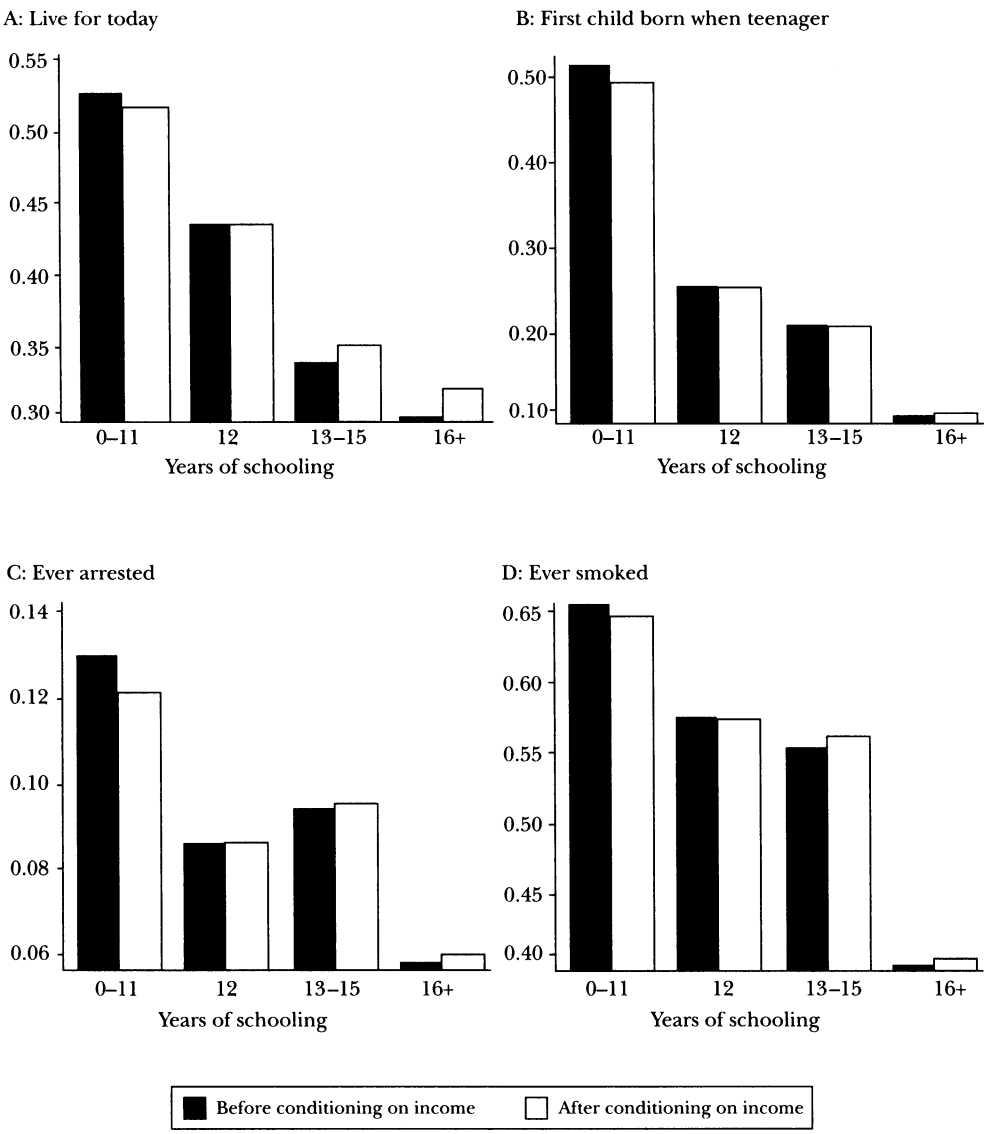
Figure 4
Time Preference Measures by Years of Completed Schooling before and after Conditioning on Income
(*fraction of respondents*)



Source: Based on data from the General Social Survey.
Notes: "Live for Today" indicates whether an individual agrees to the statement, "Nowadays, a person has to live pretty much for today and let tomorrow take care of itself." Samples, definitions, and methodologies are similiar to those used for Figure 1. See data appendix for more details.

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Negative Nonpecuniary Returns

We do not rule out the possibility that schooling may bring certain negative returns, like added stress and constraints on time. Jobs that pay more may also come with more responsibility, more travel, and more effort, all of which may add stress and pressures to work more. The costs of losing one's job when earning more are obviously higher. Surprisingly, Cohen, Doyle, and Baum (2006) find that stress hormones are *negatively* associated with income and schooling. The authors suggest that any additional pressures from working in higher-paid occupations are offset by better health and social support. Figure 5 shows other time use outcomes from our sample: whether people say that they "always feel rushed," whether they want more leisure time, and whether they want more time with friends. These questions were asked only to a subset of the General Social Survey, so the sample sizes are smaller and the patterns are less precise than the ones presented above. Fewer individuals with more schooling report always feeling rushed for time than those with less. College graduates are almost 6 percentage points less likely to feel rushed than high school graduates with no college. Conditioning on family income generally strengthens this relationship. Perhaps lower-income households feel more rushed because they are not able to afford commodities that would help save time. We do find a tendency for college graduates to report wanting to spend more time with friends and in leisure activities.

Schooling as Consumption

The satirical newspaper, *The Onion* (2000), published a story about an accountant manager at a meeting who became distracted during his presentation looking out the window. The paper quoted the manager remarking to his coworkers that the weather reminded him of "this great day when me and a bunch of my buddies climbed up onto the roof and spent the whole day just drinking beer and cranking U2 and soaking up the sun. Man, that was awesome." The human capital model usually treats time spent in school as an opportunity cost in terms of foregone earnings. Some researchers add "psychic costs" to account for the mental effort required to complete the necessary requirements to graduate. However, schooling provides more experiences than just sitting in class or studying. These include viewing and participating in sports, socializing with others the same age, dating, attending nearby entertainment events, living among other youth away from parents, and enjoying campus scenery. Of course, students with children or working significant hours in the paid labor force are less likely to partake in these activities.

Quantitative evidence for the consumption value of schooling comes from showing that some students make enrollment decisions based in part on factors not likely to help their earnings power after completion of a degree. Several researchers estimate low or even negative pecuniary returns from majoring in certain college majors or enrolling in graduate school (after conditioning on academic potential) and attribute this behavior to school consumption (Alstadsaeter, 2004; Arcidiacono, 2004; Lazear, 1977). However, it is possible that future nonpecuniary returns make up for this difference. As another approach, Pope and Pope (2009) show an increase

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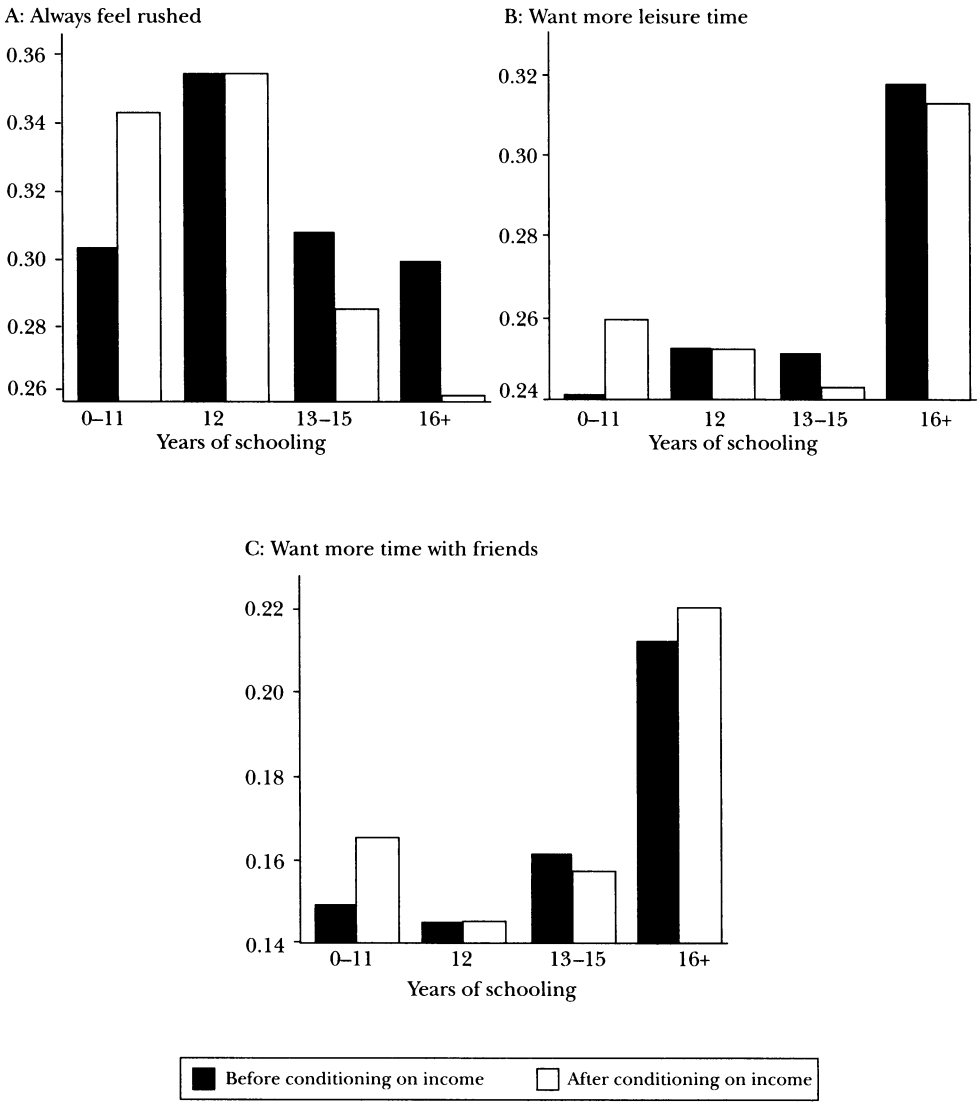
Figure 5
Time Constraint Measures by Years of Completed Schooling before and after Conditioning on Income
(*fraction of respondents*)



Source: Based on data from the General Social Survey.
Notes: Figure 5 shows other time use outcomes from our sample: whether people say that they "always feel rushed," whether they want more leisure time, and whether they want more time with friends. These questions were asked only to a subset of the General Social Survey, so the sample sizes are smaller and the patterns are less precise than the ones presented above. See data appendix for more details.

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in the quantity and quality of students applying to colleges that performed well in basketball and football the previous year.[6]

Causality and Other Interpretation Issues

Schooling is often used as the prototypical example for demonstrating challenges in trying to estimate causal effects. Above a minimum level, people usually choose their level of attainment. Skills that individuals already possess may therefore be correlated with these choices. Estimated returns are upward biased if those who would have attained more social–economic success regardless tend to complete more schooling anyway (for example, perhaps for consumption reasons).

In this section, we describe two approaches to estimating nonpecuniary returns to schooling that are more methodologically satisfying for causal inference than the selection-on-observables approach presented above. The downside with these approaches, however, is that, due to limited data availability, we are unable to explore more specific, and perhaps more important, outcomes of schooling.

Twin and Sibling Studies

By comparing life outcomes between brothers or sisters with different levels of schooling, we hold constant many common family factors. When looking at identical twins, highly similar genetic influences are accounted for. The question, then, is why would siblings (especially twins) end up with different levels of schooling? Perhaps one sibling became more inspired by friends or teachers to continue. On the other hand, even small genetic differences between siblings can lead to differences in mental development and academic achievement (Fletcher and Lehrer, 2009; Black, Devereux, and Salvanes, 2007; Neumark, 1999). If the reasons why some siblings obtain different schooling amounts are mostly unrelated to later socioeconomic success, then the approach provides a useful estimation strategy.

Table 1 presents sibling and twin returns-to-schooling estimates for several outcomes with and without conditioning on income. We take advantage of Norwegian administrative data, which contain extremely large samples of siblings and twins.[7] The twins sample consists of both fraternal and identical twins. Our sample

[6] Along these lines, we collected data from Princeton Review's college rankings and estimated whether top "party" or "sports" colleges were harder to get into compared to other colleges with similar academic ranking in the same region. Specifically, for the sample of 324 colleges with ACT composite data in the 2010 edition of the Princeton Review rankings, we regressed the mean Freshman ACT score (used for admissions) on a linear or quadratic variable for academic ranking, fixed effects for state or first three digits in the college's ZIP code, and dummy variables for whether the college was included among the top 20 "Party Schools," "Most Beautiful Campuses," or sports schools ("Students Pack the Stadiums"). Admissions requirements were significantly higher for party and sports schools. The estimated effects weakened and became only marginally significant after further conditioning on the log of college size. The results generally support the conclusion that which college students attend depends, at least in part, on sports and social opportunities. Results are available on request from the authors.

[7] Behrman and Rosenzweig (2002) use a small sample of identical twins to compute within-twin estimates of the effect of mother's schooling on children's schooling. Lundborg (2008) uses identical twins to

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Table 1
Estimated Effects from an Extra Year of Schooling—Siblings and Twins

	[1]	[2]	[3]	[4]	[5]
		Siblings sample		*Twins sample*	
Outcome	*Mean*	*Change in mean from 1 year of schooling before conditioning on income*	*Change in mean from 1 year of schooling after conditioning on income.*	*Change in mean from 1 year of schooling before conditioning on income*	*Change in mean from 1 year of schooling after conditioning on income*
Log annual income	12.0407	0.0517*** (0.0003)	NA	0.0476*** (0.0026)	NA
Unemployed (*share*)	0.07356	–0.0047*** (0.0001)	NA	–0.0047*** (0.0001)	NA
On welfare (*share*)	0.02332	–0.0034*** (0.0001)	NA	–0.0028*** (0.0005)	NA
Disability pension (*share*)[a]	0.1672	–0.01*** (0.0001)	NA	–0.01*** (0.0007)	NA
Divorced (*share*)	0.11413	–0.0023*** (0.0001)	–0.0017*** (0.0001)	–0.0027* (0.0011)	–0.0027* (0.0011)
Spouse's years of schooling[b]	11.8347	0.228*** (0.0019)	0.221*** (0.0019)	0.229*** (0.0173)	0.227*** (0.0175)
First child born when teenager (*share*)[c]	0.11167	–0.0083*** (0.0002)	–0.0071*** (0.0002)	–0.0041*** (0.0011)	–0.0372** (0.0012)

Notes: Unless otherwise noted, all estimates are generated with Norweigian administrative data and include all 28–60 year-olds in 2005. The table reports the coefficients corresponding to total years of schooling (mean = 12.0, standard deviation = 3.2) after regressing each outcome on county of residence and a quartic in age. Results in columns 3 and 5 are from regressions that also include a fourth-order polynomial in log annual income, and drop those respondents without income. The results in column 3 are presented after including quartic polynomial controls for annual income. Some results are not applicable (NA) because they involve conditioning on income when the outcome itself depends on whether someone works or not. Standard errors are clustered by state and year of birth. The full siblings sample size is 1,433,006, and the full twins sample size is 26,056.
[a] For siblings near retirement (age 55–67).
[b] For those who are married.
[c] Limited to women in the sample.
*, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

includes individuals 28 to 60 years old in 2005. A more detailed data description is given in the appendix. Column 1 displays the mean for each outcome: annual income is calculated for all those in the sample who are working; the share unemployed and on welfare is calculated over the full sample; the share on disability is only for those in the age 55–67 age bracket; the share divorced is over the full sample;

estimate returns of schooling to health.

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the variable "Spouse's years of schooling" is limited to the part of the sample that is married; and "First child born when teenager" is limited to women in the sample.

Column 2 shows the estimated difference between siblings when one sibling has on average an additional year of education. A variety of other control variables are included in this calculation, including county of current residence. Thus, the first row in Column 2 shows that working siblings with one more year of schooling have, on average 5.2 percent more annual income than their less-educated siblings. All differences in column 2 are statistically significant at the 1 percent level. As has been found previously for Norway and indeed the other Nordic countries, where the distribution of income is relatively equal, the monetary return to education is on a lower spectrum relative to most other high-income countries.

Turning to nonpecuniary outcomes, siblings with one more year of schooling are 0.47 percentage points less likely to be unemployed and 0.34 percentage points less likely to be on welfare. As a measure for health, we also estimate effects on the likelihood of receiving health disability payments. In Norway, disability benefits seek to ensure sufficient income for subsistence for people whose earning ability is permanently impaired by at least 50 percent due to illness, injury, or defect. Disability pensions are granted if it is quite clear that there are no prospects of an improvement in earning ability. Siblings near retirement (age 55–67) with more schooling are 1 percentage point less likely to receive such benefits, and are therefore healthier. Consistent with the earlier patterns presented in the last section, siblings with more schooling are also less likely to be divorced; women are less likely to give birth as teenagers and more likely to be married to spouses who have higher education themselves. The results in Column 4 just for twins are basically the same as those for the full sibling sample.

As noted near the start of the paper, an added challenge in trying to estimate nonpecuniary returns purely to schooling is to separate them from pecuniary ones, since more money may be used to improve the very same outcomes we are interested in. Many researchers estimate nonpecuniary returns without worrying whether they occur through wealth effects or not. Some outcomes, like unemployment, voting, and teen fertility are unlikely to be related to income. For others, however, we would ideally like to use two separate sources of exogenous variation—one that affects schooling and another that affects income. As a hypothetical example, we could use data that make it possible to compare siblings with different levels of schooling and in different firms where some unexpectedly are let go because of downsizing, and then we would check some nonpecuniary outcome like health, for instance. Even without separate sources for exogenous variation in schooling and income, conditioning on observable income may still help if at least some of the income variation uncorrelated with schooling is also related with the outcomes of interest. Schooling effects after conditioning on income are probably downward biased because individuals with above average schooling but below average income likely have inherently poor skills relative to their attainment level that affect both why they earn less and why they fare poorly on other outcomes. On the other hand, income only approximates lifetime wealth. Results could be upward-biased if the schooling effect still comes from increases in wealth that are not adequately controlled for by

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conditioning on income. We explored these possible measurement errors by using siblings' income as an instrument for own income. This generated slightly higher estimated returns than those presented in Table 1, but not by much.

Columns 3 and 5 show nonpecuniary returns to schooling estimates after conditioning on own incomes. The estimated schooling effect on divorce rates falls by about a fourth for the siblings sample and it hardly falls at all for the twins sample. The estimated effect on teen fertility falls by very little, similar to the patterns presented in the previous section.

Seeking Natural Experiments in Schooling

Another approach to estimating causal returns to schooling involves taking advantage of policies that affect schooling costs without affecting benefits. For example, whether individuals can commute to school impacts their likelihood of attending. If a new college opens up in a remote neighborhood, it allows a follow-up analysis with local youth who become, on average, more educated than youth from other remote neighborhoods without nearby colleges. Card (1995) uses this policy change to estimate pecuniary returns to schooling. Sometimes policies differ across region and over time. Researchers can compare relative schooling differences and corresponding outcomes between groups of individuals from different regions before and after policy changes that affect schooling attainment for younger birth cohorts from one region but not the other. Kane and Rouse (1993) use tuition changes over time to estimate large pecuniary returns to schooling. Currie and Moretti (2007) use college openings in the mid-twentieth century and find significant impacts of maternal schooling on children's health, and Kenkel, Lillard, and Mathios (2006) use differences in high school graduation requirements and local spending on education to find schooling effects on smoking and obesity. The caveat with this approach is that the reasons behind the policy changes (or other policies introduced at the same time) need to be unrelated to the later outcomes of interest.

By far the most common policy instrument used to examine pecuniary and nonpecuniary returns is compulsory schooling. Minimum schooling legislation changed over time in many countries. The changes made some youths stay in school who would have left earlier in absence of the more restrictive laws. Angrist and Krueger (1991) were the first to use compulsory schooling to estimate pecuniary returns to schooling, and many have done so since (for example, Meghir and Palme, 2005; Oreopoulos, 2006a; Aakvik, Salvanes, and Vaage, 2010). More recently, other researchers have used these laws to estimate nonpecuniary effects on just about everything from trust (Milligan, Moretti, and Oreopoulos, 2004) to eyesight problems (Soloveichik, 2007).

Table 2 shows several estimates of pecuniary and nonpecuniary returns to schooling. Most of the results come from a large sample of native-born Americans aged 25 to 64 from the 1950 to 2000 U.S. Censuses and 2001 to 2007 American Community Surveys. The estimates use compulsory schooling laws faced when aged 16 as instrumental variables. That is, in a first-stage regression the state's compulsory schooling age is included as an independent variable, which is used to predict school attainment for individuals from different states and different birth

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Table 2
Estimated Effects from an Extra Year of Compulsory Schooling

	[1]	[2]	[3]	[4]
Outcome	*Mean*	*Change in mean from 1 year of compulsory schooling before income controls*	*Change in mean from 1 year of compulsory schooling after income controls*	*Sample specification*
Log weekly income	3.06	0.131 (0.006)***	NA	Working
Log occupational prestige score	3.27	0.063 (0.003)***	0.046 (0.003)***	Working
Unemployed (*share*)	0.045	–0.005 (0.002)***	NA	Full
On welfare (*share*)	0.019	–0.015 (0.002)***	NA	Full
In jail (*share*)	0.027	–0.006 (0.003)*	NA	Black men 21–65 yrs old
In mental institute (share)	0.003	–0.001 (0.000)*	NA	Full
Probability of dying within 10 years[a]	0.11	–0.037 (0.006)***	NA	14 yrs old in 1914–1939 in 1960–1980 U.S. Censuses
First child born when teenager (*share*)	0.078	–0.008 (0.002)***	–0.008 (0.002)***	Women
Divorced (*share*)	0.137	–0.01 (0.002)***	–0.005 (0.003)***	Full
Oldest child behind grade level (*share*)	0.199	–0.032 (0.004)***	–0.026 (0.006)***	Parent matched to oldest 8–16 year old in household
Voted last national election (validated) (*share*)	0.49	0.09 (0.025)***	0.089 (0.027)***	Voting age 1978–2000 November Current Population Survey
Satisfied with life overall (*share*)	0.86	0.048 (0.010)***	0.035 (0.012)***	25–65 year olds born in UK from 1973–98 Eurobarometers

Source: Unless specified in column 4, all estimates are generated with a combined sample from the 1950–2000 U.S. Censuses and 2001–2007 American Community Surveys and include all 25–65 year-old native-born Americans aged 16 in 1915 or later with no more than a high school degree. The estimated effects from compulsory schooling on mortality are from Lleras-Muney (2004). The other estimates are by the authors.

Notes: Table 2 shows several estimates of pecuniary and nonpecuniary returns to schooling. The estimates use compulsory schooling laws faced when aged 16 as instrumental variables. Predicted minimum school-leaving ages and exceptions are calculated according to the laws that existed in an individual's state of birth when the individual is age 16. The table reports the coefficients corresponding to total years of schooling after regressing each outcome on year of birth, data year, gender, and race fixed effects, a quartic in age, and on total years of schooling instrumented using the predicted minimum school-leaving ages. Results in column 3 are from regressions that also include a fourth-order polynomial in log weekly income and that drop individuals without income. Some results are not applicable (NA) because they involve conditioning on income when the outcome itself depends on whether someone works or not. Standard errors are clustered by state and year of birth.

[a] Estimates from Lleras-Muney (2004)

*, **, and *** asterisks indicate significance at the 10, 5, and 1 percent levels, respectively.

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cohorts. In the second-stage regressions, the estimated values of school attainment from that regression are used as the independent variable to predict effects on adult outcome variables. This approach uses only variation in schooling outcomes due to variation in compulsory schooling laws, after factoring out overall state and birth cohort trends. The appendix available with this article at ⟨http://e-jep.org⟩ provides more details.

The first row of column 2 shows the estimated pecuniary returns. One year of compulsory schooling increases weekly earnings by 13.1 percent, on average. It also affects other labor market outcomes including occupational prestige, the likelihood of being unemployed, and the likelihood of being on welfare (all in the expected directions). Outside the labor market, compulsory schooling decreases the chances of ending up in jail (among black youth), being divorced, being pregnant before age 20, and even being in a mental institute. It also decreases mortality and increases voting.[8] We find additional intergenerational effects on the likelihood that a child repeated a grade. And finally, using changes to compulsory schooling laws in the United Kingdom and data on self-reported well-being, we also estimate that compulsory schooling increases overall life satisfaction. All of these estimates fall by less than half when conditioning on individual income.

The results from Table 2 are supported by several other studies that utilize instrumental variables and other causal inference identification strategies. For example, Machin, Pelkonen, and Salvanes (forthcoming), Li (2006), and Oreopoulos (2007) also find effects of schooling on regional mobility and unemployment. Our findings that schooling decreases the likelihood of criminal activity are consistent with Lochner and Moretti (2004) and Anderson (2009). Our findings that schooling affects teen fertility are consistent with Black, Devereux, and Salvanes (2005b) and Fort (2007). De Walque (2004b) also estimates causal effects of schooling on mortality, and Powdthavee (2009) finds effects on blood pressure using changes in minimum school leaving age in the United Kingdom. Milligan, Moretti, and Oreopoulos (2004), and Dee (2004) present results for additional civic participation outcomes. The results on whether a child repeats a grade are similar to those presented in Oreopoulos, Page, and Stevens (2006). Black, Devereux, and Salvanes (2008) use a different set of compulsory schooling laws in Norway to find intergenerational effects on education. Carneiro, Meghir, and Parey (2007), and Plug (2004) also find intergenerational effects of schooling. Perez-Arce (2010) estimates schooling effects on subjective time preferences, and Oreopoulos (2007) presents additional estimates on returns to schooling on life satisfaction.

Interpreting the Findings: Signaling and Heterogeneity

A substantial and growing body of evidence using several appealing methodological approaches suggests that schooling does indeed have substantively

[8] The effects on mortality are taken from Lleras-Muney (2005). Data for the estimates on voting are from the November Current Population Surveys. See the online appendix with this paper at ⟨http://www.e-jep.org⟩ for more details concerning Table 2.

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important causal effects on a variety of life outcomes other than income. However, some useful points should be remembered in interpreting these results.

One issue is that schooling may help develop skills or it may help signal skills that individuals already have. If those with more schooling also have more inherent abilities (perhaps because schooling for them is easier or more enjoyable), employers can use schooling to predict better candidates. This is especially helpful when desirable worker attributes, like perseverance, discipline, and time management, are not easily observed. The distinction matters because, with the signaling story, the private returns to individuals overestimate the total economic gains (perhaps massively so), whereas in the case where schooling develops skills, the private gains are probably a lower bound (due to externalities).

It is very difficult to disentangle the extent to which returns to schooling are driven more by signaling or skill development mechanisms because both theories generate very similar empirical predictions. Our view of literature is that there is evidence of both (for example, Arcidiacono, Bayer, and Hizmo, 2008). That said, causal evidence of nonpecuniary returns to schooling tends to support the skill development theory more than it does signaling. According to the signaling theory, exogenous increases to schooling would affect a person's ranking, which would matter only to employers (or possibly potential spouses), but it should not affect individual decisions such as whether to smoke, vote, spank, or "live for today." If schooling affects these decisions, it likely plays more than just a signaling role.

Finally, it's worth remembering that the relationships between schooling and life outcomes mentioned throughout this discussion are averaged over some individuals who benefit more and some less. This makes assessing potential returns to schooling for subgroups complicated. Clearly, individuals differ by their tolerance for taking tests and their degree of parental support. Access to job networks and a little luck also lead to different outcomes. So not all schooling investments pay off. With sufficient sample size, results can be separated by observable characteristics (for example, by gender), which partly offsets these problems. Econometric techniques sometimes also help in identifying individuals we are often most interested in, like those on the verge of leaving school without college or a high school degree. Still, it must be recognized that the effects are averaged and do not necessarily reflect real effects for every individual.

Discussion and Next Steps

Increasing income and wealth clearly provides a central motivator for why students forego earnings and suffer through exams and writing assignments. But, as we argue in this paper, the experience and skills acquired generate many other nonpecuniary returns. Gains from school occur from being in a job that not only pays more but also offers more opportunities for self-accomplishment, social interaction, and independence. Schooling generates occupational prestige. It reduces the chance of ending up on welfare or unemployed. It improves success in the labor market *and* the marriage market. Better decision-making skills learned in

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school also lead to better health, happier marriages, and more successful children. Schooling also encourages patience and long-term thinking. Teen fertility, criminal activity, and other risky behaviors decrease with it. Schooling promotes trust and civic participation. It teaches students how to enjoy a good book and manage money. And for many, schooling has consumption value too.

This line of thought emphasizes a key weakness in much of the literature on the economics of education: Years of schooling and degree attainment are not particularly good measures of education. They provide limited information on what it is about schooling that produces both pecuniary and nonpecuniary returns. A better understanding about which particular skills generate returns and how skills are actually acquired could lead to better measures of school quality. Despite much interest, we know very little about the impact of different curricula or about different pedagogical methods and ways of organizing and running schools. An overreliance on quantitative- and qualification-based measures has neglected qualitative evidence and theoretical perspectives. For example, perhaps the effects of schooling depend just as much on the nature and quality of learning as on the number of years spent in school. Of course, the reasons why most of the research so far has focused on years of schooling or grades completed is that these data are readily available, while collecting information on curricula and teaching methods is much more difficult and costly. To extend our knowledge, we need to look more carefully at what happens during learning experiences and expand the range of measures to include the more qualitative dimensions of learning environments.

We hope to have persuaded the reader at this point that nonpecuniary returns from education are both real and important. To get a rough back-of-the-envelope measure of the relative importance between pecuniary and nonpecuniary returns, we can compare our estimated schooling effects on happiness in Table 2 before and after controlling for income. The effect before conditioning on income falls by only one-quarter after conditioning, suggesting that as much as three-quarters of the schooling effect on self-reported life satisfaction is due to nonpecuniary factors.

If returns to schooling are so high—with nonpecuniary returns that may well be even higher than the more-often-estimated pecuniary returns—why do students not stay on longer? One reason is that these returns are averaged over some individuals who benefit more and some less. Since children begin school with different capabilities and face different obstacles, not everyone faces the same costs and benefits. But this same heterogeneity also suggests that at least some students should expect larger-than-average returns. Under the basic investment model of schooling, the upfront costs for these students would have to be extremely large or the benefits extremely uncertain to rationalize early exit decisions (as calculated in Oreopoulos, 2007). In our opinion, the estimated returns are too large to support the theory that most students are optimally trading off costs and benefits when deciding how much education to acquire. Some people are missing out on significant welfare-increasing opportunities.

We suggest several explanations worth further research, each carrying quite different implications about education policy. First, low-income families may face financial obstacles in trying to afford school. They may be averse to accepting

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thousands of dollars in debt for an indefinite amount of time, or they may be unaware about how to obtain financial aid. Recent work by Bettinger, Long, Oreopoulos, and Sanbonmatsu (2009), for example, show that helping individuals from disadvantaged families complete college financial aid application forms dramatically increases enrollment. Belley and Lochner (2007) and Field (2009) offer more evidence and further reading on the importance of financial constraints.

Second, many students may be myopic. Parents with teenagers can attest that youth are particularly predisposed to downplaying or ignoring future consequences from current behavior (for a more academic gloss on this argument, see Laibson, 1997; O'Donoghue and Rabin, 1999; Spear, 2000). When teenagers and young adults make their choices about school attainment, it may be especially easy to see the immediate costs and harder to grasp fully the long-term benefits. Exploring these issues more thoroughly would shed further light on the overall education attainment decision-making process and help identify ways to make individuals recognize the large returns from schooling. Large amounts of money appear to be lying on the sidewalk. Of course, money isn't everything. In the case of returns from schooling, it seems to be just the beginning.

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References

Aakvik, Arild, Kjell G. Salvanes, and Kjell Vaage. 2010. "Measuring Heterogeneity in the Returns to Education in Norway Using Educational Reforms." *European Economic Review,* 54(4): 483–500.

Alstadsaeter, Annette. 2004. "Measuring the Consumption Value of Higher Education." NHH Discussion Paper SAM 04/2004.

Anderson, Mark D. 2009. "In School and Out of Trouble? Compulsory Schooling and Juvenile Crime." Unpublished paper.

Angrist, Joshua D., and Alan B. Krueger. 1991. "Does Compulsory Schooling Attendance Affect Schooling and Earnings." *Quarterly Journal of Economics,* 106(4): 979–1014.

Angrist, Joshua D., Victor Lavy, and Analia Schlosser. 2006. "New Evidence on the Causal Link between the Quantity and Quality of Children." IZA Discussion Paper 2075.

Arcidiacono, Peter. 2004. "Ability Sorting and the Returns to College Major." *Journal of Econometrics,* 121(1–2): 343–75.

Arcidiacono, Peter, Patrick J. Bayer, and Aurel Hizmo. 2008. "Beyond Signaling and Human Capital: Education and the Revelation of Ability." NBER Working Paper 13951.

Arrow, Kenneth J. 1974. "The Limits of Organization." New York: W.W. Norton.

Becker, Gary S. 1964. *Human Capital: A Theoretical and Empirical Analysis with Special References to Education.* (Revised editions in 1975 and 1993). Chicago: University of Chicago Press.

Becker, Gary S. 1973. "A Theory of Marriage: Part I." *Journal of Political Economy,* 81(4): 813–46.

Becker, Gary S., and Harold Gregg Lewis. 1973. "On the Interaction between the Quantity and Quality of Children." *Journal of Political Economy,* 81(2): S279–S288.

Becker, Gary S., and Casey B. Mulligan. 1997. "The Endogenous Determination of Time Preference." *Quarterly Journal of Economics,* 112(3): 729–58.

Becker, Gary S., and Nigel Tomes. 1976. "Child Endowments and the Quantity and Quality of Children." *Journal of Political Economy,* 84(4): S143–S162.

Belley, Philippe, and Lance Lochner. 2007. "The Changing Role of Family Income and Ability

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in Determining Educational Achievement." *Journal of Human Capital,* 1(1): 37–89.

Behrman, Jere R., and Mark R. Rosenzweig. 2002. "Does Increasing Women's Schooling Raise the Schooling of the Next Generation?" *American Economic Review,* 91(1): 323–34.

Bettinger, Eric, Bridget Terry Long, Philip Oreopoulos, and Lisa Sanbonmatsu. 2009. "The Role of Information and Simplification in College Decisions: Results from the H&R Block FAFSA Experiment." Unpublished paper.

Bjorklund, Anders, and Tor Eriksson. 2007. "Unemployment and Mental Health: Evidence from Research in the Nordic Countries." *International Journal of Social Welfare,* 7(3): 219–35.

Black, Sandra, Paul Devereux, and Kjell G. Salvanes. 2005a. "The More the Merrier? The Effect of Family Composition on Children's Outcomes." *Quarterly Journal of Economics,* 120(2): 669–700.

Black, Sandra, Paul Devereux, and Kjell G. Salvanes. 2005b. "Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital." *American Economic Review,* 95(1): 437–49.

Black, Sandra, Paul Devereux, and Kjell G. Salvanes. 2007. "From the Cradle to the Job Market? The Effect of Birth Weight on Adult Outcomes of Children." *Quarterly Journal of Economics,* 122(1): 409–39.

Black, Sandra, Paul Devereux, and Kjell G. Salvanes. 2008. "Staying in the Classroom and out of the Maternity Ward? The Effect of Compulsory Schooling Laws on Teenage Births." *Economic Journal,* 118(530): 1025–54.

Black, Sandra, Paul Devereux, and Kjell G. Salvanes. 2010. "The More the Smarter? Family Size and IQ." *Journal of Human Resources,* 45(1): 33–58.

Card, David. 1995. "Using Geographic Variation in College Proximity to Estimate the Return to Schooling." In *Aspects of Labour Market Behaviour: Essays in Honour of John Vanderkamp,* ed. Louis N. Christofides, E. Kenneth Grant, and Robert Swidinsky, 201–222. University of Toronto Press.

Card, David. 2001. "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems." *Econometrica,* 69(5): 1127–60.

Carneiro, Pedro Manuel, Costas Meghir, and Matthias Parey. 2007. "Maternal Education, Home Environments, and the Development of Children and Adolescents." IZA Working Paper 3072.

Cascio, Elizabeth U., and Ethan Lewis. 2006. "Schooling and the Armed Forces Qualifying Test: Evidence from School-Entry Laws." *Journal of Human Resources,* 41(2): 294–318.

Castriota, Stefano. 2006. "Education and Happiness: A Further Explanation to the Easterlin Paradox?" Unpublished paper.

Cecas V., M. A. Seff. 1989. "Social Class, Occupational Conditions, and Self-Esteem." *Sociological Perspectives,* 32(3): 353–64.

Chadwick, Laura, and Gary Solon. 2002. "Intergenerational Income Mobility among Daughters." *American Economic Review,* 92(1): 335–44.

Chen, Keith, and Fabian Lange. 2008. "Education, Information, and Improved Health: Evidence from Breast Cancer Screening." Unpublished paper.

Chiappori, Pierre-André, Murat Iyigun, and Yoram Weiss. 2009. "Investment in Schooling and the Marriage Market." *American Economic Review,* 95(5): 1689–1713.

Cohen, Sheldon, William J. Doyle, and Andrew Baum. 2006. "Socioeconomic Status is Associated with Stress Hormones." *Psychosomatic Medicine,* 68(3): 414–20.

Cunha, Flavio, and James J. Heckman. 2009. "The Economics of Psychology of Inequality and Human Development." *Journal of the European Economic Association,* 7(2–3): 320–64.

Currie, Janet, and Enrico Moretti. 2007. "Biology as Destiny? Short- and Long-Run Determinants of Intergenerational Transmission of Birth Weight." *Journal of Labor Economics,* 25(2): 231–63.

de Walque, Damien. 2004a. "Education, Information, and Smoking Decisions: Evidence from Smoking Histories, 1940–2000." Policy Research Working Paper 3362, World Bank.

de Walque, Damien. 2004b. "How Does the Impact of an HIV/AIDS Information Campaign Vary with Educational Attainment? Evidence from Rural Uganda." Policy Research Working Paper 3289, World Bank.

Dee, Thomas S. 2004. "Are There Civic Returns to Education?" *Journal of Public Economics,* 88(9–10): 1697–1720.

Desjardins, Richard. 2008. "Researching the Links between Education and Well-Being." *European Journal of Education,* 43(1): 23–35.

Duncan, Greg J. 1976. "Earnings Functions and Nonpecuniary Benefits." *Journal of Human Resources,* 11(4): 462–83.

Fehr, Ernst, and Simon Gachter. 2000. "Fairness and Retaliation: The Economics of Reciprocity." *Journal of Economic Perspectives,* 14(3): 159–81.

Field, Erica. 2009. "Educational Debt Burden and Career Choice: Evidence from a Financial Aid Experiment at NYU Law School." *American Economic Review: Applied,* 1(1): 1–21.

Fletcher, Jason M., and Steven F. Lehrer. 2009. "Using Genetic Lotteries within Families to Examine the Causal Impact of Poor Health on Academic Achievement." NBER Working Paper 15148.

Fort, Margherita. 2007. "Just a Matter of Time: Empirical Evidence on the Causal Effect of Education on Fertility in Italy." Unpublished paper.

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Green, David A., and W. Craig Riddell. 2003. "Literacy and Earnings: An Investigation of the Interaction of Cognitive and Unobserved Skills in Earnings Generation." *Labour Economics,* 10(2): 165–185.

Heckman, James J. 2006. "Lessons from the Technology of Skill Formation." *Annals of the New York Academy of Sciences,* vol. 1038, Issue: Understanding and Optimizing Human Development: From Cells to Patients to Populations, pp. 179–200.

Helliwell, John F., and Robert D. Putnam. 1999. "Education and Social Capital." NBER Working Paper 7121.

Glaeser, Edward, Giacomo Ponzetto, and Andrei Shleifer. 2005. "Why Does Democracy Need Education?" *Journal of Economic Growth,* 12(2): 77–99.

Glied, Sherry, and Adrianna Lleras-Muney. 2008. "Health Inequality, Education, and Medical Innovation." *Demography,* 45(3): 741–61.

Goldin, Claudia. 1992. "The Meaning of College in the Lives of American Women: The Past One-Hundred Years." NBER Working Paper 4099.

Grossman, Michael. 2006. "Education and Nonmarket Outcomes." Chap. 10 in *Handbook of the Economics of Education,* vol. 1, ed. Eric Hanushek and Finis Welch. Elsevier.

Hammermesh, Daniel S. 1999. "Changing Inequality in Markets for Workplace Amenities." *Quarterly Journal of Economics,* 114(4): 1085–1123.

Hanushek, Eric. 2002. "Publicly Provided Education." Chap. 30 in *Handbook of Public Economics,* vol. 4, ed. Alan Auerbach and Martin Fedstein. Elsevier.

Haveman, Robert H., and Barbara L. Wolfe. 1984. "Schooling and Economic Well Being: The Role of Nonmarket Effects." *Journal of Human Resources,* 19(3): 377–407.

Jones, Larry E., and Michelle Tertilt. 2008. "An Economic History of Fertility in the United States: 1926–1960." Chap. 5 in *Frontiers of Family Economics,* vol. 1, pp. 165–230.

Jones, Larry E., Alice Schoonbroodt, and Michele Tertilt. 2008. "Fertility Theories: Can They Explain the Negative Fertility–Income Relationship?" NBER Working Paper 14266.

Kalil, Ariel, Rebecca Ryan, and Michael Corey. 2010. "Diverging Destinies: Maternal Education and the Development Gradient in Time with Children." Unpublished paper.

Kane, Thomas, and Cecilia Rouse. 1993. "The Labor Market Returns to Two and Four Year College: Is a Credit a Credit and Do Degrees Matter?" NBER Working Paper 4268.

Kenkel, Donald S. 1991. "Health Behavior, Health Knowledge, and Schooling." *Journal of Political Economy,* 99(2): 287–305.

Kenkel, Donald S. 2000. "Prevention." In *Handbook of Health Economics,* vol. 1B, ed. Anthony J. Culyer and Joseph P. Newhouse, 1675–1720. Elsevier.

Kenkel, Donald, Dean Lillard, and Alan D. Mathios. 2006. "The Role of High School Completion and GED Receipt in Smoking and Obesity." *Journal of Labor Economics,* 24(3): 635–60.

LaFortune, Jeanne. 2010. "Making Yourself Attractive: Pre-marital Investments and the Returns to Education in the Marriage Market." Unpublished paper.

Laibson, David. 1997. "Golden Eggs and Hyperbolic Discounting." *Quarterly Journal of Economics,* 112(2): 443–77.

Lange, Fabian, and Robert Topel. 2006. "The Social Value of Education and Human Capital." Chap. 8 in *Handbook of Education Economics,* vol.1, eds. Eric Hanushek and Finis Welch. Elsevier.

Lazear, Edward. 1977. "Education: Consumption or Production?" *Journal of Political Economy,* 85(3): 569–98.

Lee, David S., and Justin McCrary. 2005. "Crime, Punishment, and Myopia." NBER Working Paper 11491.

Li, Mingliang. 2006. "High School Completion and Future Youth Unemployment: New Evidence from High School and Beyond." *Journal of Applied Econometrics,* 21(1): 23–53.

Lleras-Muney, Adriana. 2005. "The Relationship between Education and Adult Mortality in the United States." *Review of Economic Studies,* 72(1): 189–221.

Lochner, Lance, and Enrico Moretti. 2004. "The Effect of Education on Criminal Activity: Evidence from Prison Inmates, Arrests, and Self-Reports." *American Economic Review,* 94(1): 155–89.

Lundborg, Peter. 2008. "The Health Returns to Schooling: What Can We Learn from Twins?" IZA Discussion Paper 3389.

Machin, Stephen J., Panu Pelkonen, and Kjell G. Salvanes. Forthcoming. "Education and Mobility." *Journal of the European Economic Association.*

Malamud, Ofer. 2009. "Discovering One's Talent: Learning from Academic Specialization." NBER Working Paper 15522.

Mare, Robert D. 1991. "Five Decades of Educational Assortative Mating." *American Sociological Review,* 56(1): 15–32.

Meghir, Costas, and Marten Palme. 2005. "Educational Reform, Ability, and Family Background." *American Economic Review,* 95(1): 414–24.

Michael, Robert T. 1973. "Education in Nonmarket Production." *Journal of Political Economy,* vol. 81, no, 2, part 1, pp. 306–27.

Milligan, Kevin, Enrico Moretti, and Philip Oreopoulos. 2004. "Does Education Improve Citizenship? Evidence from the U.S. and the U.K." *Journal of Public Economics,* 88(9–10): 1667–95.

Moretti, Enrico. 2004. "Human Capital Externalities in Cities." Chap. 51 of *Handbook of Regional*

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and Urban Economics, vol. 4. Elsevier.

McPeck, John E. 1994. "Critical Thinking and the "Trivial Pursuit" Theory of Knowledge." In *Re-thinking Reason: New Perspectives in Critical Thinking*, ed. Kerry S. Walters. New York: Suny Press.

Neumark, David. 1999. "Biases in Twin Estimates of the Return to Schooling." *Economics of Education Review*, 18(2): 143–48.

O'Donoghue, Ted, and Matthew Rabin. 1999. "Doing It Now or Later." *American Economic Review*, 89(1): 103–24.

The Onion. 2000. "Account Manager Fondly Remembers Day in College When Everyone Hung Out on Roof." June 7, issue 36, no. 21.

Oreopoulos, Philip. 2006a. "The Compelling Effects of Compulsory Schooling: Evidence from Canada." *Canadian Journal of Economics*, 39(1): 22–52.

Oreopoulos, Philip. 2006b. "Estimating Average and Local Average Treatment Effects of Education when Compulsory School Laws Really Matter." *American Economic Review*, 96(1): 152–75.

Oreopoulos, Philip. 2007. "Do Dropouts Drop Out Too Soon? Wealth, Health, and Happiness from Compulsory Schooling." *Journal of Public Economics*, 91(11–12): 2213–29.

Oreopoulos, Philip, Marianne Page, and Ann Stevens. 2006. "The Intergenerational Effects of Compulsory Schooling." *Journal of Labor Economics*, 24(4): 729–60.

Perez-Arce, Francisco. 2010. "The Effect of Education on Time Preferences." Unpublished paper.

Pierce, Brooks. 2001. "Compensation Inequality." *Quarterly Journal of Economics*, 116(4): 1493–1525.

Plug, Erik. 2004. "Estimating the Effect of Mother's Schooling on Children's Schooling Using a Sample of Adoptees." *American Economic Review*, 94(1): 358–68.

Pope, Devin G., and Jaren C. Pope. 2009. "The Impact of College Sports Success on the Quantity and Quality of Student Applications." *Southern Economic Journal*, 75(3): 750–80.

Powdthavee, Nattavudh. 2009. "Does Education Reduce Blood Pressure? Estimating the Biomarker Effect of Compulsory Schooling in England." Discussion Paper no. 2009/4, Department of Economics, University of York.

Qian, Nancy. 2009. "Quantity-Quality and the One Child Policy: The Only-Child Disadvantage in School Enrollment in Rural China." NBER Working Paper 14973.

Riddell, Craig W., and Xueda Song. 2008. "The Causal Effects of Education on Adaptability to Employment Shocks: Evidence from the Canadian Labour Market." Unpublished paper. (Working Paper 8, Canadian Labor Market and Skills Researcher Network, 2009).

Rockwell, Richard. 1976. "Historical Trends and Variations in Educational Homogamy." *Journal of Marriage and the Family*, 38(1): 83–96.

Ross, Catherine E., and John Mirowsky. 1999. "Refining the Association between Education and Health: The Effects of Quantity, Credential, and Selectivity." *Demography*, 36(4): 445–60.

Schwarz, Norbert, and Fritz Strack. 1999. "Reports of Subjective Well-Being: Judgmental Processes and Their Methodological Implications." Chap. 4 in *Well Being: The Foundations of Hedonic Psychology*, ed. Daniel Kahneman, Ed Deiner, and Norbert Schwarz. New York: Russell Sage Foundation.

Sheeran, Paschal, Dominic Abrams, and Sheina Orbell. 1995. "Unemployment, Self-Esteem, and Depression: A Social Comparison Theory Approach." *Basic and Applied Social Psychology*, 17(1 & 2): 65–82.

Soloveichik, Rachel. 2007. "Does Education Cause Vision Problems? An Instrumental Variables Estimate." Unpublished paper.

Solow, Robert M. 1990. *The Labor Market as a Social Institution*. Cambridge, MA. Basil Blackwell, Inc.

Soskice, David W. 1993. "Social Skills from Mass Higher Education: Rethinking the Company-based Initial Training Program." *Oxford Review of Economic Policy*, 9(3): 101–13.

Spear, L. P. 2000. "The Adolescent Brain and Age-Related Behavioral Manifestations." *Neuroscience and Biobehavioral Reviews*, 24(4): 417–63.

Stein M. T., and E. L. Perrin. 1998. "Guidance for Effective Discipline. American Academy of Pediatrics. Committee on Psychosocial Aspects of Child and Family Health." *Pediatrics*, vol. 101, no. 4, part 1, pp. 723–28.

Sullivan, Daniel, and Till von Wachter. 2009. "Job Displacement and Mortality: An Analysis Using Administrative Data." *Quarterly Journal of Economics*, 124(3): 1265–1306.

Uslaner, Eric M. 2000. "Producing and Consuming Trust." *Political Science Quarterly*, 115(4): 569–90.

Wagstaff, Adam. 1993. "The Demand for Health: An Empirical Reformulation of the Grossman Model." *Health Economics*, 2(2): 189–98.

Winkelmann, Liliana, and Rainer Winkelmann. 1997. "Why Are the Unemployed So Unhappy? Evidence from Panel Data." *Economica*, 65(257): 1–15.

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