

**What Do We Know About the Economic Benefits of the GED?  
A Synthesis of the Evidence from Recent Research**

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## **Abstract**

### **What Do We Know About the Economic Benefits of the GED? A Synthesis of the Evidence from Recent Research**

This paper synthesizes new research on the economic impact of the General Educational Development (GED) credential. Four new lessons emerge from research that has been conducted since a comprehensive review of GED-related research that was published in 1998. First, any economic benefits associated with a GED seem to accrue only to low skilled dropouts, with no benefits for higher skilled dropouts. Second, economic benefits associated with a GED appear over time rather than immediately upon receipt of the credential. Third, GED benefits associated with post-secondary education and training are small due to the small amounts of each that GED holders obtain. Fourth, many GEDs are obtained in prison and there appears to be no economic payoff to obtaining a “prison GED.”

J.E.L Classifications: I21 (Analysis of Education) and J24 (Human Capital Formation)

## **What Do We Know About the Economic Benefits of the GED? A Synthesis of the Evidence from Recent Research**

### I. Introduction

The General Educational Development or GED credential has become an important education credential for school dropouts in the U.S. In 2000 half a million individuals earned their GED credential and each year about one in every seven high school “diplomas” is a GED credential. In fiscal year 1999-2000 federal funds for adult education programs authorized by the Adult Education and Family Literacy Act of 1998 totaled \$365 million. A large portion of these funds benefited GED preparation programs.

The ascent of the GED has garnered the attention of researchers seeking to quantify any economic benefits that might be associated with the credential. In 1998 Boesel, Alsalam, and Thomas (hereafter BAT) synthesized the GED research that had been conducted up to that point. A section of that synthesis examined the research concerning the labor market performance of GED recipients. Informative additional research on the economic benefits of the GED has emerged in the years since the BAT review. The goals of this paper are to update our knowledge of how the GED works in the labor market in light of the most recent research, reconcile findings from the recent work with earlier research results, and suggest directions for future research on the GED in light of what we now know.

The focus in this paper will be on results that compare how GED recipients fare in comparison to school dropouts who lack the credential rather than a comparison between GED holders and regular high school graduates. The reason for this emphasis is that there has been virtually no new information in the last few years on how GED holders perform

in the labor market relative to regular high school graduates. Cameron and Heckman first addressed this question (1993), and their results have held up over several subsequent studies. The consensus is that GED recipients are not the labor market equivalents of regular high school graduates regardless of the measure. Most post-Cameron and Heckman research has examined a different question: once the drop out decision is made, is there any economic payoff to obtaining a GED? Answering this question involves comparing dropouts who obtain a GED to dropouts who lack the credential.

The synthesis of the most recent research in this area will point to four areas where we have gained substantial knowledge since BAT. First, the GED apparently has different payoffs for dropouts who left school with different skills. The research shows that there are substantial economic gains associated with the GED for dropouts who left school with weak skills, and essentially no GED-related benefits for dropouts who left school with higher skills. Research that does not take this differential effect into account will tend to understand any economic returns to the credential. Second, recent research indicates that it takes some time for the economic benefits associated with a GED to accrue. Research that only looks at the short term returns to a GED may miss a substantial portion of the impact of the credential on labor market outcomes. Third, the payoffs to post-secondary education and on the job training are just as high for GED holders as they are for regular high school graduates, and GED holders tend to obtain more of both than do uncredentialed dropouts. There is, however, an important caveat to this finding. Even though GED holders obtain more of these human capital enhancing activities than uncredentialed dropouts do, they still obtain very little of each. As a result, the evidence is that these indirect routes constitute only trivial portions of the measured

economic returns to a GED. Fourth, results from new work examining the returns to GEDs that are obtained while in prison will be presented and discussed. The emerging evidence here is that a substantial number of GEDs are earned while the examinee is incarcerated and there are apparently no economic benefits to these “prison GEDs.”

## II. The GED: History, Relationship to the Labor Market, and Research Issues

The GED program was started in 1942 as a means of certifying that veterans returning from World War II without a conventional high school diploma had the skills to take advantage of the post-secondary education benefits provided in the GI Bill. In 1947 New York allowed school dropouts who were not veterans to seek the GED credential, and other states soon followed. The rapid growth in the number of people receiving the GED credential began in the late 1960s as the Great Society programs provided funding for GED preparation programs. Currently about 700,000 dropouts attempt the GED exams each year and about 500,000 of these earn their credential.

Obtaining a GED is contingent upon passing a five test battery of exams that takes about seven and three-quarter hours when taken all at the same time. Four of the five tests in the battery are multiple choice exams covering mathematics, social studies, science, and interpretation of literature. Writing is tested via multiple-choice questions and a short essay exercise. The American Council for Education (ACE) produces and administers the tests, and the Commission on Educational Credit and Credentials of the American Council sets minimum passing scores on the exams for Education. Each state education agency, however, is free to set higher passing standards if it so chooses. Until 1997 this was an important consideration as many states chose higher standards than those set by the ACE generating substantial variation across states in what it took to pass the GED

exams. In 1997 ACE raised the required minimum so that since that time most states have had the same GED passing standard. Under certain conditions that also vary by state, individuals who fail the GED exams may retake the tests.

Since this paper examines the recent evidence on the economic returns to a GED, it is worth asking in what ways could obtaining this credential lead to higher wages and/or greater employment. There are three primary mechanisms through which a GED could lead to better labor market outcomes. First, for students with weak cognitive skills, studying to pass the GED exams could lead to gains in human capital that might be rewarded in the labor market. Second, if it is the experience of employers that GED holders are more productive employees than dropouts without a GED, then employers will likely use the GED as a signal of hard to observe productive traits such as higher cognitive skills, motivation, or commitment to work. If the GED does serve as a labor market signal, then we would expect to see GED holders with higher employment levels, more annual hours worked, and higher wages. Finally, dropouts may use the GED to gain access to post-secondary education and training and to the student loans and grants that pay for these human capital-enhancing activities. To the extent that this happens, and to the extent that these activities lead to better labor market outcomes, acquiring a GED would be associated with economic benefits.

While there are theoretical mechanisms that link GED acquisition to better outcomes in the labor market, it is an empirical question whether or not these causal connections actually adhere in the labor market. Unfortunately, thorny problem underlies the research that would answer this question. Since GED holders are a self-selected group, simple

estimates of the economic payoff to the credential are subject to incorrect inferences. A stylized example illustrates the problem.

Consider Sue and Jane, two school dropouts in their early twenties who have virtually identical “observable” characteristics. They are of the same racial/ethnic background, the same age, have identical family backgrounds, come from similar neighborhoods, and they dropped out of school at the same time. Neither Sue nor Jane has been particularly motivated to work since dropping out, and both have moved in and out of a variety of low-skilled, low paying jobs. Sue has recently decided, however, that she is tired of this life style and has begun pursuing more serious employment. She begins spending time and effort honing her interview skills and looking for a better paying job that might lead to a career. Her work pays off and she finds the best paying job that she has yet had, a job that also promises a real future. At the same time she decides, for whatever reason, to obtain a GED. Meanwhile, Jane’s relationship with the labor market remains unchanged. For this example, we assume that the causal impact of the GED on earnings is small or even zero.

What would we find if we had a data set containing many individuals such as Sue and Jane? Consider first a cross sectional regression analysis conducted some time after the “Sues” in the data set obtained their GED. Such an analysis would estimate the parameters in a model such as,

$$y_i = X_i\beta + \delta GED_i + \varepsilon_i ,$$

where  $y$  is a labor market outcome, say annual earnings,  $X$  is a vector of observable characteristics in the data,  $\beta$  represents a vector of coefficients associated with the  $X$ ’s,  $GED$  is an indicator variable identifying the GED holders in the data, and  $\varepsilon$  is a standard

error term. In this model estimates of  $\delta$  represent the difference in the mean earnings of the GED holders in the data relative to uncredentialed dropouts after controlling for the effect of all the available observable characteristics on earnings.

Given the Sue and Jane scenario, estimates of  $\delta$  would be positive and statistically significant. Even after controlling for all observable characteristics, the GED-holding Sues in the data would have higher estimated annual earnings than the uncredentialed Janes, since Sue and her counterparts had unobservable (to the researcher) changes that caused them to land better jobs. Given the story of Sue and Jane, however, it is not clear how much, if any, of the higher earnings are attributable to obtaining a GED versus how much is due to changes in attitude, motivation, and commitment to work that occurred along with the decision to obtain a GED. The researcher's problem in this case is the absence of variables that would allow us to partition Sue's greater earnings into those that are due to her increased motivation and commitment and those that are the result of her having pursued and obtained a GED. Unable to do that, estimates of the *causal* effect of the GED on earnings in this case would be biased upward by an unknown amount.

Would the availability of longitudinal data solve this evaluation problem?

Longitudinal analysis would show the dropouts in the data set with similar earnings up to the point where Sue and others like her obtain their GED. At that point the earnings of the GED holders would begin to diverge in a positive manner from those of the uncredentialed dropouts. It would appear that the earnings of dropouts improved *when they obtained their GED*. While true, this still does not answer the question of how much, if any, of the higher earnings are causally attributable to the GED credential versus how much are due to behavioral changes that are correlated with obtaining the credential.

Longitudinal data does not help us solve the evaluation problem in this case. Even the analytically powerful technique known as “fixed effects” estimation would not help us to unravel the knot in this case. “Fixed effects” estimation uses longitudinal data to control for each individual’s unobserved and unchanging traits that may affect the outcome. Since the problem as presented in the Sue and Jane story is that GED holders (Sue) and uncredentialed dropouts (Jane) differ in unobservable ways that *vary over time*, fixed effects estimation will not solve the bias problem.

This stylized example highlights the fact that even with rich longitudinal data and powerful analytic techniques, reliable estimates of the *causal* effect of the GED on labor market outcomes are hard to obtain. Causal interpretations of the effect of the GED are often tenuous because there is the worry that individuals self-select into the GED pool on unobservable factors that are themselves related to the outcome of interest. Experimental conditions where the GED is randomly assigned would solve this research problem, but carrying out such an experiment poses its own problems and has never been attempted. There are two potential alternatives to a controlled experiment that could solve the evaluation problem. The first is the presence of conditions that would simulate a random assignment of the GED, while the second is the presence of sufficient information that would allow the researcher to accurately model the GED selection process. The “quasi-experimental” approach has proven to be a more fruitful avenue than obtaining data rich enough to allow a modeling of the GED selection process. The one study that has utilized quasi- or natural-experimental approach will be discussed later in the paper. As in most social science research, however, our eventual understanding of how the GED works in

the labor market will derive from the accumulation of evidence from many studies that employ many different data sets and research methods.

### III. Lessons from BAT and An Overview of the Post-BAT Research

The BAT synthesis of GED research covered work that occurred up to 1997. Three regularities emerged from that research. First, GED holders tend to come from more advantaged backgrounds than uncredentialed dropouts, and they tend to complete more years of schooling before dropping out and have higher cognitive skill levels than dropouts without a GED. Second, GED holders have higher estimated wages and annual earnings than uncredentialed dropouts. Third and most important, however, is that the wage and annual earnings advantages of GED holders become much smaller and often statistically insignificant when years of completed schooling and/or cognitive skill differences are accounted for.

Since BAT there have been four published papers and four unpublished working papers examining the economic benefits of the GED. The main features of these papers are summarized in Table 1. All of the post-BAT papers are from 1999 or later, and all of the papers are by authors whose earlier GED research was covered in the BAT synthesis. Four different data sources and several different research methods are represented in the papers that are summarized in Table 1. Like earlier work on the GED, most but not all, of the recent research examines males.

An examination of the “Methods” column indicates that several studies used longitudinal data to estimate what are known as “fixed effects” models. The advantage of this research technique is that it controls for all unobserved differences between GED holders and uncredentialed dropouts that are *unobservable* and *time-invariant*. For

example, if dropouts who obtain a GED tend to be more motivated than other dropouts, and if motivation is rewarded in the labor market, then failure to control for this unobserved characteristic would bias estimates of the effect of the GED on earnings or employment upward.<sup>1</sup> Under an assumption that this unobserved motivation does not change over time, fixed effects estimation accounts for this confounding factor.

With the exception of the Heckman, Hsueh, and Rubinstein paper, the results summarized in the last column consistently indicate that obtaining a GED leads to substantially better labor market outcomes, at least for the least skilled GED holders. Reconciling this departure from the earlier research covered in BAT is discussed below.

#### IV. Major Findings of the Recent GED Research

The next sections present and discuss research from the eight papers summarized in Table 1. While all of the papers focus on estimating the economic benefits of obtaining a GED, the lessons we learn from the recent research are best grouped and discussed in four categories. For expository convenience in the text that follows, I will on occasion reference the papers in Table 1 by their numbers in that table.

##### *Lesson 1. The Payoffs to a GED Are Different for Low Skilled and High Skilled Dropouts*

The BAT synthesis reviewed a working paper by Tyler, Murnane, and Willett (1998). As BAT explained this paper utilized a quasi-experimental research design that exploited the fact that in 1990 some states had higher GED passing standards than other states. This interstate variation in GED passing standards allowed Tyler, Murnane, and Willett to compare the earnings of dropouts who passed the GED in states having relatively low passing standards with the earnings of other dropouts who took the test and

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<sup>1</sup> Heckman, Hsueh, and Rubinstein (2000) discuss the non-cognitive traits of GED holders. Their work is

received the same scores but did not pass because they lived in states with higher passing standards. This approach allows for earnings comparisons between dropouts with the same motivation to take the tests and the same cognitive skills, some of whom received their GED and some of whom did not by virtue of the states they happened to live in. The estimated impact of the GED on earnings in this paper, 10 to 19 percent larger for white GED holders, were substantially larger than previous estimates in the literature.

BAT did not pursue the question of how to reconcile the large effects found in the Tyler, Murnane, and Willett (hereafter TMW) working paper with the much more modest and often insignificant returns to the GED found in the other papers they reviewed. There are three possible answers for the differences: (1) different data, (2) different estimation methods, and (3) different true returns to the GED for different dropout populations. The TMW working paper was subsequently redrafted and published in the *Quarterly Journal of Economics* under the title of “Estimating the Labor Market Signaling Value of the GED” (2000). In this version TMW directly addressed the fact that their estimates were larger than previous estimates in the literature. They explained that as a result of their research design, their estimates were driven by GED holders who barely passed the GED exams, GED holders with the lowest cognitive skill levels. In contrast, estimates from prior research was based on all GED holders in a given data set and previous authors had adopted an implicit assumption that the impact of the GED on earnings was independent of skill level. When this is not the case and there are differential impacts for different subgroups in the population, then the resulting estimate is a weighted-average of the

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discussed in detail later in this paper.

differential impacts for each subgroup, where the weights are given by the proportion of each subgroup in the population.

Now consider a case where the GED has a small or zero impact on the outcomes of relatively high skilled dropouts and a more substantial impact on the outcomes of lower skilled dropouts. Estimates from specifications that constrain the impact to be the same for both groups could be small and insignificant in this situation, while estimates that allow the impact to differ by skill-group could uncover statistically significant impacts for low skilled dropouts. This scenario offers a possible reconciliation of the TMW estimates with previous research.

A testing of this proposition requires data with both low and high skilled dropouts and a specification that would allow differential impact of the GED by skill level. The data and specification in “Who Benefits from a GED? Evidence from High School and Beyond” (Murnane, Willett, and Tyler 2000) fit these criteria, and the results from this paper support the proposition that low skilled dropouts benefit substantially from the GED, while higher skilled dropouts receive little or no economic benefit. The measure of cognitive skill in this paper was scores on a 10<sup>th</sup> grade math achievement test. Low skilled dropouts were defined as those in the bottom quartile of the math test score distribution. The estimated impact of the GED on the log earnings of 27 year-old low skilled males was about 36 percent when only controls for family background, region of the country, and 10<sup>th</sup> grade math test score were used, and 28 percent when controls for work experience were added (Table 6, Models 1 and 2 respectively, of paper II in Table 1 of this paper). In none of the specifications could the authors reject the null hypothesis that the log earnings of higher skilled GED holders were different from the log earnings

of similarly high skilled uncredentialed dropouts. An important section of this paper reproduced earlier GED results by estimating specifications where the impact of the GED was constrained to be the same across dropout skill levels. In these specifications the effect of the GED on earnings was consistently small and statistically insignificant.

Additional support for the hypothesis that the impact of the GED on outcomes depends on the skill level of the dropout came from two other papers. “Do Male Dropouts Benefit from Obtaining a GED, Postsecondary Education, and Training?” (Murnane, Willett, and Boudett 1999) also examined males, but used data from the NLSY. Low skilled male dropouts in the NLSY data were defined as those in the bottom three-quarters of the Armed Forces Qualifying Test (AFQT) distribution.<sup>2</sup> Five years after obtaining a GED, low skilled male GED holders in the NLSY were predicted to have wages that were six percent higher (Table 4, Model 1a of paper I) and earnings that were almost 10 percent higher (Table 5, Model 1a of paper I) than low skilled uncredentialed dropouts. The hourly wage results were robust to a fixed effects specification, while the earnings results dropped by about one half and became insignificant in the fixed effects specification. Again, there was no evidence that the wages or earnings of higher skilled GED holders differed from those of higher skilled uncredentialed dropouts.

“Who Benefits from a GED? Evidence for Females from High School and Beyond” (Tyler, Murnane, and Willett 2001) explored whether the differential GED-impact hypothesis held for females. The results here were very similar to results for males using HSB data. At age 27 low skilled female GED holders had annual earnings that were 25 percent higher than low skilled female dropouts without a GED, while there was no

difference in the age 27 earnings of higher skilled female GED holders and uncredentialed dropouts (Table 8, Model 1 in paper IV).

One other post-BAT paper examined the effect of the GED on low skilled dropouts. Heckman, Hsueh, and Rubinstein (2000) used NLSY data and a sample of white dropouts in the second quartile of the AFQT distribution to examine the effect of the GED on log hourly wages. Their fixed effects results were similar to the Murnane, Willett, and Boudett results in paper I (1999) in that they found that the hourly wages of low skilled GED holders were about five percent higher than those of low skilled dropouts without a GED. A difference in the results from the two papers is that the Murnane et al results were statistically significant, while those of Heckman et al were not. This difference may be explained by the fact that the Murnane et al specification allowed the impact of the GED on wages to grow over time while the Heckman et al specification did not. As will be discussed later, one finding from the recent round of research is that the GED apparently has little effect on outcomes in the first years after receipt.

Recent research offers a final lesson regarding the effect of the GED on wages or earnings. The GED could affect labor market outcomes either directly or indirectly by providing access to other interventions that positively affect labor market outcomes. The direct effect of the credential would occur either through generating increases in human capital or by serving as a labor market signal. The indirect effect of the credential on outcomes could come about because the GED might increase individuals' chances of garnering post-secondary education credits or hours in job training that are themselves linked to better labor market outcomes. Two papers in particular, the Murnane, Willett,

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<sup>2</sup> The AFQT score is a weighted average of four subtests of the Armed Services Vocational Aptitude

and Boudett *Evaluation Review* paper (1999) and the Boudett *Monthly Labor Review Paper* (2000) offer strong evidence that the bulk of the GEDs impact on wages and earnings occurs through the direct effect rather than any indirect effect. The relationship between GED attainment and post-secondary education and training will be discussed in detail in a later section. Suffice to say at this point that the indirect effect of the GED through these human capital enhancing activities is small in large part because dropouts obtain very little post-secondary education and on the job training.

*Lesson 2. It Takes Time for the Effects of the GED on Wages or Earnings to Appear*

The BAT review of the TMW working paper first alerted us to the possibility that it may take time for the effects of the GED on wages or earnings to appear. BAT points out that the TMW results indicate that “GED earnings increased year by year but were relatively low or negative in the first 2 years after attainment of the credential” (Boesel, Alsalam, and Smith 1998, p. 53). BAT reviewed another paper that also offered evidence that the early effects of the GED might be small (Murnane, Willett, and Boudett 1995), but they did not comment on this feature of this particular paper. Several post-BAT papers have now reinforced the hypothesis that it takes time for GED effects to appear. Two papers use the longitudinal nature of NLSY data to estimate the effect of the GED on wage and earnings growth. Murnane, Willett, and Boudett (Murnane, Willett, and Boudett 1999) examine the evidence for males, while Boudett (2000) uses the NLSY to study females. The first paper shows that the linear rate of wage growth of low skilled GED recipients increased by approximately 1.5 percent over the predicted rate in the absence of the credential (Table 4, Model 1 in paper I). Thus, if one compared the wages

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Battery (ASVAB) that was administered to 94 percent of the participants in the NLSY in 1980.

of low skilled GED holders to those of low skilled uncredentialed dropouts one year after the receipt of the credential, only small differences would be observed. As reported earlier, however, the wage difference after five years is six percent and statistically significant. In fixed effects models the Boudett paper finds that the earnings of female dropouts grow at a faster rate after GED attainment than before. The predicted earnings gain associated with a GED in the first year after the credential is earned is about \$300, while the GED earnings advantage seven years after GED receipt is about \$1,300.

Further evidence on the timing of GED effects comes from a different longitudinal data set employed by Tyler (2001). He used GED test data on male dropouts who attempted the GED in Florida between the years of 1994 and 1998, merged with quarterly earnings from the Florida Unemployment Insurance system. Quarterly earnings are available from the first quarter of 1993 through the last quarter of 1999. Figure 1 displays the estimated differences in mean quarterly earnings (and 95% confidence bands) between male dropouts in Florida who eventually passed their GED exams (at quarter = 0) and GED candidates who never passed the exams. The estimates are derived from a series of regressions by quarter that control for age and age squared, race/ethnicity, highest grade completed, both initial and final score on each of the GED exams, and whether the candidate attempted the GED exams more than once. Figure 1 indicates that GED holders earn less than \$100 per quarter more than uncredentialed dropouts do for the first 11 or 12 quarters after they obtain their GED. Furthermore, any observed differences during the first 12 months may be the result of sampling error. After the 11<sup>th</sup> or 12<sup>th</sup> quarter, however, the earnings advantage associated with the GED begins to climb and about five years after the GED attempt, GED holders earn around \$400 more per

quarter than uncredentialed dropouts. This represents about a 15 percent increase in earnings after five years, a figure that is close to the other estimates reviewed in this paper. Tyler also obtained fixed effects estimates that were very similar to the Ordinary Least Squares (OLS) estimates depicted in Figure 1. In an attempt to control for potentially *time varying*, unobserved differences in GED holders and uncredentialed dropouts as was discussed at the beginning of this paper, Tyler also estimated models that controlled for pre-GED attempt earnings and employment dynamics. The idea is that to the extent that employment and earnings patterns prior to the attempt capture unobservable changes in behavior and attitudes, correct inferences can be obtained even in the face of time-varying, unobservable differences between GED holders and uncredentialed dropouts. Again, the estimates from this model are very similar to the OLS and fixed effects estimates.

An additional piece of information in Figure 1 is that there are essentially no differences in the pre-attempt earnings patterns of eventual GED holders and permanently uncredentialed dropouts. This suggests that simply controlling for who *attempts* the GED exams may capture much of the difference between GED holders and uncredentialed dropouts that is related to earnings.

### *Lesson 3. Post-Secondary Education and Training Could Be Important for GED Holders...But They Usually Are Not*

A 1997 paper by Murnane, Willett, and Boudett that was reviewed by BAT found that acquisition of a GED led to a greater probability of obtaining post-secondary education or non-company training (Murnane, Willett, and Boudett 1997). Non-company or off-the-job training is defined as training provided by the government or proprietary schools. A question remaining from that work was whether or not there are returns to

post-secondary education and either on- or off-the-job training for GED holders. This question was addressed in two post-BAT papers.

Three interesting findings on post-secondary education and training emerge from the first paper, “Do Male Dropouts Benefit from Obtaining a GED, Postsecondary Education, and Training?” The first is that college pays off for dropouts who use the GED to gain access to post-secondary education and that dropouts who obtain on-the-job training experience higher wages (Table 4, Model 1a in paper I). The second and critical finding on the subject is that GED holders obtain very little post-secondary education or on-the-job training. Only 12 percent of the GED holders in the sample completed at least one year of college, only 3 percent obtained an Associate’s Degree, and only 18 percent of the GED holders obtained any on-the-job training. The median training time for on-the-job training was 63 hours. Thus, the average impacts of college and on-the-job training on the wage profiles of male GED recipients are very small because so few GED holders participated in these activities. The final lesson from this study is that the one type of human capital investment that a large percentage of GED recipients participated in, off-the-job training, did not result in higher wages. 41 percent of the GED holders obtained some off-the-job training and the median amount of training time was 569 hours.

However, there was no measurable effect of this type of intervention on their wages.

The second paper examining the effect of post-secondary education and training on the outcomes of dropouts was the *Monthly Labor Review* paper of Boudett (2000).

Boudett’s findings for females essentially echo what Murnane, Willett, and Boudett found for males: there are payoffs to post-secondary education and on-the-job training, but GED holders obtain little of either. There is one departure in the Boudett paper from

the findings of Murnane, Willett, and Boudett. Unlike the case for males, off-the-job training appears to pay dividends for females. Boudett found that a year of off-the-job training is associated with earnings gains of \$1,239 in each subsequent year. This is important, because 46 percent of the female GED holders in her sample obtained some off-the-job training, and the median hours in training was 527 hours, or almost half a year of training by her definition.

*Lesson 4. Relatively Many GEDs are Acquired in Prison With Apparently No Economic Benefits Accruing to the Recipients*

The Tyler, Murnane, and Willett (1998) working paper reviewed by BAT presented a puzzle that remained in the published version of that paper (Tyler, Murnane, and Willett 2000). While TMW estimated that obtaining a GED led to substantial earnings gains for white dropouts, they found no evidence that the credential affected the earnings of dropouts who were not white. One of the explanations offered was that a potentially large portion of minority GED holders, particularly black men, obtained their GED in prison. The estimated value of the GED for this group could be depressed either because they carried a prison “stigma” into the labor market or because a non-trivial portion of them were still in prison when their Social Security earnings were measured five years later.

Using a special data set containing the universe of Florida dropouts who attempted the GED *while in prison*, Tyler examines this issue (2001). To replicate the TMW sample as closely as possible, Tyler combined the Florida data based on incarcerated GED candidates with a data set containing Florida GED candidates who did *not* attempt the GED while in prison. Almost 20 percent of the black male candidates in this combined data set attempted the GED exams while in prison. The figures for white and Hispanic males are 2.9 percent and 3.9 percent, respectively. The non-trivial percentage of

dropouts who attempt the GED while incarcerated could potentially help to explain the white-nonwhite GED differences in the TMW paper.

To assess this possibility, Tyler generated two different sets of estimates using the Florida data. One set of estimates was based on the combined sample that included male candidates who attempted the GED while incarcerated, and the other set was based on a sample that excluded these individuals. These estimates, along with the original TMW estimates, are presented here in Table 2. The first columns in the table replicate the three sets of estimates from Table V in the published TMW paper (paper III in Table 1). These estimates are based on three different samples, each of which included data from candidates whom attempted the GED while incarcerated. Regardless of the sample, the TMW estimates show statistically significant GED effects for young, white GED candidates and much smaller (and even negative) results for non-white candidates, none of which are statistically different from zero.

The right most columns in the table provide results from the Florida data. Like TMW, estimates in the first row are based on a sample that includes candidates who attempted the GED while incarcerated. Similar to TMW, these estimates indicate that young, white GED holders have an annual earnings advantage over young, white uncredentialed dropouts that is large (\$1,293) and statistically significant. This estimated earnings gain represents a 16.7 percent increase in annual earnings, a figure that lies in the middle of the TMW estimates. Meanwhile, the estimated GED advantage for non-white candidates is much smaller and statistically insignificant.

The estimates in the second row, based on a sample containing no candidates who attempted the GED while in prison, indicate that white GED holders have a \$1,576

earnings advantage over unsuccessful candidates. The result is statistically significant and is a 20 percent advantage over the earnings of white unsuccessful candidates who did not attempt the GED while incarcerated. However, when prison GEDs are excluded from the minority group sample, the estimated earnings advantage for GED holders is \$1,258, statistically significant, and represents an 18 percent earnings advantage.

The lessons from Table 2 are quite explicit. Including candidates who attempted to obtain a GED while incarcerated depresses GED estimates only slightly for whites. However, because a relatively large percentage of minority candidates earn their GED in prison, the inclusion of individuals who earn their GED in prison substantially reduces the estimates for minority group members. Since TMW used a pooled sample that included incarcerated GED candidates, the results from Table 2 explain why TMW found positive GED results for white dropouts, but not for minority group members who possessed a GED.

A remaining question, however, is once a dropout is in prison, are there any payoffs to obtaining a GED? This involves comparing the outcomes of individuals who earned their GED while in prison to the outcomes of similar individuals who were also incarcerated at one time. Another recent Tyler paper (2001) sheds some light on this question.

Figure 2 from that paper plots the unconditional mean quarterly earnings of male dropouts in Florida who all attempted the GED while in prison in that state between 1994 and 1998. The left graph in the figure depicts the mean quarterly earnings around the GED attempt for unsuccessful candidates, and the right graph does the same for successful candidates who passed the exams and obtained their GED. It appears that there

is little difference between the post-attempt earnings growth of successful and unsuccessful candidates.<sup>3</sup>

Unconditional earnings may, however, be influenced by observed or unobserved differences between successful and unsuccessful candidates. However, regression adjusted estimates in the Tyler paper that control for race/ethnicity, age, years or completed schooling, and GED test scores also show no measurable differences in the quarterly earnings of successful and unsuccessful candidates. Figure 3 shows the quarter by quarter estimated differences in the earnings of successful and unsuccessful candidates, along with 95 percent confidence bands. There is no evidence that the GED holders fared better over time than did dropouts who did not obtain their GED while in a Florida jail or prison.

Finally, estimates from a fixed effects model that controls for all observed and unobserved time invariant differences between the two groups also fail to find differences between those individuals who did and did not successfully obtain a GED while incarcerated. Thus, the initial evidence is that GEDs earned in prison have little or no economic impact on the mainstream earnings of former criminal justice offenders.<sup>4</sup>

### Discussion

This paper has summarized the evidence on the economic effects of the GED since the release of the Boesel, Alsalam, and Thomas synthesis of 1998. There are four primary lessons from the most recent research. First, the GED appears to benefit dropouts who

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<sup>3</sup> The observed post-attempt earnings growth for both groups could reflect the effects of age and experience on earnings, the fact that over time more individuals are out of prison and recording non-zero earnings, or both.

<sup>4</sup> Due to the nature of his data, Tyler's estimated impact of the GED on the earnings of former offenders will be biased downward if it is the case that offenders who obtain their GED systematically have longer

leave school with very low skills, but does not increase the wages or earnings of dropouts who leave school with higher skills. Second, it takes time for GED effects to appear and analyses that do not take this into account may underestimate the labor market impact of the credential. Third, using the GED to gain access to post-secondary education and job training could potentially result in large payoffs, but relatively few GED holders actually participate in these human capital enhancing activities. Fourth, a large number of male, minority GED holders obtain their GED credential while incarcerated, and while the evidence is incomplete, there are apparently no economic benefits to these “prison GEDs.”

The findings presented in this paper give rise to additional questions that future research should consider. First, why does the GED impact the earnings and wages of low skilled dropouts, but not those of dropouts who leave school with higher skills? A plausible explanation goes as follows. Individuals who leave school with very weak skills are the least desirable job applicants. Some dropouts in this situation may improve their skills over time and their work ethic as well. These dropouts may use the GED as a signal to employers that they are more desirable employees than they had been in the past, enabling them to obtain better jobs with higher wages and more hours. Additional research is needed to establish whether this “signaling” story indeed explains the differential returns to the GED or whether there is some other explanation. Field research such as that conducted by Holzer (1996) that questioned employers about their hiring practices and use of credentials as “signals” would provide valuable insight into this question.

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sentences than do offenders who attempt, but fail, their GED exams. It is hard to imagine why this might be

If the GED does primarily serve as a labor market signal, then it is not clear why it takes time for the returns to accrue to the signal. It does not take time for employers to observe the signal, so why the delayed returns to a GED? One explanation is that many GED holders use the credential to obtain better jobs that have a steeper age-earnings profile. In these “career type” jobs, employees trade early wages for informal on-the-job training and the chance to earn higher wages later on. It could also be that while GED holders obtain little post-secondary education and training, they obtain enough to depress their early post-GED wages and earnings. As yet it is not exactly clear why it takes time for the returns to a GED to appear in the data. Better data on the post-secondary enrollment and attendance patterns of GED holders would be helpful in this regard, as would information obtained from employers and dropouts about the characteristics of the jobs in which credentialed and uncredentialed dropouts.<sup>5</sup>

A third area for future research would examine why it is that so many GED candidates indicate that they are obtaining the credential to pursue further education, but yet so few do. 66 percent of the GED examinees in 2000 indicated that they were obtaining the credential in order to pursue further education. However, as indicated in the papers reviewed here, even though college pays off for GED holders, only 30 to 35 percent of GED holders obtain any post-secondary education at all, only 5 to 10 percent obtain at least a year of post-secondary education, and, according to Boudett (2000), only one-half of one percent of female GED holders obtain an Associates degree. Many more GED holders, on the other hand, accumulate hours in proprietary school training where the evidence on the benefits is not encouraging. Research that helped to establish the

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the case.

reasons for the depressed levels of post-secondary education of GED holders relative to their stated desires and to regular high school graduates would be informative here. For example, is it primarily barriers to post-secondary participation such as lack of child care, transportation, or part-time work at play, or is it changing preferences on the part of dropouts that result in so little realized post-secondary education? If it were deemed desirable for GED holders to obtain more post-secondary education, then different answers to these questions would suggest very different policy responses.

Finally, given the relatively large number of male GED holders—especially minority males—who obtain their credential while incarcerated, more work is needed to understand the mechanisms of a “prison GED.” The average cognitive skill levels of criminal justice offenders are notoriously low. Why then does a GED obtained in prison not impact the earnings of these individuals while it has a substantial impact on the earnings of low skilled dropouts who obtain their GED while in “the free world?” Is it simply because the “stigma” associated with conviction outweighs any beneficial effects of a “prison GED?”<sup>6</sup> Or, is it that a “prison GED” is essentially different from a GED obtained in a non-correctional setting, because of either differences in GED preparation programs in the two settings or differences in who selects into the GED program in the two settings.

Drop out rates are not expected to decline in the next years, at least partly because of the expected response to increased high school graduation standards taking effect across many states. There are also no projections that would suggest a decline in the number of GEDs that will be issued annually in the foreseeable future. As a result, the GED will

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<sup>5</sup> See Holzer (1996) for comparable research.

likely remain an important education credential in the U. S., a proposition that suggests a continuing role for research that illuminates our understanding of how this credential works in the U.S. labor market.

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<sup>6</sup> See Buikhisen (1971) and Boshier (1974) for research on the effects of prison “stigma” on outcomes.

Figure 1. Differences in mean quarterly earnings between eventual male GED holders and male GED candidates who never passed the exams in Florida (1999 constant dollars), along with 95% confidence bands.

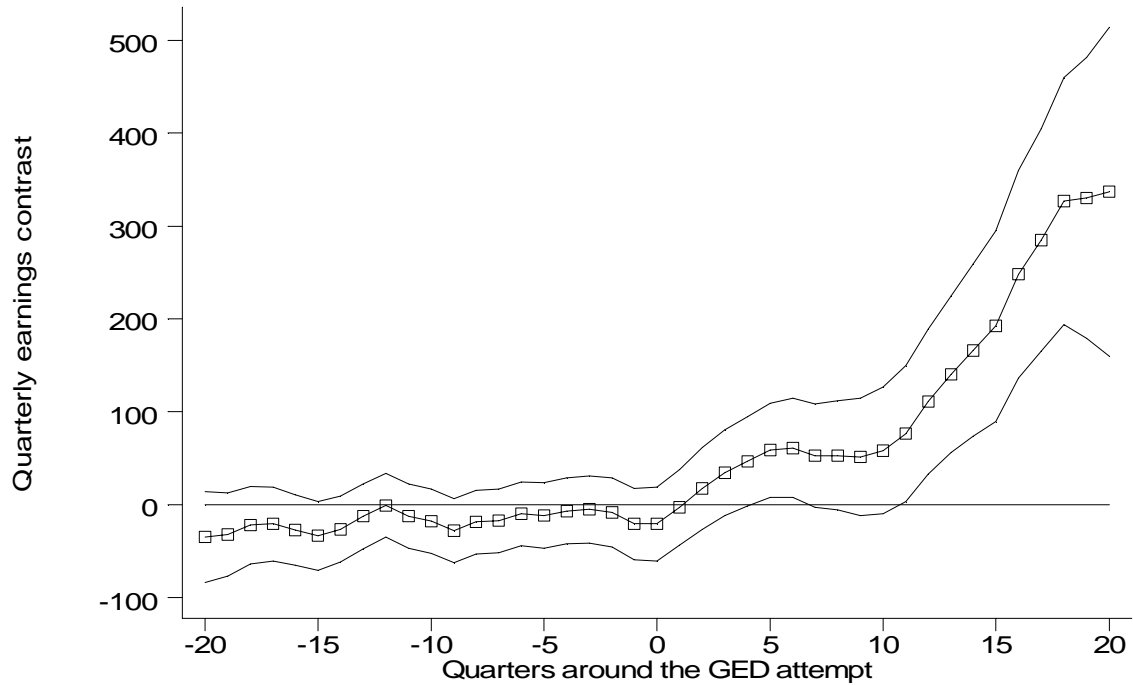


Figure 2. Unconditional mean quarterly earnings (1999 constant dollars) before and after the GED attempt for unsuccessful and successful GED candidates who attempted the GED while in prison in Florida, along with 95% confidence bands.

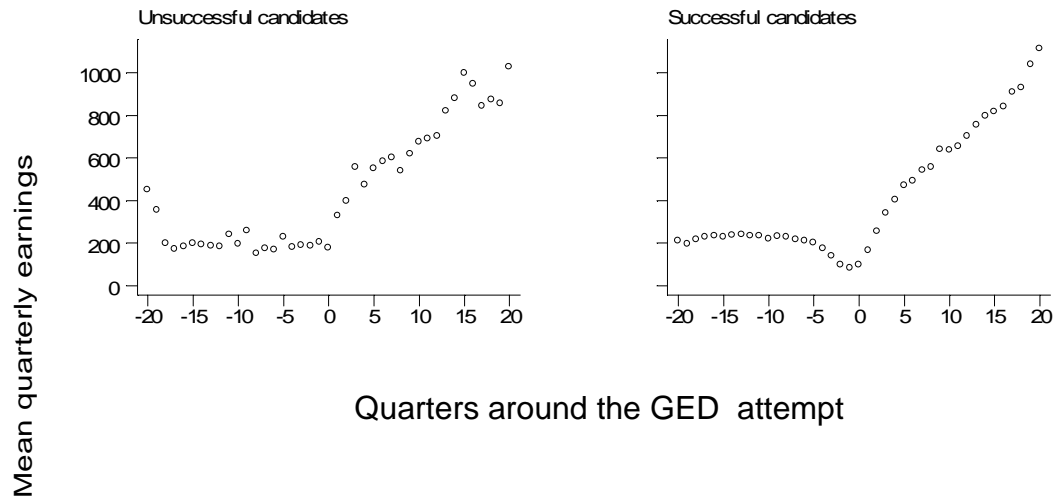


Figure 3. Differences in mean quarterly earnings between eventual GED holders who obtained their GED while in prison and unsuccessful male GED candidates who attempted, but did not obtain, the GED in prison in Florida (1999 constant dollars), along with 95% confidence bands.

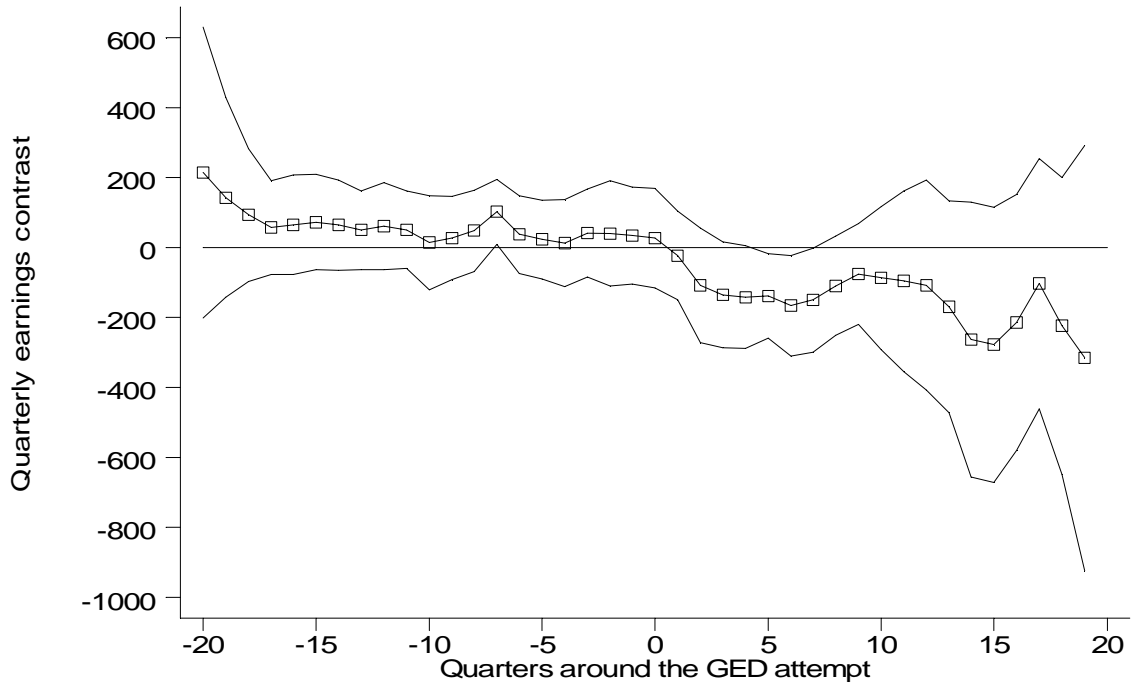


Table 1. Summary of the eight papers studying the economic effects of the GED that have been written since the Boesel, Alsalam, and Thomas synthesis.

Title and Authors	Year	Journal/Working Paper	Data Set, Usage, and Gender	Dependent Variable	Estimation Methods and Controls	Summary of Findings
I. “Do Male Dropouts Benefit from Obtaining a GED, Postsecondary Education, and Training?” (Murnane, Willett, and Boudett)	1999	<i>Evaluation Review</i>	NLSY; Longitudinal analysis; Males	1) Natural logarithm of self reported hourly wages 1979-1994; 2) Self reported annual earnings 1979-1994.	a) Regression adjusted random effects estimates that control for race/ethnicity, parental education, AFQT score, years of completed schooling, and time invariant differences between eventual GED holders and permanently uncredentialed dropouts. b) Fixed effects estimates that control for time-invariant, unobserved differences.	a) GED effect of six percent increase in wages five years after obtaining the credential for male dropouts who left school with weak cognitive skills. No effect for dropouts who left school with stronger cognitive skills. Similar effects by skill level on annual earnings of about 10 percent. b) Fixed effects estimates are approximately the same as the random effects estimates when log hourly wage is the dependent variable, but substantially smaller when annual earnings is the dependent variable.
II. “Who Benefits from a GED? Evidence from High School and Beyond” (Murnane, Willett, and Tyler)	2000	<i>The Review of Economics and Statistics</i>	HSB; Cross sectional analysis; Males	Natural log of the average of 1990 and 1991 self reported annual earnings	Regression adjusted estimates that control for 10 <sup>th</sup> grade math test scores, race/ethnicity, parental education, number of siblings when a 10 <sup>th</sup> grader, region, and years of completed schooling.	GED effect of 36 percent higher earnings at age 27 for male dropouts who left school with weak skills. No effect for dropouts who left school with higher cognitive skills.

<p>III. “Estimating the Labor Market Signaling Value of the GED” (Tyler, Murnane, and Willett)</p>	<p>2000</p>	<p><i>Quarterly Journal of Economics</i></p>	<p>National data on GED examinees merged with Social Security Administration earnings data; Cross sectional analysis; Males and females</p>	<p>Social Security taxable annual earnings</p>	<p>Quasi-experimental research design that used interstate variation in GED passing standards to simulate random assignment of the GED</p>	<p>GED effect of 10-19 percent higher earnings five years after obtaining a GED for white dropouts on the margin of passing the GED exams, relative to white dropouts with equal, but non-passing scores. No measured effects for non-white dropouts on the margin of passing.</p>
<p>IV. “Who Benefits from a GED? Evidence for Females from High School and Beyond” (Tyler, Murnane, and Willett)</p>	<p>2000</p>	<p>Working paper</p>	<p>HSB; Cross sectional analysis; Females</p>	<p>Same as II.</p>	<p>Same as II.</p>	<p>GED effect of 25 percent higher earnings at age 27 for female dropouts who left school with weak skills. No effect for dropouts who left school with higher cognitive skills.</p>
<p>V. “Second Chance Strategies for Women Who Drop Out of School” (Boudett)</p>	<p>2000</p>	<p><i>Monthly Labor Review</i></p>	<p>NLSY; Longitudinal analysis; Females</p>	<p>1) Self reported annual earnings 1979-1994; 2) Probability of employment; 3) Annual hours worked; 4) Log hourly wage</p>	<p>Fixed effects estimates that control for time-invariant, unobserved differences.</p>	<p>GED effect of 25 percent higher earnings seven years after receipt of the GED, no GED effect on probability of employment, GED effect of 102 additional annual hours worked, and a 6 percent GED effect on hourly wage.</p>

VI. “The GED Is a ‘Mixed Signal’: The Effect of Cognitive and Non-cognitive Skills on Human Capital and Labor Market Outcomes” (Heckman, Hsse, and Rubinstein)	2000	Working Paper	NLSY; Longitudinal; White males	Log hourly wage	a) Regression adjusted random effects estimates that control for AFQT score, years of completed schooling, work experience, and log of annual hours worked. b) Fixed effects estimates that control for time-invariant, unobserved differences.	No statistically significant GED effects in either the random effects or the fixed effects models
VII. “So You Want a GED? Estimating the Effects of the GED on the Earnings of Dropouts Who Seek the Credential” (Tyler)	2001	Working Paper	Data on Florida GED examinees who tested between 1994-1998 merged with Unemployment Insurance quarterly earnings	Quarterly earnings	Regression controlled estimates, fixed effects estimates, and estimates that control for pre-GED earnings and employment dynamics	Estimates from all methods indicate GED effects of around 15 percent five years after the GED attempt
VIII. “What Is the Value of a GED Obtained in Prison?” (Tyler)	2001	Working Paper	Data on Florida GED examinees who tested while in prison between 1994-1998 merged with Unemployment Insurance quarterly earnings	Quarterly earnings	Regression controlled estimates, estimates that control for pre-GED earnings and employment dynamics, and fixed effects estimates	GED effects found only in the fixed effects model

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Table 2. Estimated annual earnings advantages for GED holders, relative to unsuccessful GED candidates, five years after the GED attempt, by racial group and sample.<sup>a</sup>

		TMW Estimates Based on National Data		Estimates Based on Florida Data	
		Whites	Non-whites	Whites	Non-whites
Candidates who were incarcerated at the GED attempt in the sample?					
Yes				1293 <sup>*</sup> (510)	681 (608)
Yes	TMW Sample 1:	1473 <sup>*</sup> (678)	-1357 (906)		
Yes	TMW Sample 2:	1531 <sup>**</sup> (529)	231 (548)		
Yes	TMW Sample 3:	907 <sup>~</sup> (481)	-67 (518)		
No				1575 <sup>**</sup> (5160)	1258 <sup>*</sup> (642)

a. Source, Table 6 from Tyler (2001).

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