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The Relative Impact of the GED on Labor Market Outcomes for the Formerly Incarcerated

Sally Vandenberg
Claremont McKenna College

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Professor David Bjerk

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Sally Vandenberg

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Abstract

This paper shows that while incarceration is associated with economic losses, the economic benefits associated with a GED may be nearly twice as large for high school dropouts that have been incarcerated than for dropouts who have not been incarcerated. My results, though imprecisely estimated, suggest that this relationship may be one of correlation, rather than causality. I find that among the formerly incarcerated the GED is associated with other positive outcomes, particularly lower rates of drug use.

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Chapter 1: Introduction

It is well-known that the United States has monumentally high incarceration rates. Despite recent decreases, 1,526,800 prisoners were under the jurisdiction of state and federal correctional authorities at year-end 2015. Said another way, 458 of every 100,000 U.S. residents are incarcerated (Anderson and Carson 2015). Leaving aside the social costs of incarceration and the lost wages associated with barring most of these 1,526,800 men and women from the workforce during their sentences, the total per-inmate cost of incarceration averages $31,286 per year (Delaney and Henrichson 2012). A special report by the U.S. Department of Justice documents recidivism rates of 67.8% within 3 years of release and 76.6% within 5 years of release (Cooper, Durose, and Snyder 2014).[1] These numbers leave policymakers and taxpayers scrambling for ways to reduce recidivism and the resultant costs. A variety of papers have suggested prison education as a way to improve outcomes for the formerly incarcerated. I focus particularly on the General Education Diploma (GED) and the economic returns associated with this certificate among the formerly incarcerated, compared to the general population.

The GED was created in 1942 as a second chance opportunity for men and women who left school before graduation to fight in World War II (Kamenetz 2016). About 20 million people have earned a GED since then, and it has come to represent a second chance for anyone whose life has gotten in the way of a traditional high school diploma, including immigrants, teen parents, and my focus for this paper, prisoners.

The fourth version of the GED since its creation was introduced in 2002. This exam lasted 7.5 hours and was comprised of language arts (writing), social studies,

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[1] Measured in state prisoners released in 2005 in 30 states.

science, language arts (reading), and mathematics. The score of each test ranged from 200 to 800. To receive the GED credential, a candidate had to earn an average score of at least 450 across the five tests, with no single score below 410. According to the GED Testing Service, the purpose of this exam was to certify a high school level of academic knowledge and skills, with a goal of opening opportunities to postsecondary education or better jobs (Ou 2008). However, some research questions whether the GED lives up to this goal.

A concern among economists and policymakers is whether the GED is worth the money. Some previous research calls into question the effectiveness of the GED in terms of labor market outcomes (Cameron and Heckman, 1993; Heckman and Rubinstein, 2001; Heckman and LaFontaine, 2006; Murnane, Willett, and Boudett, 1997). Although the evidence is mixed, these researchers suggest that the old version of the GED did not have a significant positive effect on labor market outcomes. In 2014, a new version of the GED was released, covering the same topics, this time in line with the Common Core State Standards (Adams 2014). The creators of this new exam cited a need for higher standards.

The release of this new version of the test has resulted in a significant drop in testing, from 800,000 test takers in 2013 to 248,000 in 2014 (Kamenetz 2016). Citing these dismal statistics – as well as complaints from students and teachers – critics declared this more difficult, expensive, and newly for-profit and computer-based GED exam beyond the level of difficulty necessary to be beneficial, and an unnecessary barrier to adult students.

In response to findings that students who passed the new version of the GED needed less remedial coursework in college than did those who earned traditional high school diplomas, the GED Testing Service recommended that states lower the cutoff passing score (Gewertz 2016). As states consider implementing this new pass score, granting diplomas retroactively, and seeking alternatives with lower standards, my findings add to existing literature that measures the effectiveness of the GED in improving labor market outcomes. I focus specifically on the relative impact of the GED on labor market outcomes for the formerly incarcerated. Furthermore, I aim to determine whether the GED certificate is inherently useful, or instead is useful as a signal that a formerly incarcerated man or woman possesses other desirable characteristics and is an ideal candidate for reintegration because of those characteristics.

To answer this question, I use the NLS97 data and narrow my sample to include only respondents who have obtained a GED and no further degree, and respondents who have received less than a high school degree (i.e. dropouts). I then divide this sample into two groups: respondents who have been incarcerated for some period of time, and those who have not. Finally, I measure the difference in yearly total income for these two groups, looking for higher returns associated with the GED among the formerly incarcerated group. I do find the returns associated with the GED are nearly twice as large for dropouts who have been incarcerated for some period of time, compared to dropouts who have never been incarcerated. However, these results are imprecisely estimated and therefore ambiguous regarding the question of interest.

Chapter 2: Related Literature

2.1 Effectiveness of the GED Generally

There is expansive literature regarding the relationship between the GED and future outcomes, as measured by returns to postsecondary education and training, health, earnings, life satisfaction, future optimism, and substance use. Much of the GED literature uses data from the general population of the United States, predominantly young people. Most of this research focuses on the direct economic benefits associated with the GED. There is considerable disagreement within this line of research.

Cameron and Heckman (1993), Heckman and Rubinstein (2001), Heckman and LaFontaine (2006), and Murnane, Willett, and Boudett (1997) conclude that the GED is not valuable as an educational end in itself. I explain some of this research in detail in the following paragraphs.

Cameron and Heckman (1993) find that GED holders are not the labor market equivalents of regular high school graduates. They find that both high school dropouts and GED recipients are inferior to high school graduates in terms of hours, wages, salaries, weeks worked, and length of time in their current job. Furthermore, their findings suggest that the mean labor market status of GED recipients in terms of hourly wages and salary is the same as that of high school dropouts, measured at age 25. Cameron and Heckman find that the only value of a GED is that it opens postsecondary schooling and training programs. However, GED holders are much less likely to complete these opportunities than ordinary high school graduates, particularly academic programs. GED holders are more likely to participate in vocational and technical training.

Heckman and Rubinstein (2001) determine that dropouts who take the GED have higher levels of cognitive skills but lower levels of non-cognitive skills like persistence, discipline, adaptability, and forward thinking than other high school dropouts. Heckman and LaFontaine (2006) find that previously documented returns to GED certification with age are due to dropouts becoming more skilled over time.

Murnane, Willett, and Boudett (1997) find that a GED is associated with a higher likelihood of obtaining training and post-secondary education among dropouts. Furthermore, they find that this increase in enrollment levels does not stem from pre-existing differences between permanent dropouts and GED recipients. However, their findings suggest that less than 20% of these GED recipients complete a year or more of college by 26.

Heckman, Humphries, and Mader (2010) agree that the GED certificate may be minimally valuable in terms of labor market outcomes, but only a few individuals successfully use it as a path to obtain post-secondary credentials. They further assert that GED recipients have deficits in in non-cognitive skills such as persistence, motivation and reliability.

Some studies do find that the GED is associated with positive labor market outcomes in limited cases. Murnane, Willett, and Tyler (1999) find higher earnings at age 27 associated with a GED, but only among male dropouts with very weak cognitive skills as tenth graders. The authors suggest that this is because dropouts with poor cognitive skills make the least desirable job applicants, and earn only about two-thirds as much as similar dropouts who left school with stronger cognitive skills. Those with previously

low cognitive skills have the most to gain from the GED as a signal to employers that they are now more desirable employees.

Murnane, Willett, and Tyler (2000) conclude that the GED is associated with a 10 to 19% increase in earnings for young white dropouts on the margin of passing the exams, presumably the lowest skilled GED-holders, but no statistically significant effects for minority dropouts in the same scoring range.

Murnane, Willett, and Tyler (2003) find that the GED is associated with higher labor market earnings among females in their mid-twenties who dropped out of high school with weak basic math skills, compared to observationally similar dropouts lacking the GED credential. Furthermore, they find that this increase in earnings is explained by an increase in work experience associated with the GED for this group. They find no change in work experience or labor market earnings among female dropouts who left school with higher math scores. The authors reaffirm their 1999 claim that the GED serves as a signal to employers that applicants with previously low cognitive skills are now desirable employees. They further suggest that the increase in human capital resulting from studying for the GED is greater for those beginning with lower cognitive skills.

Tyler (2003) suggests that there are economic benefits associated with the GED, with some caveats. First, he concludes that these benefits accrue only to dropouts who leave school with very low cognitive skills, reiterating the findings of Murnane, Willett, and Tyler (1999). Next, he highlights the importance of measuring outcomes some years after receipt of the GED, because the estimated impact of the GED may appear over time rather than immediately following receipt of the credential. Finally, he concludes in

agreement with Murnane, Willett, and Boudett (1997) that the GED is beneficial in making postsecondary education and job training accessible, and the GED is a good investment for dropouts when used for this purpose, though few GED holders participate in these activities.

The body of research examining the relationship between the GED and non-labor market outcomes is small but worthy of note. Kenkel and Lillard (2006) find small health returns to GED receipt, though the returns are much larger for traditional high school completion. Their research suggests that male GED recipients are 10 percentage points less likely to smoke than high school dropouts. In an inner-city cohort, Ou (2008) finds significant differences between dropouts and GED recipients as measured by life satisfaction, future optimism, depression, substance use, and the potential of average quarterly income. Ou's findings suggest that GED receipt is associated with better outcomes in these metrics, compared to permanent dropouts. However, traditional high school graduation is associated with the most positive outcomes.

2.2 Effectiveness of Prison Education

Comprehensively, research suggests that prison education of some form is associated with lower rates of recidivism (Batiuk et. al, 2005; Esperian, 2010; Gordon and Weldon, 2003; Jancic, 1998; Haugebrook, Jenkins, and Zgoba, 2008; Brewster and Sharp, 2002; Hollmen, Nuttall, and Staley, 2003; Jensen and Reed, 2006; Fabelo, 2002; Harer, 1995; Stevens and Ward 1997), although researchers differ on the specifics.

Hollmen, Nuttall, and Staley (2003) find that the relationship between GED attainment and recidivism is particularly prominent among offenders who were under age 21 at release. Batiuk et al. (2005) find that college has a substantially stronger negative

impact upon recidivism than do other forms of correctional education such as GED or vocational courses. Fabelo (2002) agrees that typically inmates with the highest education are more likely upon release to obtain employment, have higher wages and lower recidivism. As an exception to this rule, Fabelo also finds that nonreader property offenders who learned to read while incarcerated experienced a larger decline in their recidivism rate and a better improvement in their employment prospects than inmates who earned a GED.

Haugebrook, Jenkins, and Zgoba (2008) find that although receipt of a GED while incarcerated diminishes the likelihood of recidivism, if an offender does recidivate, GED program participation has no effect on the number of re-offenses.

Brewster and Sharp (2002) find that completing a GED while incarcerated is predictive of longer periods of time outside of custody before recidivating. Their findings suggest that women are particularly likely to have longer periods of time outside of custody compared to men. Surprisingly, the authors find that for both men and women, those who complete vocational education programs while incarcerated have shorter survival times outside of prison than those who do not complete programs.

Findings by Black et al. (1996) suggest that both a vocational certificate and a GED are separately associated with increased likelihoods of employment after release. Combined, a student who earns both a GED and a vocational certificate of completion is three times more likely to be employed than a student from within the total study group.

Research by Jenkins, Pendry, and Steurer (1995) suggests that educational attainment while incarcerated is positively related to success in obtaining employment, the type of employment obtained, hourly wages earned, and successful completion of

community supervision. Their research supports the claim that inmates who complete a high school equivalency or college program are more likely to earn a higher hourly wage than inmates who complete an adult basic education or vocational program, although the differences are not striking. They conclude that the financial benefits of training and additional education may accrue over time.

Interestingly, Boardman, Masters, and Nowotny (2016) find that among inmates who enter prison with no degree, receiving a GED while incarcerated is associated with better current health outcomes for men, but not women.

Given the prevalence of high school dropouts in prison populations and the popularity of prison education as a means of reducing recidivism, it is surprising that research exploring the effectiveness of the GED among the formerly incarcerated compared to the general population does not already exist. This paper seeks to fill in this gap.

If the GED is associated with positive labor market outcomes, the question of whether the GED is intrinsically beneficial as a credential, or beneficial as a signal of other behaviors remains. I hypothesize that the GED is associated with positive economic outcomes, but these outcomes will be magnified among the formerly incarcerated. I suggest that this is because the GED signals a lack of persistence, diligence, and responsibility among members of the general population who were cognitively able to complete high school, but failed to do so originally. I further suggest that the GED signals the presence of these same characteristics in the population that has been incarcerated, and other positive outcomes can be found among this sample who have forgone criminal activity in pursuit of positive opportunities, educational and otherwise.

Chapter 3: Data and Methods

I use data from the 1997 National Longitudinal Survey of Youth (NLSY97) to consider the impact of a GED on labor market outcomes for formerly incarcerated dropouts, compared to dropouts that have not been incarcerated for any period of time. The purpose of this study is to determine if the labor market returns are larger for the formerly incarcerated group.

The NLSY97 is an annual or biannual survey given to an initial cohort of 8,984 respondents, aged 12-18 when first interviewed in 1997. This cohort is ongoing, and rounds 1-16 are used in this paper. The most recent data release was fielded in 2013, at which time respondents were aged 28 to 34. In the initial survey respondents were 51% male, 49% female, 26% Black, 21% Hispanic or Latino, 1% mixed race, and 52% non-Black/non-Hispanic. The NLSY97 cohort is comprised of two subsamples. The first is a cross-sectional sample of 6,748 respondents intended to be representative of people living in the United States at the time. A supplemental sample of 2,236 respondents is included to oversample Hispanic or Latino and Black people.[2]

To measure the economic benefits of a GED for high school dropouts, I narrow my sample to include only respondents whose highest degree by the most recent data release, the end of the 2010-2011 school year, was either a GED ("Yes GED") or less than a high school degree ("No Degree Ever"). This subsample is comprised of 1,686 respondents. Of these respondents 57% are male, 43% are female, 35% are Black, 26% are Hispanic or Latino, 1% are mixed race, and 38% are non-Black/non-Hispanic.

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[2] More information about the 1997 National Longitudinal Survey of Youth can be found at https://www.nlsinfo.org/content/cohorts/nlsy97

To measure economic outcomes associated with the GED for each individual, I use total before tax income at age 25 ("Total Income 25"), including salary, wages, commissions, and tips. To determine the impact of incarceration on benefits associated with obtaining a GED, I split the sample into two distinct groups: those that were incarcerated for some period of time by age 23 ("Incarcerated Before 23"), and those that were not. To this end, I document the incarceration status of each respondent in each month of each year, beginning with the month the respondent turned 12, and ending with the year the respondent turned 25. Any respondent incarcerated for any part of any month within that window is included in the incarcerated by age 23 subsample.

Using these definitions, the mean yearly total income at age 25 for the entire sample, including those who have or haven't been incarcerated and those with and without a GED, is $18,510.17, shown in Table 1.[3] The mean yearly income for all respondents in the sample with less than a high school degree is $16,666.42. For those with a GED and no further degree, the mean yearly income is $19,741.80. The mean yearly income for all respondents in the sample with less than a high school degree and who have not been incarcerated is $17,624.19.[4] The mean yearly income for all never incarcerated respondents in the sample with a GED and no further degree is $20,076.07. The mean yearly income for respondents with less than a high school degree and who have been incarcerated is $12,380.00. The mean yearly income for respondents in the incarcerated group with a GED is $18,012.64.

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[3] Total income measured at age 25 for all subsequent measurements.
[4] Incarceration status measured by age 23 for all subsequent measurements.

TABLE 1 MEAN YEARLY TOTAL INCOME, AGE 25

	No GED	GED	Difference
All	$16,666.42	$19,741.80	**$3,075.38 (18.5%)**
Non-Incarcerated	$17,624.19	$20,076.07	**$2,451.88 (13.9%)**
Incarcerated	$12,380.00	$18,012.64	**$5,632.64 (45.5%)**

Source: NLSY97

As can be seen in Table 1, for the incarcerated subsample, a GED is associated with a $5,632.64 or 45.5% yearly salary increase at age 25, compared to those from the same subsample with no degree. For comparison, a GED is associated with a lesser $2,451.88 or 13.9% yearly salary increase among the never incarcerated subsample. These findings are suggestive that a GED has a much larger positive impact for those that have been incarcerated than for those who haven't, in terms of yearly income. This table suggests that the labor market returns associated with the GED are much larger for the formerly incarcerated.

It is possible that other differences between the groups, like race or ethnicity and academic ability could drive the large differential in returns between the formerly incarcerated and non-incarcerated. To look at these issues more formally, I use OLS regression methods. Specifically, I run regressions of the form $Y_t = \alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k$. I regress total income at age 25 ("Total Income 25") on a dummy variable for GED ("Yes GED"), a dummy variable for incarceration ("Incarcerated Before 23"), and an interaction variable ("GED Incarcerated"). It is from this interaction variable that I may determine whether or not there is a differential in the returns associated with the GED between the incarcerated and non-incarcerated groups.

To control for other characteristics that may differ between the groups, I also add control variables into successive specification regressions, including: "Non White," "Female," "Household Net Worth Childhood," "Dads Highest Grade," "Moms Highest Grade," "Environmental Risk," "Test Scores," "High School GPA," and "Bad School." In the following paragraphs, I explain how these control variables are defined.

The dummy variable "Non White" is pulled from the race and ethnicity information obtained in the first round of surveys. "Non-White" includes respondents who identify as Black, Hispanic or Latino, or mixed race. The dummy variable "Female" comes from the gender information, also obtained in the first round of surveys in 1997.[5] All respondents identified as either male or female.

"Household Net Worth Childhood" is a continuous variable, documented by a parent of each respondent in 1997 and capped at $600,000. "Dads Highest Grade" and "Moms Highest Grade" are continuous variables that measure the highest grade completed by the respondent's biological father and mother, respectively. "Environmental Risk" is a continuous variable that measures the Physical Environment Risk Index of each respondent. Scores range from 0 to 7, and higher scores indicate a riskier physical environment.

"Test Scores" is a continuous variable that documents scores on four exams taken in 1999: Mathematical Knowledge, Arithmetic Reasoning, Word Knowledge, and Paragraph Comprehension. The scores are reported as percentile scores based on the weighted number of respondents scoring below each score. "High School GPA" is a continuous variable measuring each respondent's credit weighted overall GPA, taken

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[5] All dummy control variables measured in 1997 unless stated otherwise.

from transcripts and measured on a 4.0 scale. Finally, "Bad School" is a dummy variable; taken from the most recent round of interviews in 2011, measuring whether or not the school from which each respondent's transcript was primarily collected did or did not offer calculus.

Next, I set out to determine why it is that formerly incarcerated GED holders are doing better in the labor market. I hypothesize that respondents in this group are doing better in terms of other outcomes as well. I investigate whether or not the GED affects these other outcomes differentially for the formerly incarcerated and non-incarcerated groups.

For this reason, I run regressions with new dependent variables capturing other outcomes. These variables include: "Volunteering," "Smoker," "Drinker," "Drinking Freq," "Drinking Before Work Freq," "Smoked Weed," "Weed Freq," "Weed Before Work Freq," "Used Hard Drugs," "Drugs Before Work Freq," and "Birth Control Freq." I define these variables in the following paragraphs.

Volunteering is a continuous variables captured in 2005 that measures the frequency of unpaid volunteer work over the last twelve months.[6] This variable returns a 1 for never, a 2 for 1-4 times, a 3 for 5-11 times, and a 4 for 12 times or more. "Smoker," "Drinker" and "Smoked Weed" are dummy variables that measure whether or not a respondent has had a drink of an alcoholic beverage, smoked a cigarette, or used marijuana at least once since the date of the last interview.

"Drinking Freq" is a continuous variable that measures the number of days a respondent had one or more drinks of an alcoholic beverage in the 30 days prior to being

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[6] With the exception of Total Income, which is measured at age 25, all measurement variables captured in 2005.

interviewed, measured only among those that had a drink since the date of the last interview.[7] "Weed Freq" is a continuous variable that measures the number of days a respondent used marijuana, among those that used marijuana since the date of the last interview. "Drinking Before Work Freq" and "Weed Before Work Freq" are continuous variables that measure the number of days a respondent had something alcoholic to drink or used marijuana right before or during school or work hours, observed only among those that drank or used marijuana since the date of the last interview, respectively. "Used Hard Drugs" is a dummy variable that measures whether or not a respondent used any drugs excluding marijuana and alcohol, like cocaine or crack or heroin, or any other substance not prescribed by a doctor, in order to get high or achieve an altered state. "Drugs Before Work Freq" is a continuous variable that measures how many times a respondent used hard drugs right before school or during school or work hours, among those that used hard drugs at least once since the date of the last interview.

"Birth Control Freq" is a continuous variable that measures the percent of the time that a respondent or their sexual partner or partners used any method of birth control, including a condom. Birth control frequency was measured among those that had sex since the date of the last interview only, and is used here as a measurement of responsibility.

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[7] All frequency variables measure frequency over the 30 days prior to being interviewed. These include: "Drinking Freq," "Drinking Before Work Freq," "Weed Freq," "Weed Before Work Freq," "Drugs Before Work Freq," and "Birth Control Freq."

Chapter 4: Findings

4.1 Results

Column I in Table 2 shows the results from regressing the dependent variable for total income at age 25 on the dummy variable for GED, the dummy variable for incarceration, and the interaction variable, before controlling for any explanatory variables. It is the coefficient on this interaction variable that is of interest.

As can be seen, in general, the coefficient on the dummy variable for GED is positive. The coefficient on the interaction variable suggests that the impact of the GED may be much larger for the formerly incarcerated, consistent with Table 1. However, this is a very imprecisely estimated coefficient, not even statistically significant at the 10% level. Because of this, I cannot rule out that there is no differential in the returns associated with the GED between the formerly incarcerated and the non-incarcerated groups.

In the first regression, shown in column I, the coefficient on the dummy variable for GED suggests that a GED for the entire sample is associated with a $2,451.88 increase in yearly income at 25. The coefficient on the interaction variable suggests that a GED for those that have been incarcerated by age 23 is associated with an additional $3,180.76 increase in yearly income at age 25.[8]

Column II controls for race or ethnicity, column III further adds gender, column IV controls for the above with the addition of childhood household net worth, column V further adds parents' education, column VI further adds childhood environmental risk level, and column VII controls for all of the above and measures of youth cognitive

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[8] Assume yearly income measured at age 25 and incarceration status measured at age 23 for all regressions that follow.

ability and opportunity: test scores, high school GPA, and whether or not the respondent's high school offered calculus.

As can be seen from Table 2, very little changes between Columns I and VII, although the coefficient of interest falls in magnitude by nearly one-third. This shows that some of the previously documented return associated with the GED is explained by other differences between formerly incarcerated GED holders and formerly incarcerated non-GED holders.

In general, Table 2 suggests that the GED may have a bigger impact for the formerly incarcerated, compared to non-incarcerated dropouts. However, these results are relatively imprecisely estimated, so I cannot put too much confidence in this result.

TABLE 2 CHANGE IN MEAN YEARLY TOTAL INCOME, AGE 25

	Reg. I	Reg. II	Reg. III	Reg. IV	Reg. V	Reg. VI	Reg. VII
Yes GED	2451.88**	2116.17*	2661.99**	2664.1**	2476.51**	2351.95**	1796.96
	(1202.65)	(1182.17)	(1150.69)	(1151.33)	(1154.55)	(1155.3)	(1175.57)
Incarcerated Before 23	-5244.19**	-5868.87***	-7088.52***	-7129.9**	-7166.44**	-7042.11**	-6949.0**
	(2189.79)	(2152.61)	(2097.64)	(2102.39)	(2098.91)	(2097.49)	(2094.41)
GED Incarcerated	3180.76	3206.28	2167.92	2150.07	2283.02	2016.7	2261.68
	(2884.0)	(2831.32)	(2753.69)	(2755.68)	(2751.56)	(2752.32)	(2749.13)
Non White	-	Yes	Yes	Yes	Yes	Yes	Yes
Female	-	-	Yes	Yes	Yes	Yes	Yes
HH Net Worth Childhood	-	-	-	Yes	Yes	Yes	Yes
Dads Highest Grade & Moms Highest Grade	-	-	-	-	Yes	Yes	Yes
Environmental Risk	-	-	-	-	-	Yes	Yes
Test Scores, High School GPA, & Bad School	-	-	-	-	-	-	Yes

While this analysis suggests a correlation between a GED and increased yearly income, the relationship is not necessarily causal. For the formerly incarcerated in particular, a GED might be reflective of someone with a strong work ethic and the ability to overcome obstacles. Thus, those in possession of GEDs might also be more likely to possess other favorable labor market traits that are correlated with obtaining a degree, rather than caused by the GED itself.

I next ask whether the impact of the GED has a differential impact for other outcomes of interest. I hypothesize that the GED is correlated with other behavioral outcomes beyond labor market outcomes. To test this theory, I choose eleven variables that are relevant to a respondent's ability to reintegrate and function in society. These variables take the place of total income at age 25 as dependent variables. These variables are: "Volunteering," "Smoker," "Drinker," "Drinking Freq," "Drinking Before Work Freq," "Smoked Weed," "Weed Freq," "Weed Before Work Freq," "Used Hard Drugs," "Drugs Before Work Freq," and "Birth Control Freq." Each of these variables is defined in Chapter 3 of this paper.

In each regression, I control for the full set of controls: race or ethnicity, gender, childhood household net worth, biological parents' education level, childhood environmental risk index, math and verbal test scores, overall high school GPA, and whether or not the respondent's primary high school offered calculus.

Table 3 shows the results from regressing each of these eleven variables, one by one, on the dummy variable for GED, the dummy variable for incarceration, and the interaction variable – my coefficient of interest. Shown in the table, very few of these interaction variables are statistically significant.

My results indicate that those who have been incarcerated for some period of time are far more likely to use drugs, both hard drugs and marijuana. However, the coefficient on the interaction variable shows that GED holders who have been incarcerated are less prone to such usage, even compared to the non-incarcerated GED group. This is consistent with the hypothesis that among those who have been incarcerated for some period of time, obtaining a GED has a negative impact on drug usage.

Seen in Table 3, a GED is associated with a 2.3 percentage point increase in the likelihood of being a marijuana smoker, incarceration is associated with a 12.2 percentage point increase in the likelihood of being a marijuana smoker, and a GED is associated with 9.1 percentage point decrease in the likelihood of being a marijuana smoker for those that have been incarcerated, compared to GED holders who have not been incarcerated. This result is statistically significant at the 0.1% level for the incarceration dummy variable, and statistically significant at the 10% level for the coefficient of interest.

Among those that smoked marijuana at least once in 2004, a GED is associated with a 54.2 percentage point increase in marijuana smoking frequency, and among those that have been incarcerated, getting a GED is associated with a 154.1 percentage point decrease in marijuana smoking frequency, compared to GED holders that have not been incarcerated. Incarceration is associated with a 142.3 percentage point increase in marijuana smoking frequency. These results are statistically significant at the 10% level both for the incarceration dummy variable and the coefficient of interest.

The coefficient on the dummy variable for GED suggests that a GED is associated with a 0.33 percentage point increase in the likelihood of using hard drugs at least once

and the coefficient on the interaction variable suggests that a GED for those who have been incarcerated is associated with a 2.56 percentage point decrease in the likelihood of using hard drugs at least once, compared to GED holders that have not been incarcerated. The coefficient on the dummy variable for incarceration suggests that incarceration is associated with a 5.18 percentage point increase in the likelihood of using hard drugs at least once. This result is statistically significant at the 1% level only for the incarceration dummy variable.

Among those that used hard drugs at least once in 2004, a GED is associated with a 4.65 percentage point decrease in frequency of hard drug use before school or work and a GED is associated with an additional 17.3 percentage point decrease in frequency for those that have been incarcerated. Incarceration is associated with a 51.49 percentage point increase in frequency of hard drug use before school or work. This result is statistically significant at the 5% level for the coefficient on the incarceration dummy variable. However, I do not put too much confidence in these results, as I assume a great deal of measurement bias in a question that asks respondents to admit to such nefarious activity as illegal drug use before work.

TABLE 3 OLS RESULTS OF OTHER DEPENDENT VARIABLES, 2005

Characteristics	Yes GED	Incarcerated before 23	GED*Incarcerated
Volunteering	.033	-.021	.079
	(.049)	(.078)	(.106)
Smoker	-.014	.15**	.041
	(.027)	(.044)	(.059)
Drinker	.018	-.002	-.016
	(.028)	(.044)	(.06)
Drinking Freq.	-.037	.211	.462
	(.356)	(.569)	(.776)
Drinking before Work Freq.	-.188	.203	.323
	(.133)	(.212)	(.289)
Smoked Weed	.023	.122****	-.091*
	(.022)	(.034)	(.047)
Weed Freq.	.542	1.423*	-1.541*
	(.393)	(.628)	(.857)
Weed before Work Freq.	.008	-.092	.197
	(.238)	(.381)	(.52)
Used Hard Drugs	.003	.052***	-.026
	(.012)	(.02)	(.027)
Drugs before Work Freq.	-.047	.515**	-.173
	(.128)	(.205)	(.28)
Birth Control Freq.	3.286**	-1.332	.001
	(1.41)	(2.254)	(3.075)

Source: NLSY97
Standard errors in parentheses
* p<0.1, ** p< 0.05, *** p < 0.01, **** p <0.001

4.2 Limitations

There are several limitations to this analysis. First, I measure incarceration status by the age of 23 and total yearly income at age 25. At 25, a considerable portion of those that were incarcerated by the age of 23 could still be incarcerated and returning a very minimal income that does not fairly represent their worth in the labor market. I also fail to exclude part time jobs from my analysis. Respondents going to school and working less hours may record a far lower yearly income that is again not a fair measure of their labor market desirability. Furthermore, I fail to determine if the GED is obtained before, during, or after incarceration. Additionally, I only test income at one age, rather than before and after GED obtainment.

In contrast to previous literature, the traditional high school graduate is absent from my comparisons. Consistent with research (Ou, 2008), I predict that despite the increases in total income associated with GED obtainment, these increases pale in comparison to the increases in total income associated with a traditional high school diploma.

After dropping all respondents that aren't included in the no degree or GED only groups, my new sample contained a considerably higher proportion of Black and Hispanic or Latino individuals and men. Permanent dropouts are more likely to be minority, from larger families, with lower incomes and less educated parents than are GED recipients, who in turn have poorer background characteristics than traditional high school graduates (Cameron and Heckman, 1993). Although I control for gender and race or ethnicity, my results are reported as averages and do not display the differences in outcomes among men and women or between different racial or ethnic groups.

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I fail to control for years of education prior to dropping out or GED obtainment. On average, GED recipients complete one more year of high school before they drop out of school than do dropouts who do not attain the GED (Cameron and Heckman, 1993). I also failed to control for previous work experience that could drive wages.

I chose to measure the impact of the GED in terms of yearly total income. The role of the GED in opening postsecondary opportunities is an interesting area of study, but the benefits of higher education and training obtained after a GED are unexplored in my research. Additionally, hourly wages may have better measured the economic benefits of a GED. Using yearly wages obscures respondents who may be working more hours, but for a lower hourly wage or highly valued workers who work fewer hours per week due to unrelated circumstances. In any sense, dealing in averages hides important differences in programs or participants

Finally, these results were captured prior to the introduction of an updated, more difficult version of the GED and the introduction of two new alternatives to the GED, the HiSET and TASC. Further research is required to measure the benefits of these updated alternatives to high school graduation among the incarcerated and non-incarcerated populations.

Chapter 5: Conclusions

In this study I build upon previous literature by again looking at the question of whether or not the GED is associated with economic gains, but uniquely measuring the relative impact among those that have been incarcerated for some period of time.

To look at this, I use data from the 1997 National Longitudinal Survey. My findings suggest that the economic benefits associated with a GED, measured using total yearly income at age 25, are perhaps nearly twice as large for high school dropouts that have been incarcerated than for those that have not been. Shown in Table 2, the coefficients on "Yes GED" and "Incarcerated Before 23" suggest that a GED is associated with a $1,796.96 increase in total yearly income at age 25, and an additional $2,261.68 for those who have been incarcerated. While this is a considerable increase, the standard errors are also quite large. Thus, these results are not statistically significant and therefore imprecise. So, while my results suggest that there may be a difference in the return to a GED between formerly incarcerated and non-incarcerated dropouts, I also cannot rule out the possibility that there is no difference in the return to a GED across these groups.

Controlling for race or ethnicity, gender, childhood household net worth, biological parents' education level, and childhood environmental risk index does not explain away much of the economic growth associated with a GED. Consistent with previous research, the impact of controlling for test scores, high school GPA, and quality of schooling appears to reflect that respondents with a GED who have not been incarcerated also have higher levels of cognitive ability. This is demonstrated by the decrease in economic gains associated with a GED after holding measures of academic

ability constant, as shown in Table 2. However, this does not extend to GED holders who have been incarcerated. For this group, controlling for these academic variables results in negligible changes in total income.

My results suggest that there are other positive characteristics associated with formerly incarcerated respondents who obtained a GED. I find that the GED is associated with lower rates of drug use among the formerly incarcerated. I suggest that among the formerly incarcerated, the GED is a signal of responsibility, hard work and persistence.

This analysis is far from comprehensive, and more research is needed to measure the effectiveness of the GED for incarcerated and formerly incarcerated populations, particularly today as the GED undergoes changes and our prisons remain full.

Suggestions for further research include a replication of this model with a larger and more homogenous sample that allows for greater statistical significance, different variables to measure economic benefits such as hourly wages and higher education attainment, and additional measurement of income many years after GED attainment. Interesting research might also report the differences in benefits associated with the GED among genders, racial or ethnic groups, and people with more work experience or years of schooling before dropping out.

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