State of Washington

Assessment of the General Educational Development Certificate on Earnings for Washington High School Dropouts

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Abstract

This research examines the impact of attaining a General Educational Development (GED) credential on the earnings trajectory of high school dropouts in Washington state. The propensity score matching method is used to estimate earnings premiums between GED recipients and dropouts without a GED certificate. Statewide longitudinal education data across sectors housed in the Washington State Education and Research Data Center's P20 data warehouse are used to implement the analysis. The results show overall indifferent earnings gains for GED recipients. Black GED recipients earn relatively less than non-GED dropouts while GED recipients of other nonwhite minority groups earn modest gains.

1. Introduction

Each year, about 6 percent of public high school students drop out of schools in Washington state[1]. After dropping out, students rarely return to school to complete an education degree or credential. Leaving school without a high school diploma, however, makes it challenging to enter postsecondary education and affects workforce outcomes (Baum et al. 2013; ERDC 2014[2]). The General Educational Development (GED) credential, equivalent to a high school diploma, thus becomes a "second-chance" pathway to postsecondary education for dropouts. It is also considered an indicator of better skills and readiness for the workforce compared to those who dropped out and do not have a GED certificate. Over the past few years, about 3 to 4 percent of adults without high school credentials took the GED test in Washington, and the majority of them passed (about 86 percent)[3]. The proportion of GED test taking has declined over the years partly because of a harder exam and a new approach for gaining a high school equivalent credential (e.g., Open Doors Youth Reengagement and High School 21+ program)[4].

Considering competitive high school equivalent programs, the question whether a GED credential is beneficial for dropouts in terms of workforce outcomes remains debatable. The analytical challenge lies in selection bias from using observational data. This study estimates the return of a GED certificate on earnings by applying propensity score matching (PSM) to correct as much as possible for such potential bias. It portrays the differences in characteristics between those Washington students who gained a GED credential and those who dropped out and did not attain a GED credential. Furthermore, no dropouts in the study sample participated in any postsecondary education in the school years covered by the data, so the study specifically examines the net earnings impacts of gaining just a GED credential. The analytical approach to estimate earnings premiums between groups is similar to prior studies conducted by the Washington State Education Research and Data Center (ERDC) on the returns to postsecondary education (Paterson and Weeks, 2015).

This research was funded by a grant to Washington from the U.S. Department of Labor Workforce Data Quality Initiative. It benefits from the statewide longitudinal data warehouse (hereafter, P20W) developed by ERDC. The cross-sector administrative data of student historical records about basic backgrounds, schooling progress and workforce participation provide rich information to investigate how dropouts proceed to the labor market before and after they leave high school. This information includes factors related to the decision to get a GED certificate and allows for the use of a matching technique to correct for selection bias (Rosenbaum & Rubin, 1983; Heckman et al., 1998). The GED completers are matched to comparable non-GED dropouts based on factors such as student demographics, a proxy indicator of family income,

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[1] The Office of Superintendent of Public Instruction publishes statewide annual graduation and dropout statistics (http://www.k12.wa.us/DataAdmin/default.aspx#dropoutgrad). The 2007 dropout report cited here is the one related to this study.

[2] ERDC Research Brief 2014-04. (2014) "Washington Eight Graders' Educational and Employment Trajectories." Retrieved from: http://www.erdc.wa.gov/briefs/pdf/201405.pdf.

[3] GED Testing Service, "Annual Statistical Reports." Retrieved from http://www.gedtestingservice.com/educators/historical-testing-data.

[4] Open Doors Youth Reengagement is a state-mandated dropout reengagement program for teens and younger adults who dropped out (http://www.k12.wa.us/GATE/SupportingStudents/StudentRetrieval.aspx). High School 21+ is the high school completion program offered by Washington state community and technical colleges for adults 21 and older (http://www.sbctc.ctc.edu/college/_e-abe_hs21-program.aspx).

high school grade point average (GPA), dropout grade, enrollments in high school vocational programs, student school mobility and employment status before dropping out.

The rest of this report is structured as follows. Section 2 describes studies that estimate GED effects on earnings. Section 3 details the data used for this study. Section 4 discusses analytical approaches. Section 5 presents the findings from each analysis. Lastly, Section 6 summarizes the major findings and draws conclusions.

2. Current Research

Early research on the GED certificates yields mixed results. In the 1990s, when longitudinal survey data started to become available for educational research, several scholars used the National Longitudinal Survey of Youth (NLSY) to examine GED effects. Cameron and Heckman (1993) found potential selection bias due to a lack of wage data for nonworkers and that individuals not working are likely to be different from those who are working. After adjusting for selection bias on NLSY data, they found male GED recipients have lower earnings than male high school graduates. Combining data from the Washington State Family Income Study with NLSY, Cao, Stromsdorfer and Weeks (1996) found no GED effect for women. Later studies using more recent NLSY data have produced similar findings of no or minimal earnings returns to a GED credential (Heckman and LaFontaine, 2006; Heckman, Humphries and Mader, 2010).

However, using the same data but different method to correct for selection bias, Murnane and his colleagues found contrary results. Using multiple years of data, they applied fixed effects-effect and random effects-effect models to compensate for person-level unobservables. Murnane, Willett and Boudett (1999) found positive GED effects on hourly wage growth for men who dropped out with low cognitive skills as measured by the Armed Forces Qualification Test. Boudett, Murnane and Willett (2000) also found a positive GED effect on women's annual earnings.

Using High School and Beyond (HS&B) data, Murnane, Willett and Tyler (2000) specifically investigated the association between earnings gains and GED certification by variation of recipients' cognitive skills, measured by 10th grade math scores. They found a positive association exists mainly for GED recipients who had low cognitive skills.

While survey data provide rich information about student background, schooling and educational outcomes, both NLSY and HS&B data have limitations as they contain small samples of dropouts and GED recipients. Although selection bias might be corrected by appropriate methods, missing wage records for relatively small samples is still an analytical weakness. Tyler, Murnane and Willett (2000a, 2000b) use Social Security Administration administrative data to examine the GED effects on earnings. They compare mean earnings by GED score for individuals aged 16 to 21 who took the GED in 1989 or 1990 in New York and Florida, and in 1990 in 42 states. They find a positive association between GED completion and annual earnings for different gender and race/ethnic groups in two studies. The positive association was not found among white males in New York and Florida (2000a) and not found among nonwhites in the 42-states group. It has been suggested that inconsistent results across groups may result from not taking into account heterogeneous factors of GED regulations across states (Rubinstein 2003).

With growing availability of state longitudinal administrative data, researchers are able to track GED effects on long-term earnings while controlling for time-invariant determinants of earnings for each individual. Jepsen, Mueser and Troske (2012) used Missouri administrative data containing more than 100,000 individuals who took the GED between 1995 and 2005, as well as earnings data matched to GED takers covering the wage period from 1993 to 2008. They employed fuzzy regression discontinuity to control for selection bias by carefully considering the potential effect from multiple test taking. They did not find significant effects from GED completion on either employment or earnings. But GED completion does increase enrollments in postsecondary education.

The studies discussed above reveal three factors associated with the precision of the evaluation of the effect of GED completion on earnings. First, a selection-correction method is necessary to improve the estimation of the GED effect using observational data. Second, taking into account potential heterogeneous GED effects on earnings across groups (e.g., by gender, race/ethnicity, cognitive/non-cognitive ability) provides a better picture of GED effects than considering the GED effect as a whole. Finally, data that provide rich information about individuals' schooling and employment/earnings history over time help overcome potential bias and provide a longitudinal investigation of any GED effect. The present study examines the effect of GED completion on earnings by using the PSM approach on Washington state P20W data.

3. Data

This study combines the data of public high school dropouts with their K-12 and post-dropout employment records from multiple data sets housed in the ERDC P20W. The ninth graders enrolled in Washington public high school in the 2004–05, 2005–06 and 2006–07 school years who dropped out of school without re-enrollment in any Washington public high school in four years are selected as the three study cohorts (N=11,430)[5]. Among those dropouts, students who completed GED certificates in Washington constitute the treatment group. The non-GED completers compose the comparison group. Since this study will estimate the net earnings premium by calculating the earnings difference between GED completers and non-GED completers, those who enrolled in any postsecondary education beyond dropout are excluded from the study sample. In addition, unemployment insurance (UI) earnings records[6] are used for in-state employment. Note that the earnings records are available only for UI-covered employment in Washington and do not include the self-employed and those employed outside the state. Social Security numbers (SSNs) are the linking key to match dropouts with UI records. Records without SSNs in P20W data files are not used in the study. The final headcount of dropouts to estimate GED impact on earnings is 8,386.

Data used for this study come from multiple source files loaded in ERDC P20W, which provides longitudinal records for individuals' education and employment developments in Washington. These are administrative data files collected from various state agencies. K-12 data from the Office of Superintendent of Public Instruction include information about students' background characteristics, enrollment status and school progress. The State Board for Community and

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[5] Hereafter, cohort 2005 refers to the ninth graders enrolling in the 2004–05 academic year, cohort 2006 refers to those in the 2005–06 academic year and cohort 2007 refers to those in the 2006–07 academic year.
[6] For more information about UI data, please refer to Paterson and Weeks (2015), Appendix B.

Technical Colleges is the source for data about GED certificates awarded in Washington. The UI earnings records from the Washington State Employment Security Department provide historical records of individuals' employment and earnings. Washington State Department of Licensing (DOL) driver's license records are used to improve data matching by SSN[7].

Since administrative data files are not collected for specific research purposes, students who drop out are not tracked systematically unless they return to public school or are employed in Washington. This leads to data limitations, because less is known about dropouts when compared to non-dropouts (graduates). Students might drop out at different grades and ages. They might also persist or cycle in and out of the labor market after dropping out.

Table 1 shows the modal age for three study cohorts at the potential year of dropping out and year of employment. Most students following standard school progress graduate at age 17 or 18. This study uses K-12 enrollment records from grades nine to 12 for the same cohort to flag students' dropout status. For example, ninth graders who enrolled in the 2005 (2004–05) school year were identified as dropouts if their final enrollment status in or before 2008 is recorded as dropout. Concerning UI employment records available for this study: By 2013, there are nine years of UI records for most of dropouts from the 2005 cohort, eight years for the 2006 cohort and seven years for the 2007 cohort[8]. The age range tracked in the dropouts' employment and earnings behavior is 14 to 23 for this study.

Table 1. Modal age* by the year of dropping out and year of employment

Enrollment year of 9th grader	Year of dropping out and employment								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cohort 1: 2005	14-15 (G9)**	15-16 (G10)	16-17 (G11)	17-18 (G12)	18-19	19-20	20-21	21-22	22-23
Cohort 2: 2006		14-15 (G9)	15-16 (G10)	16-17 (G11)	17-18 (G12)	18-19	19-20	20-21	21-22
Cohort 3: 2007			14-15 (G9)	15-16 (G10)	16-17 (G11)	17-18 (G12)	18-19	19-20	20-21

* Modal age refers to the age of the majority of students from the same cohort.
** Modal grade, which refers to the grade level of the majority of students from the same cohort, is labeled in parentheses.

4. Analytical Approach

This study provides a comprehensive analysis of dropouts' workforce trajectories and the effects of a GED certificate on earnings by using three approaches: students' demographic characteristics, high school progress before dropping out and the timing of dropping out.

4.1. Exploratory analysis
An initial exploratory analysis on the full sample describes the characteristics of students' background, their schooling experiences in high school (e.g., unexcused absence, last GPA before dropping out, programs related to vocational training, school mobility), GED completion

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[7] By using DOL data, about 85 percent of dropouts were found with SSN. This approach increases the SSN matching rate, compared to prior matching without DOL data, which led to only 35 percent matched.
[8] Generally the minimum age a teen worker in Washington may be hired is 14. (http://www.lni.wa.gov/FormPub/Detail.asp?DocID=1913). Although there might be few exceptions, this study uses age 14 as the youngest age eligible for work to standardize the employment data range.

after dropping out and employment status before and after dropping out. The distribution of each characteristic is compared between GED and non-GED groups.

4.2 Propensity score matching

In the presumed presence of selection bias based on the assumption that GED completers differ from non-completers in their pre-GED characteristics, the estimate of any GED effect is misleading and thus needs to be adjusted. This study applies a similar approach as used by Paterson and Weeks (2015) to eliminate selection bias using the propensity score matching (PSM) method (Rosenbaum & Rubin, 1983; Heckman 1998)[9]. Dropouts obtaining GED certificates are in the "treatment" group, and their counterfactuals, or the "comparison" group, are comparable dropouts from the same cohort who did not receive a GED certificate. The goal of the PSM analysis is to match students in the treatment group with students in the comparison group based on observable characteristics related to GED certificate completion.

The matching procedure was done by first applying a logit regression model for all dropout students to compute the "propensity" (predicted probability) of GED completion. Once students' propensity scores were computed from the logit results, caliper matching[10] (Dehejia & Wahba, 2002; Morgan, 2001) was used to match each GED completer by propensity score with at least one but no more than five public school students (matching with replacement). A non-GED completer was selected only if his/her propensity score was similar to a GED completer's propensity score. The difference should be no more than 0.01. This technique increases the precision of the match. The unmatched cases are removed from the analytical sample for the analysis of earnings premium between treatment and comparison groups.

4.3. Net assessment methodology

Using matched sample data obtained from the PSM analysis, the net impact of GED completion on earnings for dropouts is estimated by the difference between the median annual earnings of the treatment and comparison groups, by age. Completing a GED certificate is not the choice for most dropouts; often they do not go on to obtain the degree right after dropping out[11]. Among GED completers, almost two-thirds received GED certificates within one year after dropping out and one-third in the second or third year after dropping out (see Table 2). Considering such time-variant characteristics and because dropping out could occur at any age during high school, instead of using earnings year as the unit to evaluate earnings differential, this study uses students' earnings age (starting at age 14) through their age in 2013 (the most current data year).

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[9] There is some difference in the analytical design between Paterson and Weeks (2015) and this study because, unlike high school graduates, dropouts normally do not follow standard progression through high school years. That said, the same cohort of students might drop out at a different age and grade while a majority of same-cohort students would graduate at the same time.

[10] Caliper matching selects pairs of treatment and comparison subjects where the difference in propensity scores between matched subjects is within a predefined distance — the caliper width.

[11] WAC 131-48-100 permits individuals age 16 or older to take the GED test.

Table 2. Years to GED completion after dropping out

Year(s)	Total	Percentage	Cumulative percentage
Before*	57	2.5	2.5
0	624	27.5	30.0
1	679	30.0	60.0
2	460	20.3	80.3
3	236	10.4	90.7
4	127	5.6	96.3
5+	84	3.7	100.0
Total	2,267	100.0	

* There are few cases showing GED completion dates before dropping out. This may be caused by incorrect manual input of dropout dates. Tracking the true reason for those cases is beyond this study's capacity.

5. Findings

This section presents the primary findings of this research in two subsections. First, the exploratory analysis summarizes the characteristics of the study cohorts by comparing GED completers with non-GED completers. The descriptive statistics in each table are the percentages of the distributions for each student characteristic. Following the descriptive statistics tables, earnings differentials by age between treatment and comparison group are presented in figures.

5.1. Descriptive characteristics about high school dropouts

Table 3 shows the percentage distribution of students' background characteristics, with demographics, family income status and disability status. Among students who dropped out, 27 percent went on to receive a GED certificate but did not enter postsecondary education within the time range of this study. Compared to males, females are more likely to obtain a GED certificate. Among racial/ethnic groups, whites tend to have a higher proportion earning GED certificates, whereas Hispanics are less likely to obtain the certificate. Whites compose 70 percent of GED completers and 64 percent of non-GED completers. Hispanics compose 11 percent of GED completers versus 17 percent of non-GED completers.

Table 3. Student background characteristics, by GED completion

	Percentage of all dropouts	Percentage of GED dropouts	Percentage of Non-GED dropouts
All dropouts	100	27	73
Gender			
Male	62	60	62
Female	38	40	38
Race/ethnicity			
Asian	5	4	5
Black	6	6	6
Hispanic	16	11	17
Other race	8	9	8
White	66	70	64
Free/reduced-price meal	49	46	51
Disability[12]	14	7	17
Total	8,386	2,267	6,119

This study uses the eligibility for free/reduced-price meals as the proxy indicator for students' family income status. Based on this measure, almost half of the dropouts (49 percent) are from low-income families; they are less likely to complete a GED certificate (46 percent). In general, disadvantaged students are proportionally less likely to complete a GED than their dropout counterparts.

Students' experiences in school, such as academic achievement, vocational training or school mobility, could be associated with the decision to drop out and to complete a GED certificate after dropping out. Table 4 shows that GED completers have more unexcused absences than the non-GED group. There is no difference in the average GPA between the two groups. However, non-GED dropouts are more likely to be in a bilingual program than GED dropouts. For all dropouts, there are few students enrolled in the three programs related to vocational skill preparation. There is not much difference in the proportion of students in technology preparation and receiving an industrial certificate between the GED and non-GED groups. However, the non-GED group tends to have a higher proportion taking vocational education than the GED group.

As to school mobility: Students, on average, enrolled in more than one school district (average number of district enrollments for all dropouts is 1.3) and in at least two high schools before they dropped out. GED completers present slightly higher mobility across schools and districts.

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[12] Students' disability status is defined from a disability flag from OSPI Core Student Record System data. If a student is identified as having one of the 14 disability categories listed in Disability Codes in Appendix I (http://www.k12.wa.us/CEDARS/pubdocs/2015-16CEDARSDataManualAppendices.pdf#AppendixI), the disability is reported.

Table 4. Student's schooling experience before dropping out, by GED completion

	All dropouts	GED	Non-GED
Number of unexcused absences	6.1	6.5	5.9
GPA	1.4	1.4	1.4
Bilingual program	5%	3%	6%
Vocational preparation programs			
Vocational education	13%	10%	14%
Technology preparation	10%	10%	11%
Industrial certificate	1%	1%	1%
School/district mobility			
Number of district enrollment(s)	1.3	1.4	1.3
Number of district movement(s)[*]	0.6	0.7	0.6
Number of school enrollment(s)	2.1	2.2	2.0
Number of school movement(s)	1.5	1.6	1.4
Total	8,386	2,267	6,119

[*] Two distinct enrollments equate to one movement between two districts/schools.

Table 5 presents the percentage distribution of grade level and age when students dropped out. Those who received a GED certificate tended to drop out at younger ages than those who did not get a GED. Among GED completers, about 50 percent dropped out before 12th grade while 59 percent of students who did not complete a GED dropped out in the last year of high school. Before age 18, 67 percent of GED completers dropped out compared to 57 percent of non-GED completers. From Tables 4 and 5, the results seem to show that students who dropped out and did not continue to obtain a GED certificate tended to stay in high school longer and attended more vocational education.

Table 5. Grade and Age at Dropout, by GED completion

	All dropouts (percentage)	GED (percentage)	Non-GED (percentage)
Grade			
9th	10	9	10
10th	12	15	11
11th	24	26	20
12th	54	50	59
Age			
13-14	1	1	1
15	7	9	6
16	16	20	14
17	37	37	36
18	31	25	30
19	9	7	10
20-21	3	2	3
Total count	8,386	2,267	6,119

Table 6 shows dropouts' employment status (labor market participation; not self-employed) in Washington by examining the number of quarters students were employed *before* they dropped out and the length of time they waited until first employment *after* they dropped out. Before dropping out, the average number of quarters students were employed is about six. GED completers have fewer employed quarters than those who did not go on to get a GED certificate.

This may be due to the fact that the number of GED completers who drop out early is greater than the number of non-GED completers who drop out early. Comparing by demographics, females tend to be employed in more quarters than males. Blacks and Hispanics had more persistent employment experiences than other racial/ethnic groups when they were still enrolled in high school (about seven to eight quarters). Asians had fewer employment quarters (about five quarters).

After dropping out, students, on average, stayed unemployed for almost one year (3.6 quarters) before assuming their first employment. GED completers were unemployed for a slightly longer time than non-GED completers. There is not much difference in unemployment time before first employment by gender. While most racial/ethnic groups waited for three to four quarters to be employed, Asians took a longer time (about 4.2 quarters on average).

Table 6. Average number of quarters employed around the time when dropping out, by GED completion and demographics

	Number of quarters employed *before* dropping out	Number of quarters to the first employment *after* dropping out
All	**6.1**	**3.6**
GED	5.6	3.8
Non-GED	6.3	3.5
Male	5.8	3.7
Female	6.7	3.5
Asian	4.9	4.2
Black	7.9	3.7
Hispanic	7.5	3.3
Other race	5.5	3.9
White	5.8	3.6
Free/reduced-price meal	6.4	3.8

Table 7 illustrates employment status by age for those who worked in Washington and were not self-employed after they dropped out. Before 17 years of age (the age the majority are promoted to 12th grade), few had started to work and most did not work through the whole calendar year (four quarters). For instance, only two dropouts worked for one quarter at age 14. Among the 28 dropout students who worked at age 15, 12 worked for one quarter and four worked for four quarters in the same calendar year. For those who worked when they were 17 or 18 years old and were supposed to be in 11th or 12th grade if they did not drop out, about 30 percent worked four quarters of the calendar year. Between ages 19 and 21, half were employed through the whole year (four quarters). However, at ages 22 and 23, the proportion of being employed full time through the calendar year decreased. The decline of full employment at an older age might be due to an increase in self-employment or to migrant workers who worked outside of Washington occasionally. These data are not available so potential explanations cannot be explored.

Table 7. Number of quarter(s) employed in each calendar year *after* drop out, by age

| Age | Number of quarters employed | | | | Total |
| | 1 | 2 | 3 | 4 | |
	Count (percentage)	Count (percentage)	Count (percentage)	Count (percentage)	Total
14	2	0	0	0	2
	(100%)	(0%)	(0%)	(0%)	(100%)
15	12	7	4	5	28
	(43%)	(25%)	(14%)	(18%)	(100%)
16	134	82	44	83	343
	(39%)	(24%)	(13%)	(24%)	(100%)
17	338	255	148	336	1,077
	(31%)	(24%)	(14%)	(31%)	(100%)
18	1,027	811	507	1,121	3,466
	(30%)	(23%)	(15%)	(32%)	(100%)
19	1,017	898	712	2,614	5,241
	(19%)	(17%)	(14%)	(50%)	(100%)
20	905	913	855	3,241	5,914
	(15%)	(15%)	(14%)	(55%)	(100%)
21	892	855	720	2,714	5,181
	(17%)	(17%)	(14%)	(52%)	(100%)
22	717	641	560	1,532	3,450
	(21%)	(19%)	(16%)	(44%)	(100%)
23	460	315	183	357	1,315
	(35%)	(24%)	(14%)	(27%)	(100%)

5.2 Earnings premium across age

The median real (2013 dollars) earnings across age for treatment (GED) and comparison (dropout only) groups are presented in Figure 1. The comparison group started with higher earnings at the youngest age. Between ages 16 and 18, there is not much difference in median earnings between treatment and comparison groups. After age 18, when those teens become adults and are eligible for adult employment, the comparison group slightly out-earns the treatment group most of time, although the difference may be minor.

The calculation of earnings premium based on the difference between median real earnings of the treatment and comparison groups provides a clear understanding of treatment impact. The following figures present earnings premium (treatment minus comparison) results by demographics and family income status.

Figure 1. Earnings over age: GED (treatment) compared to dropout only (comparison), 2013 dollars
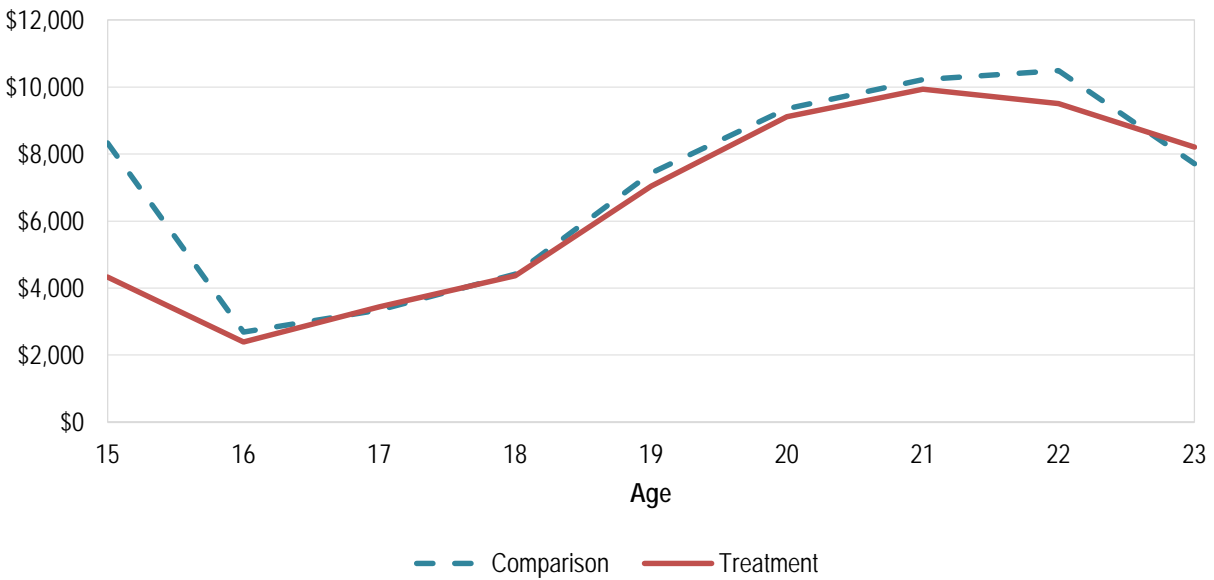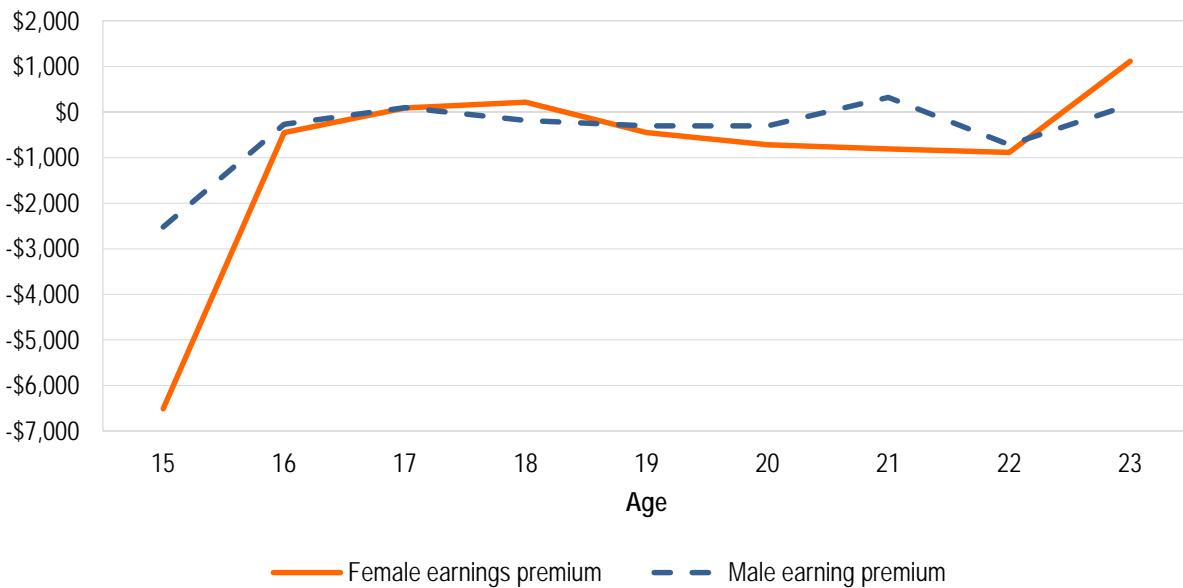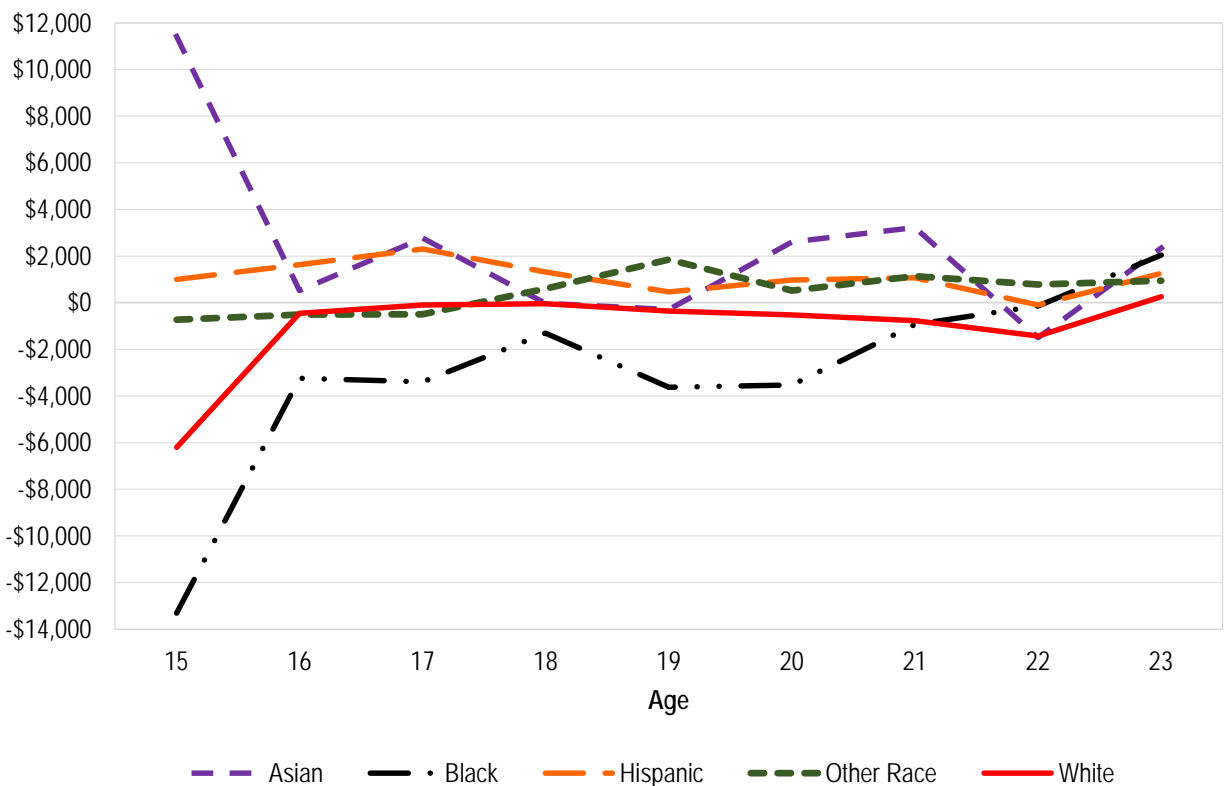

Figure 2 shows the earnings premium for males and females. As the age level increases, the two trend lines are around zero or negative, which indicates that those who achieve a GED certificate tend to earn less or the same as those who do not. This trend is consistent especially for males. However, obtaining a GED certificate seems to be more important for females, especially at the older ages (22–23).

Figure 2. Female and male earnings premiums by age: GED (treatment) compared to dropout only (comparison), 2013 dollars

The GED effect measured by earnings premium varies across race and ethnicity. Figure 3 demonstrates the change in earnings premium from age 15 to 23 for each race and ethnicity. In general, the earnings premium for each group increases from age 15 to 16[13]. From age 16, the nearly flat slope of the earnings premium trend for each group shows not much change of treatment-comparison difference over age. For whites, there is almost no earnings gain for those with a GED certificate. The earnings premium trend for whites is almost flat — around zero — over most ages. However, for minority groups, the trends show slightly different patterns. For blacks, the earnings for dropouts are greater than those with a GED certificate. For Hispanics, other race and Asians, those with a GED certificate tend to earn slightly higher earnings than those who dropped out without subsequently getting a GED. For Asians, the earnings gains for GED awardees are larger than the other groups at certain ages (17, 20 and 21). However, overall, such returns to GED on earnings might not be significant as most gains are close to zero and are less than $2,000.

Figure 3. Racial/ethnic earnings premium by age: GED (treatment) compared to dropout only (comparison), 2013 dollars
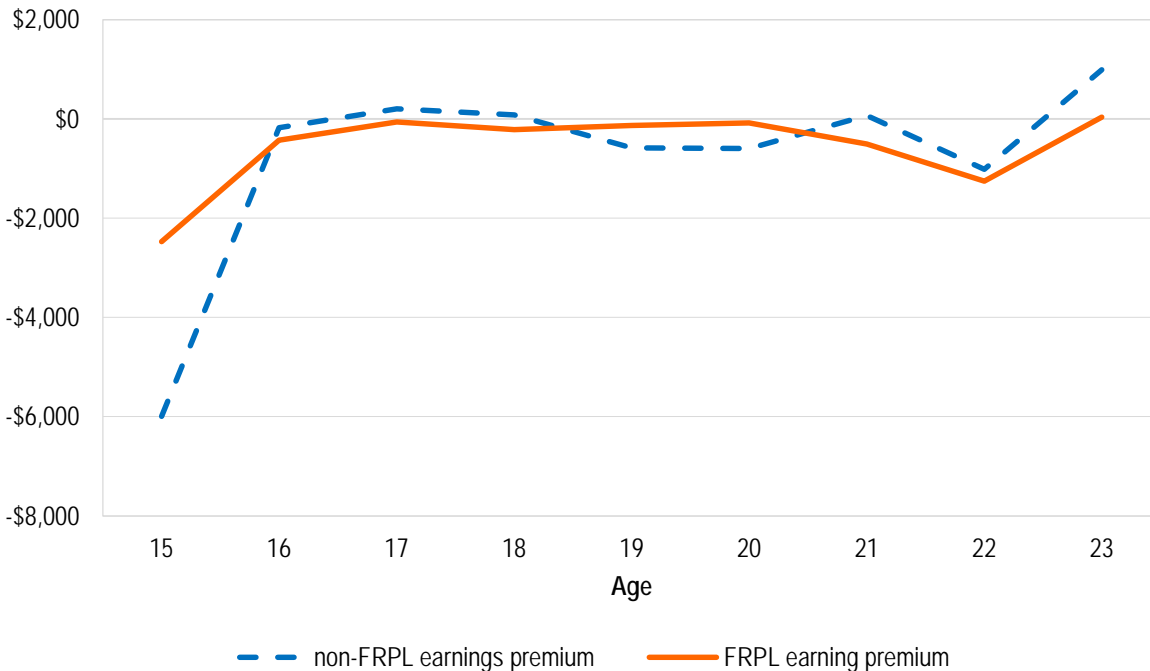

Does the GED effect vary for those from different family incomes? Figure 4 shows almost no difference between ages 16 and 21. The trends of earnings premiums for free and reduced-price lunch (FRPL) (low-income) and non-FRPL (middle/high income) GED completers are basically flat, around zero. Over age, GED awardees earn less or nearly the same as those without a GED.

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[13] At age 15, Asians have relatively higher earnings for those who eventually earn a GED certificate. It could be an outlier due to measurement error (e.g., faulty data entry). The data are not available to allow for such clarification.

Only from age 22 to 23 is there an earnings premium gain for non-FRPL GED awardees (about $2,000 difference) than the change at other age points. A GED certificate does not show much earnings benefit relative to those with different income levels. A longer-term investigation is needed to see if the upward earnings premium continues after age 23.

Figure 4. Earnings premium by age and by family income status (FRPL versus non-FRPL): GED (treatment) compared to dropout only (comparison), 2013 dollars

6. Conclusions

This study estimates the effect of a GED credential on dropouts' earnings in Washington by comparing the earnings premiums across age between GED recipients and dropouts only. An exploratory analysis reveals the differences in the characteristics between GED and dropouts only, about their backgrounds, schooling experiences, and employment and earnings status. The PSM method using Washington P20W data is employed to correct for selection bias and obtain net earnings assessments.

The exploratory results show that, compared to non-GED dropouts, GED recipients are more likely to be white and less likely to be from a low-income family (Table 3). Among nonwhite groups, Hispanics are less likely to get a GED credential. Before dropping out of high school, GED recipients have a lower likelihood of being found in bilingual and vocational education programs. They also have slightly higher school mobility (Table 4). GED recipients have a higher propensity to drop out at younger ages or earlier grades (before age 17 or 11th grade; Table 5). GED recipients and males have fewer working quarters than non-GED dropouts and females (Table 6). Hispanics and blacks worked more quarters than other racial/ethnic groups. The earnings premiums over age measure is obtained from calculating the difference between median annual earnings for the treatment and comparison groups by age. The results from Figures 1 through 4 show that, overall, there are almost no net earnings gains for GED recipients over age. The earnings premium line is flat most of the time across ages. Concerning variation in

earnings premiums by demographics and family income status: There is not much difference by gender or FRPL eligibility (Figures 2, 4). However, there is a slight racial/ethnic gap in earnings premiums. Figure 3 shows that unlike whites, whose earnings premiums are close to zero (zero or slightly below) by age, Hispanics, Asians and other races benefit from GED credentials, with about $1,000 to $2,000 annual median earnings gains from age 16 onward. Black GED recipients gain less than non-GED dropouts, but the gap gradually narrows after age 20.

Over almost two decades, a lively literature has developed about the effects of GED completion on earnings. This study contributes to this literature by investigating the heterogeneous effects of GED completion by carefully taking into consideration the individuals' prior dropout characteristics and skills.

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