The Impact of Washington State Achievers Scholarship on Student Outcomes

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Abstract

This paper uses data from the fifth cohort of the Washington State Achievers (WSA) Program to investigate the impact of receiving a WSA scholarship on various student outcomes. Using a regression discontinuity approach, we find that receipt of a WSA scholarship has a large positive and statistically significant impact on the probability of college enrollment in the year after high school. We also find that receipt of the WSA scholarship lowers student debt, and that there are sub-group differences in the effect of the program on a number of the multiple outcomes examined.

I. Introduction

The real cost of college attendance has been increasing for a long time. For example, student tuition and fees at public four-year colleges has increased from $3,860 to $6,590 (in 2008 dollars) over the fifteen year academic year period beginning in 1993-94 and ending in 2008-09 (College Board, 2008). Coupled with this rise in the real cost of attendance is the fact that college students are also leaving college with increased levels of debt (see Pew Charitable Trust, 2008). The increased financial burden is especially heavy for students from low-income families and may be a primary factor in the lower college attendance rates of this group (see Pell Institute, 2008)

To help offset the rise in college costs, many states have introduced scholarship programs for their citizens. However, many of these programs (e.g. Georgia's Hope scholarship) are not need-based and undoubtedly provide funding to students who would have attended college whether they received the scholarship or not. In addition to state-based funding of college students, community-based scholarship programs are being implemented around the United States (e.g., the Kalamazoo Promise) and a number of foundations (e.g., Jack Kent Cook Foundation) have also introduced college scholarships. The largest foundation-based initiatives are those offered by the Bill and Melinda Gates Foundation which funds the Gates Millennium Scholars (GMS) and the Washington State Achievers (WSA) programs. A twenty-year, one billion dollar project, the GMS program was established in 1999 to improve access to and success in higher education for low-income and high-achieving minority students by providing them with full tuition scholarships and other types of college-going support. The WSA program is part of an initiative to fund and support 16 high schools in Washington State as they redesign themselves to increase academic achievement for all their students thereby promoting college attendance and success. Part of the WSA initiative is to provide college scholarships for select students from each of the 16 high schools.

Although we have conducted evaluations of the GMS program (DesJardins and McCall, 2006a; 2006b; 2008), in this manuscript we focus on the effects of the WSA program on various college outcomes. We do so by using standard multivariate regression methods, as well as a quasi-experimental method known as regression discontinuity analysis (see Trochim, 1984 for a general explanation; see Thistlewaite and Campbell, 1960, for an application to the study of the National Scholars program; see DesJardins and McCall 2006a; 2006b; 2008 for an application to study the GMS program).

Although there are multiple cohorts of WSA recipients, the fifth cohort is particularly amenable to use of the RD method because a student's scholarship eligibility is determined (to some extent) by their score on a non-cognitive test, and there is evidence of a discontinuous increase in the probability of receiving a WSA scholarship across this non-cognitive score. This "discontinuity" in the chances of selection into the program can be used to help identify the causal effects of the program on any number of student choices (e.g., enrollment in college) and educational events once the student is enrolled in college (e.g., credit hours taken, work behavior, loan accumulation).

Using the aforementioned techniques, we find that receipt of the WSA increases enrollment in college compared to students who do not receive the scholarship but are alike on many other observable factors. Our results also indicate that receiving a WSA scholarship lowers the average student loans taken by scholarship recipients relative to their non-recipient counterparts. Finally, there is some evidence that receipt of a WSA scholarship increases the chances that a recipient will work while in college, but their average hours worked per week are lower than their non-recipient colleagues who also work.

The structure of the paper is s follows. The next section presents some details of the WSA program. Section 3 briefly covers them methods used in the paper. After presenting some summary statistics in Section 4, Section 5 presents the results from linear regression and probit model estimates as well as estimates from their regression discontinuity analogs.

II. The Washington State Achievers Program

The Washington State Achievers (WSA) program was introduced by the Bill and Melinda Gates Foundation in 2001. The WSA scholarships support approximately 500 low-income students each year from 16 high schools in the state of Washington (see Appendix A for a list of the high schools). The first Achievers Scholars were selected in the spring of 2001 and began attending college in the fall of that year. Subsequent cohorts of students have begun or will begin attending college each fall through 2010. Unlike the Gates Millennium Scholarship program, the WSA program is a holistic program that involves, among other things, high school reform.[1]

WSA scholars are chosen in their junior year of high school. To be selected, students must graduate from high school, demonstrate financial need, and apply for need-based financial aid at the colleges they plan to attend. Regarding their need, an applicant's family income must be lower than 35 percent of the Washington state average and the family assets must be below a specified threshold. Within this group of low-income students, scholarships are also (partially) allocated on the basis of the student's total score on a non-cognitive test they are given.

WSA scholarships pay for tuition and fees for a set of colleges and universities (including some community colleges) in the state of Washington for up to five years.[2] The program is a "top up" program in that the WSA scholarship covers any differences in the cost of attendance once other scholarships and grants (e.g. Pell grant) are taken into account. The WSA scholars are also provided mentors in high school and for their first two years of college.

III. Methods

To investigate the impact of receipt of the WSA scholarship on a number of educational events and outcomes, we estimate several multivariate regressions. Linear regression techniques are employed

1 For more information on the type of school reform see Ramsey (2008).
2 For a list of eligible colleges see http://www.collegesuccessfoundation.org/achievers/achievers_awards.htm#eligible_colleges

when the dependent variable is continuously measured (e.g., loan amount; credits taken, hours worked, while a freshman in college) and probit regression is used when the outcome is dichotomous (e.g., whether the student enrolled in college or not). In these regressions we control for observable factors such as demographic and student characteristics, characteristics of the high school the student attended, the total non-cognitive test score (and its square), and also for the eight sub-scores of the total score. We include these controls to try to isolate the independent effect of the WSA program on the aforementioned outcomes.

While this rich set of predictor variables may control for observed differences between program recipients and non-recipients, there may still be *unobserved* differences between scholars and non-scholars that are related to the outcome variables of interest, making valid inferences about the program effects problematic. One method often used to remedy this inferential problem is regression discontinuity (RD) design. RD is a non-experimental design (see Cook and Campbell, 1979) where subjects are assigned to the treatment (e.g., WSA participation) and control groups (e.g., WSA non-participants) based on a score on some pre-specified criterion (or criteria). Given the selection mechanism operating we expect that students just above and just below the cut point on the total non-cognitive test score are distributed in an approximately random fashion. If this is the case then the observed and unobserved characteristics of students around the cut score are very similar, akin to a randomized experiment around the cut point. Under these circumstances an evaluation of the effect of the program near this cut score has strong causal implications. If the program has a positive (or negative) effect on a particular educational outcome, we expect to observe a discontinuity at or near the cut score. This discontinuity helps to identify the causal effect of the program.

Given that most high schools choose program recipients (within each racial group) based on their total non-cognitive test score, at some point on the distribution of this test score there is a

discontinuous increase in the probability of receiving a WSA scholarship.[3] Because this discontinuous jump at the cut-point is in the *probability* of scholarship receipt, the RD is known as a "fuzzy" design (see Lemieux and Imbens, 2008, for more detail).[4] Our RD estimates are obtained using two-stage least squares when the outcome is a continuous variable, or in the case of a dichotomous measure we estimate a bivariate probit model with an endogenous variable. The coefficient of particular interest in these regressions is associated with the dummy variable indicating whether the total non-cognitive test score is above (=1) or below (=0) the point at which the probability of scholarship selection "jumps" (i.e., at the cut-point). This coefficient estimate will provide us with statistical evidence of any net effect of the WSA program on the outcome of interest.

IV. Summary Statistics

As noted above, the allocation of scholarships among students within a particular high school and racial group is based, to a large extent, on the student's total non-cognitive test score. Measures of the total non-cognitive test scores, as well as the individual components of the test, were obtained for nearly all applicants (1036 out of 1052) to the WSA program. Figure 1 presents kernel density estimates by whether the student received a WSA scholarship or not. Whereas the distributions of total non-cognitive scores are bell-shaped for both recipients and non-recipients, the mean total non-cognitive score is approximately 5.5 points higher for the former relative to the latter group.

Figure 2 presents local polynomial regression estimates of the probability of receiving a scholarship by total non-cognitive test score. The predicted probability of receiving a WSA scholarship increases rapidly in the total non-cognitive score range of 20 to 30. At a score of 20 the estimated probability of scholarship receipt is only .18, but increases to .52 at a total non-cognitive score of 25

3 DesJardins and McCall (2006a; 2006b; 2008) applied regression discontinuity techniques to analyze the impact of the Gates Millennium Scholars program.

4 In a "sharp" design no individuals below the cut-point receive the scholarship while all individuals above the cut point receive the scholarship.

and jumps to .94 at the non-cognitive score of 30. This sharp rise in the probability in the 20 to 30 score range allows us to make use of regression discontinuity methods to estimate the causal effects of the WSA program on education outcomes.

The total non-cognitive score is comprised of eight sub-scores. The means for each of these sub-scores are presented in Table 1 for the full group of applicants (in column 1), scholar recipients only (in column 2), and non-recipients (see column 3). Across all applicants average scores vary from a low of 2.99 for the "Understand and Navigate Social Systems" sub-score to 3.29 for the "Positive Self-Concept" sub-score. There are statistically significant differences between scholars and non-scholars on all sub-scores, with scholars having uniformly higher means than non-scholars. Thus, scholars tend to score higher on all non-cognitive components.

Because we are primarily interested in differences between scholars and non-scholars around the 20 to 30 total score range (the "cut point"), columns (5) and (6) present the mean sub-scores for students just above and below this point.[5] It is clear that students at or just above the cut point have statistically significantly higher means for all sub-scores than students who are one to two points below the cut point. Thus, the differences we observed in being just above or below the cut in terms of total non-cognitive score are not being driven by just one or two of the sub-scores.

Figures 3 and 4 present the fraction of applicants by high school and race.[6] Most high schools give between 55 and 65 percent of applicants a WSA scholarship, and a test of whether the award fractions are equal across high schools cannot be rejected (p-value = .974).[7] The fraction of WSA recipients by race varies from a low of 0.48 for Asian/Pacific Islanders to a high of 0.66 for the Other category. These differences are statistically significant (p-value = 0.034).

5 Recall that cut scores vary by racial group and high school.

6 High school information is available only for the NORC sample of applicants. In this case fractions are based on population weights.

7 Given the small number of applicants for some high schools, the p-value is based on an exact test.

Table 2 presents summary statistics for the various demographic and student background variables. Column 1 presents means for the entire sample whereas columns (2) and (3) present means by the student's scholarship status. There are statistically significant differences between scholars and non-scholars for the fraction of students having had any International Baccalaureate (IB) courses (0.25 versus 0.08, p-value < 0.001), any Advanced Placement (AP) courses (.30 versus .13, p-value < 0.001), having taken Algebra II (0.80 versus 0.72, p-value = 0.004), and having taken a high school physics course (0.33 versus 0.28, p-value = .048).

One assumption of the regression discontinuity method is that the distribution of errors be equal just above and just below the cut point. To check this assumption, in columns (5) and (6) of Table 2 are the means for the demographic and student background variables just above and just below the cut point. Statistically significant differences (at the 10% significance level) between those just above and just below the cut point are observed only for the fraction of those having taken any IB classes (0.32 versus 0.16, p-value=0.079). Thus, it appears that the observable characteristics do not differ substantially between the group of students just above and just below the cut point.

As a further check of the appropriateness of a regression discontinuity approach we examine whether there are differences in scholarship receipt in two-point bands on both sides of the total non-cognitive score cut point. The bar chart displayed in Figure 5 indicates small differences in the fractions of scholars just below the cut point and just above the cut point. There is, however, a large change in the probability of scholarship receipt at the cut point, where the fraction of WSA scholars jumps from 0.35 to 0.88.[8] This provides additional evidence that the RD approach is appropriate for this sample.

WSA scholarships provide, on average, $5,853 to students in their freshman year of college.

8 The differences in fraction of scholars between consecutive bands are not statistically significant except for those two bands which surround the cut point.

The smoothed distribution of WSA scholarship amounts is displayed in Figure 6. The median scholarship amount is $6,532 indicating a slight skew to the left. In addition to the WSA funding, students also receive other sources of financial aid. The mean amount for these other sources of scholarships and grants received by students (WSA scholars and non-scholars combined) is $9,765, with a median of about $7,000, indicating a skew to the right. (The smoothed distribution of total scholarship/grant amount is presented in Figure 7).

When we combine the WSA and other sources of aid, the total amount received by WSA scholars is $11,369, whereas the average for WSA non-scholars is only $2,419. Thus, the average difference is nearly $9,000 larger than the average WSA scholarship amount. On the other hand, on average, WSA scholars attend colleges with yearly tuition costs that are approximately $5,800 dollars higher than non-scholars ($13,398 for WSA scholars versus $7,602 for non-scholars).

V. Results

In this section we present the results of the inferential analyses. Table 3 presents the results for several education outcomes, including college enrollment, loan debt, hours worked and weekly earnings while enrolled in college. In column (1) we report results regarding the effect of a WSA scholarship on the *probability* of enrolling in a postsecondary institution. Columns (2) through (5) limit the sample to those who actually enrolled in a postsecondary institution. Column (2) presents estimates of the effect of a WSA scholarship on the probability of attending a two-year institution, column (3) presents the estimated effect on the average amount of loans a student receives by the end of the freshman year, column (4) presents estimates of the effect on the average number of hours worked per week during the freshman year, and column (5) presents estimates of the effect of the program on a student's average weekly earnings while a freshman in college.

In row a) of Table 3 estimates are presented for linear and probit regression models with no controls included. Row b) presents estimates where race, high school factors, and total non-cognitive

score (and its square) are added as regressors. Row c) adds student background and demographic characteristics, and row d) adds controls for the non-cognitive sub-scores. Rows e) through g) are similar to rows b) through d) except that we use whether a student is above the cut score as an instrumental variable for whether a student received a WSA scholarship. Thus, the estimates in rows e) through g) are the regression discontinuity estimates for a model with a fuzzy design.

Turning to the results for the probability of enrollment in the top panel of Table 3, we find that students receiving a WSA scholarship are statistically significantly more likely to enroll in a postsecondary institution than their non-WSA colleagues, and this effect remains when additional controls are added. In the model with a full set of controls (see row c), a WSA scholarship is estimated to increase the probability of enrollment by .32 relative to the non-WSA group. The regression discontinuity estimates reported in the bottom panel yield similar results. The estimated effect of a WSA scholarship on the probability of enrollment for the regression discontinuity model with a full set of controls is 0.42 and is statistically significant at the 5 percent level.

Whereas probit estimates of the probability of attending a two-year college yield statistically significant negative effects of receiving a WSA scholarship, these results do not persist when employing the regression discontinuity method. The RD point estimates in the lower panel of Table 3 are negative, but compared to the probit estimates in the upper panel their magnitude is cut by roughly two-thirds and none of the estimates are statistically significant at conventional levels.

Linear regression estimates of the effect of a WSA scholarship on average student loan amounts (displayed in the upper panel of Table 3) are negative but not statistically significant. However, the magnitude of the regression discontinuity estimate on loan amount (in the lower panel) increases substantially compared to the linear results and is statistically significant at the 5 percent level. The point estimate for the RD model with the full set of covariates suggests that receipt of a WSA scholarship lowers the average student loan amounts in the freshman year by about $4,500 compared to

students who do not receive the scholarship.

Estimates of the effect of a WSA scholarship on hours worked are negative and statistically significant for all linear model specifications (displayed in the upper panel of Table 3). The estimate for the model including a full set of controls indicates that receiving a WSA scholarship reduces the average hours worked by approximately five hours per week. Although the estimates from the RD models are also negative, and the point estimates are actually larger for the model with the full set of controls, the standard errors are considerably larger thus the estimated effects are not statistically significant.

The pattern of findings for the impact of the WSA scholarship on weekly earnings is similar to those for weekly hours of work in that the linear regression estimates are all statistically significant and negative, and the RD estimates are not statistically significant even though the point estimates are also negative and larger in magnitude.

Table 3 focuses on the regressor of interest: the effect of being a WSA scholar on each outcome. In Table A1 in the Appendix we present the RD results for each dependent variable when a full set of controls are included as regressors. This is done so that we can examine the effect of other important variables on each of the outcomes examined.

For enrollment there are significant race effects, with African American students and Asian American students having higher enrollment rates (14 and 13 percentage points, respectively) than white students, all else equal. There are also statistically significant race effects for hours worked and earnings, with Asian American students working less and earning less than white students.

There is weak evidence that students who took an AP course in high school are more likely to enroll in college than student who did not take any AP courses during high school. However, given enrollment in college, students who took an AP course in high school are significantly *less* likely to attend a two-year college than students who did not take an AP course in high school. Students who

took an IB course in high school are, all else equal, significantly less likely to enroll in a two-year college.

In Table 4 we present estimates that disaggregate the total effect of the WSA scholarship on hours worked into its component parts: the probability of working and the expected hours of work conditional on working. The RD estimates suggest that the receipt of a WSA scholarship increases the *probability* of working while in college, but *decreases* the average number of hours worked conditional on working.

Table 5 presents additional detail about the effect of receiving a WSA scholarship on the average number of credits (measured as a fraction of credits required for graduation) that a student takes during their freshman year, and the average number of hours a week a student spends studying, involved in extracurricular activities, relaxing, and sleeping during year one of college. We find statistically positive effects of receiving a WSA scholarship on the average hours spent studying and sleeping when using the linear regression (upper panel of Table 5). For the RD estimates the magnitudes of the effect of receiving a WSA increase but so do the standard errors. Weak statistical significance is attained only for the model with race, high school and total non-cognitive score controls.

Table 5 focuses on the effect of being a WSA scholar on each outcome. In Table A2 in the Appendix we present additional information about the dependent variables discussed in Table 5 by providing the RD results when a full set of controls are included as regressors.

Students who attended a middle school in a foreign country spend (on average) significantly fewer hours per week engaged in extracurricular activities than students who attended a middle school located in the United States. There is also some evidence of racial differences in the amount of sleep students get while in college, with African American, Asian American and Latino students reporting significantly fewer hours of sleep per week than white students. Finally, all else equal males report more hours per week relaxing than females and the difference is statistically significant. Not

surprisingly, students at colleges on the semester system take more credits per term than students at schools on the quarter system, and the difference is statistically significant.

To test the robustness of our results we estimated models that included interactions of race with total non-cognitive test score and its square, and interactions of high school attended variables with total non-cognitive test score. These estimates are similar to those described above, although somewhat more imprecise. For example, for the probability of enrollment the estimated impact of the WSA scholar is 0.42 (p-value =0.012).[9]

We also examined differences in the effects of the program by gender. Whereas the estimated effects of the WSA scholarship generally differed between males and females, none of these differences were statistically significant.

Regarding the limitations of the study, only the fifth cohort of WSA applicants could be used because in the other cohort for which data are available (Cohort III) there was no clear evidence that the regression discontinuity design could be implemented because there were no clear "jumps" in the probability of receiving a scholarship for the total non-cognitive test for most high schools. Thus, because we could not pool Cohorts III and V, the sample size is relatively small leading to more imprecise estimates than would otherwise be. Moreover, because the design we employ for the fifth cohort is "fuzzy" our estimates are more imprecise relative to what they would be if selection into the program was made only on one's total non-cognitive test score (a "sharp" RD design).

Also, the effect of the scholarship on college enrollment is undoubtedly picking up not only the financial effect of the scholarship, but is also probably picking up the effect of the other services that the scholars receive (mentoring while in high school, and for their first two years of college). For example, nearly 70 percent of scholars stated that the hometown mentor was helpful or very helpful to the scholar in the college admission/selection process, so we would expect that this assistance is also

9 Full results are available upon request.

related to the types of college outcomes (e.g., enrollment, credits taken, etc.) we examined.

VI. Conclusions

This study analyzed the effect of receiving a Washington State Achievers scholarship on several college education-related variables. Regression discontinuity estimates find large and statistically significant effects of receiving a WSA scholarship on college attendance. Point estimates suggest that the receipt of a WSA scholarship increases the probability of college attendance by 42 percentage points compared to non-WSA recipients. Regarding the effects of the scholarship receipt on student loan debt, our results indicate that the program significantly reduces loan amounts for WSA scholarship students. Although we found that the WSA scholarship reduces average hours worked while in college, this result was only statistically significant in the linear regression estimates. Additional analyses we conducted suggests that there may be two offsetting effects playing out with regard to average hours worked: receipt of a WSA scholarship may *increase the probability* of working but *lower the expected number of hours worked* per week among those who work while in college.

Hopefully, the manner in which WSA scholarships are distributed to future cohorts of applicants will also lend itself to a regression discontinuity design. Also, future follow-up surveys of Cohort V will indicate if theses wide differences in enrollment probabilities between WSA scholars and non-scholars will persist over time.

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Table 1
Sample Means and Means Just Above and Below the "Cut Points"
for Demographic and High School Background Variables

Subscore	Full Sample (1)	GMS Scholars (2)	Non-Scholars (3)	p-value (4)	All Applicants with Total Non-Cognitive Scores Equal to the... Cut Score or Cut Score + 1 (4)	Cut Score - 1 or Cut Score - 2 (5)	p-value (6)
Positive Self Concept	3.29	3.64	2.89	0.000	3.64	3.26	0.000
Realistic Self Appraisal	3.05	3.44	2.60	0.000	3.36	3.11	0.006
Understand and Navigate Social System	2.99	3.31	2.63	0.000	3.15	2.88	0.005
Prefer long range goals over short term	3.25	3.60	2.85	0.000	3.53	3.26	0.001
Availability of strong support person	3.03	3.28	2.74	0.000	3.21	2.93	0.001
Leadership	3.05	3.38	2.68	0.000	3.20	2.93	0.001
Community Service/Invovlement	3.04	3.33	2.71	0.000	3.23	3.07	0.046
Ability to acquire knowledge in non traditional ways	3.06	3.33	2.75	0.000	3.15	2.96	0.034

Notes: WSA Cohort V. Cut scores were determined by race with each high school.

Table 2
Sample Means and Means Just Above and Below the "Cut Points"
for Demographic and High School Background Variables

Variable Name	Full Sample (1)	GMS Scholars (2)	Non-Scholars (3)	p-value (6)	All Applicants with Total Non-Cognitive Scores Equal to the... Cut Score or Cut Score + 1 (4)	Cut Score - 1 or Cut Score - 2 (5)	p-value (6)
Any IB classes	0.18	0.25	0.08	0.000	0.32	0.16	0.079
Any AP classes	0.23	0.30	0.13	0.000	0.30	0.26	0.732
Took Geometry	0.72	0.72	0.71	0.220	0.71	0.81	0.205
Took Algebra II	0.77	0.80	0.72	0.004	0.79	0.87	0.188
Took Physics	0.31	0.33	0.28	0.048	0.36	0.25	0.356
Received free lunch in HS	0.62	0.63	0.61	0.257	0.66	0.61	0.279
Attended middle school outside US	0.03	0.04	0.02	0.387	0.07	0.03	0.604
Male	0.35	0.35	0.34	0.542	0.36	0.37	0.863
Father's education							
Less Than High school	0.22	0.23	0.21	0.352	0.21	0.24	0.172
High School	0.30	0.29	0.31		0.28	0.26	
Some College	0.26	0.26	0.26		0.22	0.23	
BA/BS Degree	0.10	0.07	0.12		0.14	0.09	
Post BA/BS Degree	0.02	0.01	0.03		0.09	0.12	
Don't Know	0.10	0.12	0.08				
Mother's education							
Less Than High School	0.20	0.18	0.21	0.838	0.22	0.21	0.180
High School	0.30	0.31	0.29		0.25	0.26	
Some College	0.31	0.31	0.32		0.26	0.27	
BA/BS Degree	0.10	0.10	0.11		0.18	0.17	
Post BA/BS Degree	0.03	0.04	0.02		0.08	0.08	
Don't know	0.05	0.06	0.05				
Sample Size	521	342	179		100	60	

Notes: WSA Cohort V. Cut scores were determined by race with each high school.

Table 3
Estimated Impact of WSA Scholarship on Outcome Variables at End of Freshman Year in College
(a) Regressions/Probits

	Additional Controls	Enrolled (1)	Two-Year College (2)	Amount of Loans (3)	Hours Worked (4)	Earnings (5)
a)	None	0.407 ***	-0.379 ***	-689	-5.37 ***	-46.35 ***
		(0.040)	(0.058)	(457)	(1.72)	(15.22)
b)	Race, High School Controls & Total Score Controls	0.354 ***	-0.383 ***	-156	-5.16 **	-48.70 **
		(0.055)	(0.075)	(517)	(2.10)	(18.74)
c)	b)+ Demographics & Student Background	0.309 ***	-0.332 ***	-526	-4.23 **	-41.65 **
		(0.058)	(0.085)	(516)	(2.17)	(18.99)
d)	c) + Subscores	0.324 ***	-0.349 ***	-531	-4.79 **	-44.81 **
		(0.060)	(0.088)	(518)	(2.17)	(19.02)

(b) IV (Regression Discontinuity) Estimates

	Additional Controls	Enrolled (1)	Two-Year College (2)	Amount of Loans (3)	Hours Worked (4)	Earnings (5)
e)	Race, High School Controls & Total Score Controls	0.415 **	-0.038	-2,792	-2.88	-48.56
		(0.197)	(0.314)	(2,090)	(7.77)	(69.27)
f)	e)+ Demographics & Student Background	0.402 **	-0.107	-4,480 **	-7.13	-83.70
		(0.200)	(0.364)	(2,103)	(8.20)	(72.98)
g)	f) + Subscores	0.423 **	-0.099	-4,519 *	-5.81	-68.98
		(0.204)	(0.400)	(2,371)	(9.32)	(82.12)

Source:WSA Cohort V. See text for details.

Notes: Estimates in columns (1) and (2) are based on probit models. The estimated marginal effects are reported. Standard errors are reported in parentheses. Standard errors adjusted for heteroskedasticity. One, two and three astericks indicate statistical significance at the 10%, 5% and 1% levels, respectively. Demographic controls include controls for gender, mother's education and father's education while the student background controls include controls for whether the student had any AP classes, was in the IB program, took Physics, took Algebra II, took Geometry, and whether the student attended middle school outside the United States.

Table 4

Estimated Impact of WSA Scholarship on Outcome Variables at End of Freshman Year in College

(a) Regressions/Probits

	Additional Controls	Work (1)	Hours Worked Among Those Working (2)
a)	None	-0.094	-5.72 ***
		(0.058)	(1.61)
b)	Race, High School Controls & Total Score Controls	-0.108	-4.55 **
		(0.074)	(2.19)
c)	b)+ Demographics & Student Background	-0.065	-3.62 *
		(0.080)	(2.12)
d)	c) + Subscores	-0.075	-4.09 *
		(0.082)	(2.23)

(b) IV (Regression Discontinuity) Estimates

	Additional Controls	Work (1)	Hours Worked Among Those Working (2)
e)	Race, High School Controls & Total Score Controls	0.394 *	-15.58 **
		(0.207)	(6.428)
f)	a)+ Demographics & Student Background	0.430 **	-17.58 **
		0.210	(8.116)
g)	v) + Subscores	0.502 ***	-19.51 *
		(0.187)	(9.970)

Source:WSA Cohort V. See text for details.
Notes: Standard errors are reported in parentheses. Standard errors adjusted for heteroskedasticity. One, two and three astericks indicate statistical significance at the 10%, 5% and 1% levels, respectively.Demographic controls include controls for gender, mother's education and father's education while the student background controls include controls for whether the student had any AP classes, was in the IB program, took Physics, took Algebra II, took Geometry, and whether the student attended middle school outside the United States.

Table 5
Estimated Impact of WSA Scholarship on Outcome Variables at End of Freshman Year in College
(a) Regressions

	Additional Controls	Credits Enrolled (%) (1)	Time Studying (2)	Time Extra-curricular (3)	Time Relaxing (4)	Time Sleeping (5)
a)	None	-0.013 **	0.585 ***	0.090	0.182	0.658 **
		(0.007)	(0.174)	(0.154)	(0.214)	(0.259)
b)	Race, High School Controls & Total Score Controls	-0.012	0.672 ***	-0.065	0.467	0.802 **
		(0.008)	(0.220)	(0.221)	(0.259)	(0.316)
c)	b)+ Demographics & Student Background	-0.010	0.696 ***	-0.145	-0.145	0.730 **
		(0.008)	(0.249)	(0.228)	(0.228)	(0.344)
d)	c) + Subscores	-0.011	0.675 ***	-0.110	-0.110	0.705 **
		(0.008)	(0.258)	(0.239)	(0.239)	(0.349)

(b) IV (Regression Discontinuity) Estimates

	Additional Controls	Credits Enrolled (%) (1)	Time Studying (2)	Time Extra-curricular (3)	Time Relaxing (4)	Time Sleeping (5)
e)	Race, High School Controls & Total Score Controls	-0.024	1.897 *	-0.505	-0.133	0.322
		(0.027)	(1.108)	(0.699)	(1.018)	(1.322)
f)	e)+ Demographics & Student Background	-0.020	1.798	-0.279	-0.032	-0.350
		(0.028)	(1.237)	(0.801)	(1.067)	(1.456)
g)	f) + Subscores	-0.027	2.034	-0.342	-0.268	-0.556
		(0.031)	(1.416)	(0.879)	(1.196)	(1.642)

Source:WSA Cohort V. See text for details.

Notes: Standard errors are reported in parentheses. Standard errors adjusted for heteroskedasticity. One, two and three astericks indicate statistical significance at the 10%, 5% and 1% levels, respectively. Demographic controls include controls for gender, mother's education and father's education while the student background controls include controls for whether the student had any AP classes, was in the IB program, took Physics, took Algebra II, took Geometry, and whether the student attended middle school outside the United States.

Figure 1
Non-Cognitive Total Score Density by Scholar Status

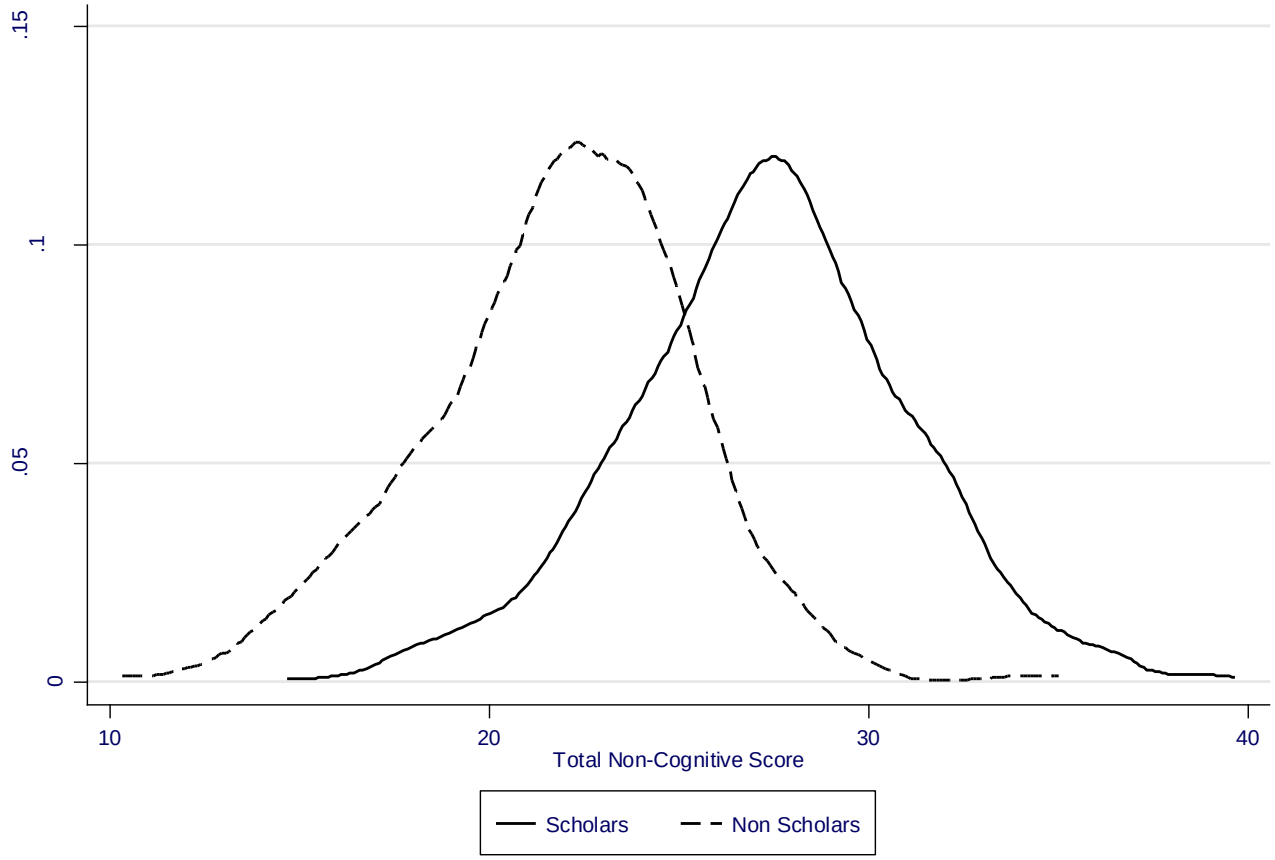
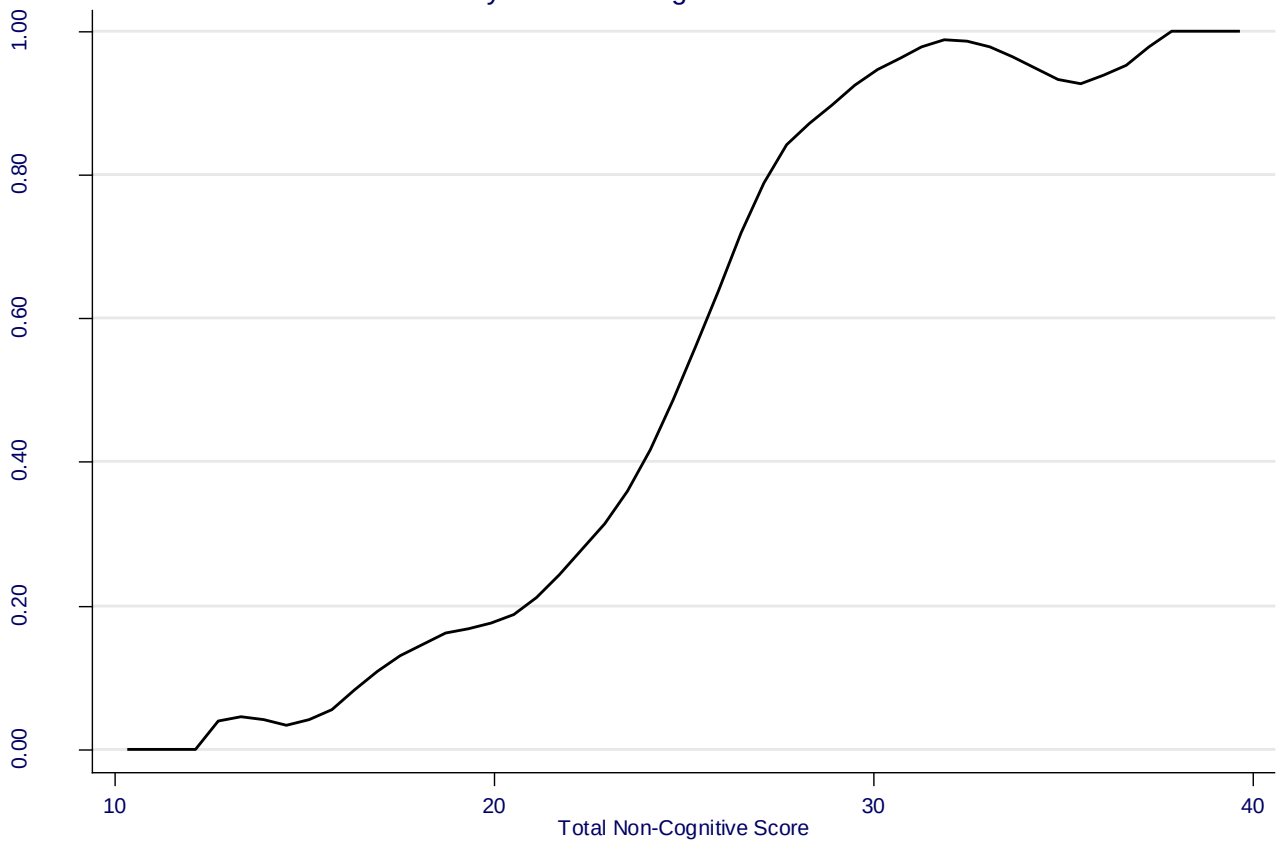


Figure 2

Local Polynomial Estimates of Probability of WSA Scholar
by Total Non-cognitive Test Score



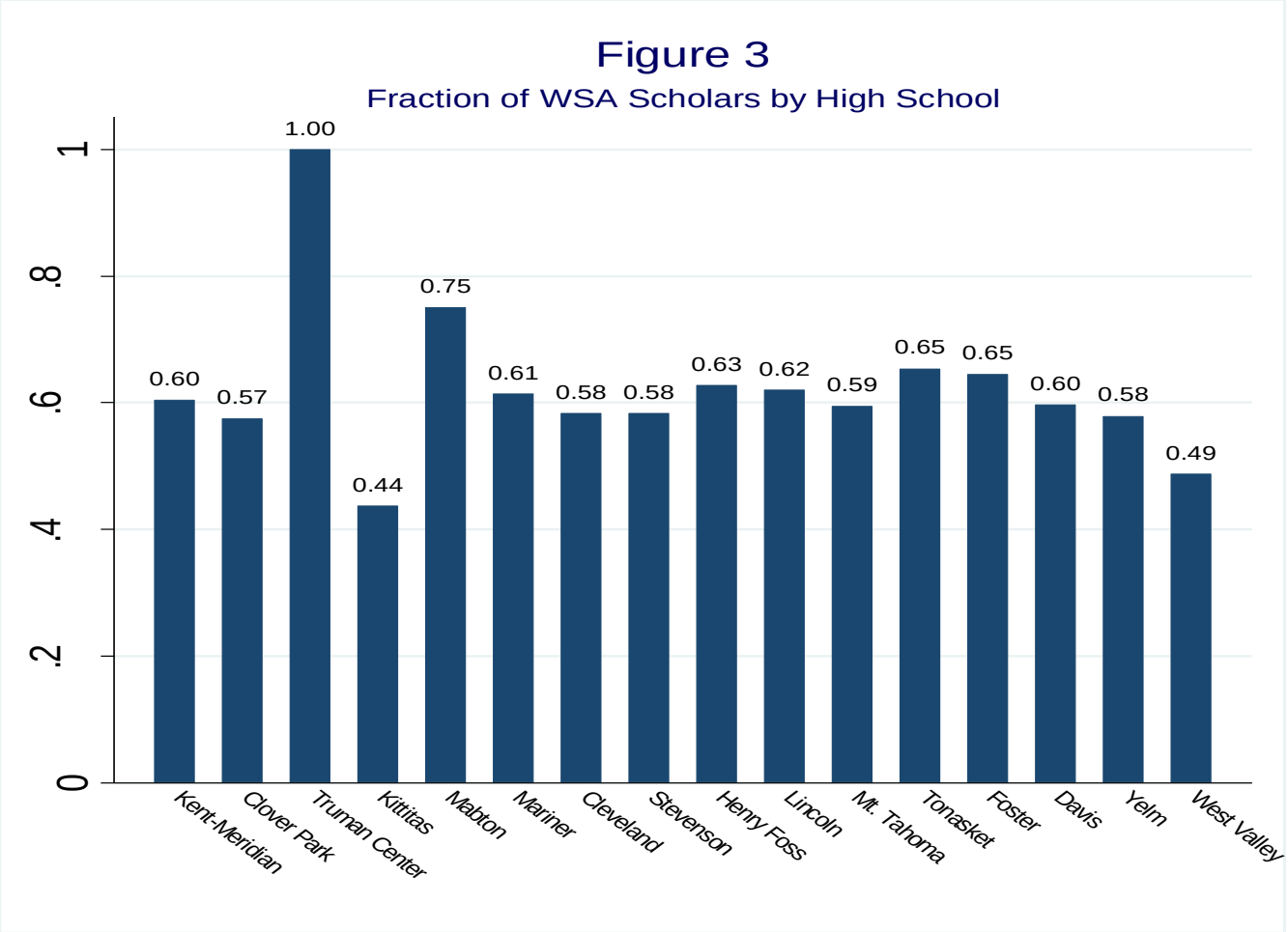


Figure 3
Fraction of WSA Scholars by High School
0
.2
.4
.6
.8
1
0.60
0.57
1.00
0.44
0.75
0.61
0.58
0.58
0.63
0.62
0.59
0.65
0.65
0.60
0.58
0.49
Kent-Meridian
Clover Park
Truman Center
Kittitas
Mabton
Mariner
Cleveland
Stevenson
Henry Foss
Lincoln
Mt. Tahoma
Tonasket
Foster
Davis
Yelm
West Valley

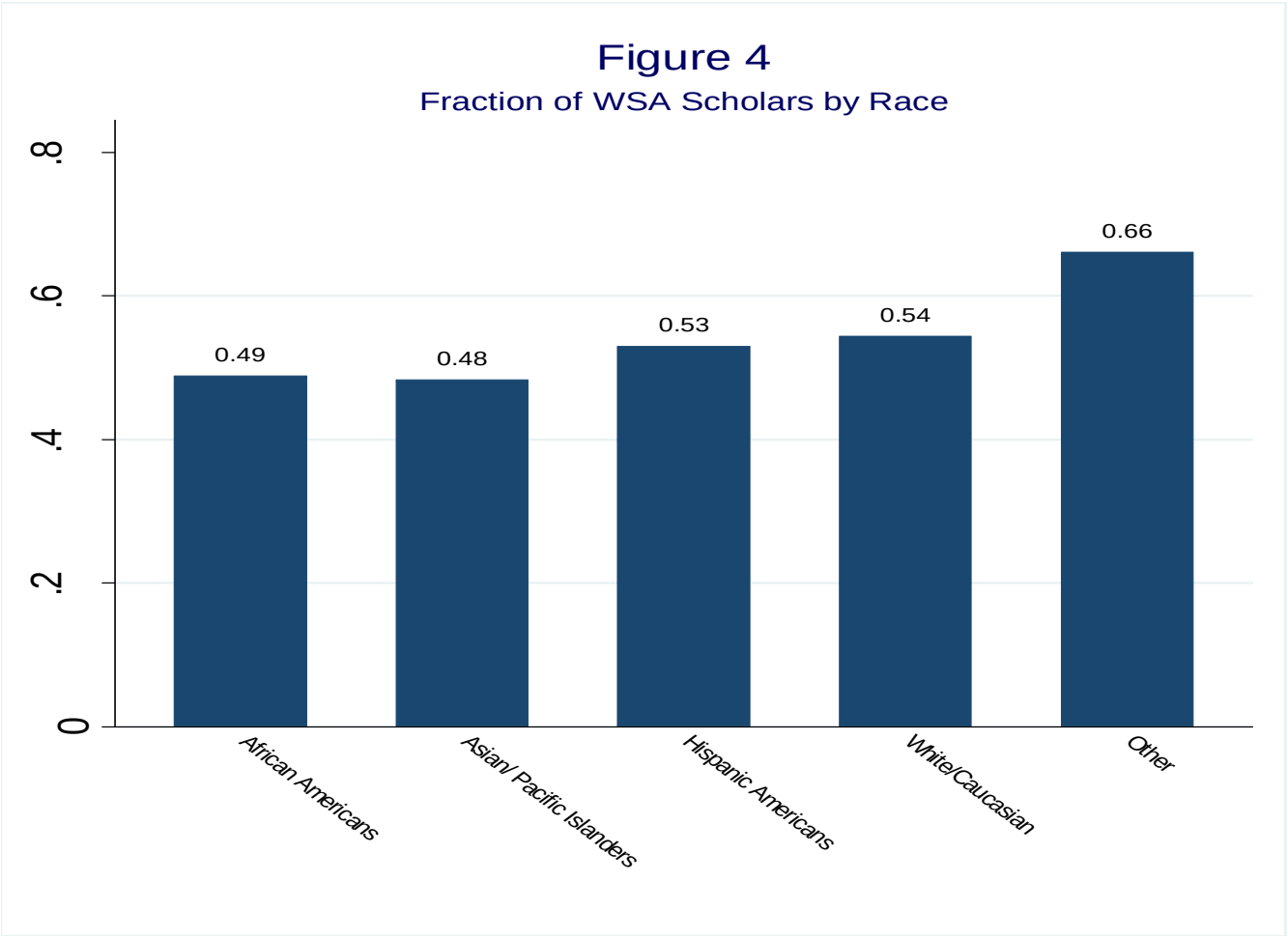


Figure 4
Fraction of WSA Scholars by Race
0
.2
.4
.6
.8
0.49
0.48
0.53
0.54
0.66
African Americans
Asian/ Pacific Islanders
Hispanic Americans
White/Caucasian
Other

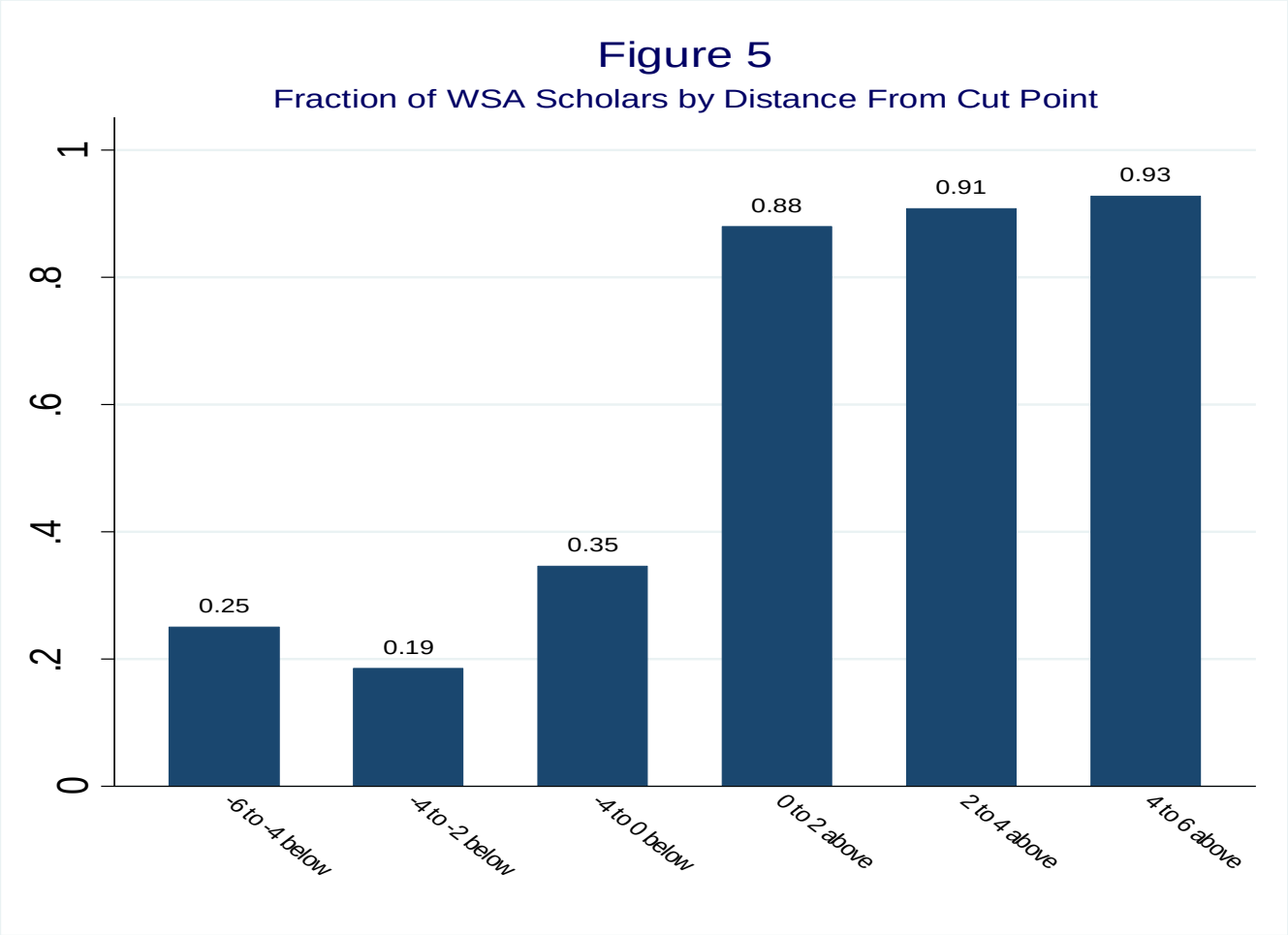


Figure 5
Fraction of WSA Scholars by Distance From Cut Point
0
.2
.4
.6
.8
1
0.25
0.19
0.35
0.88
0.91
0.93
-6 to -4 below
-4 to -2 below
-4 to 0 below
0 to 2 above
2 to 4 above
4 to 6 above

Figure 6
Distribution of WSA Scholarship Amounts

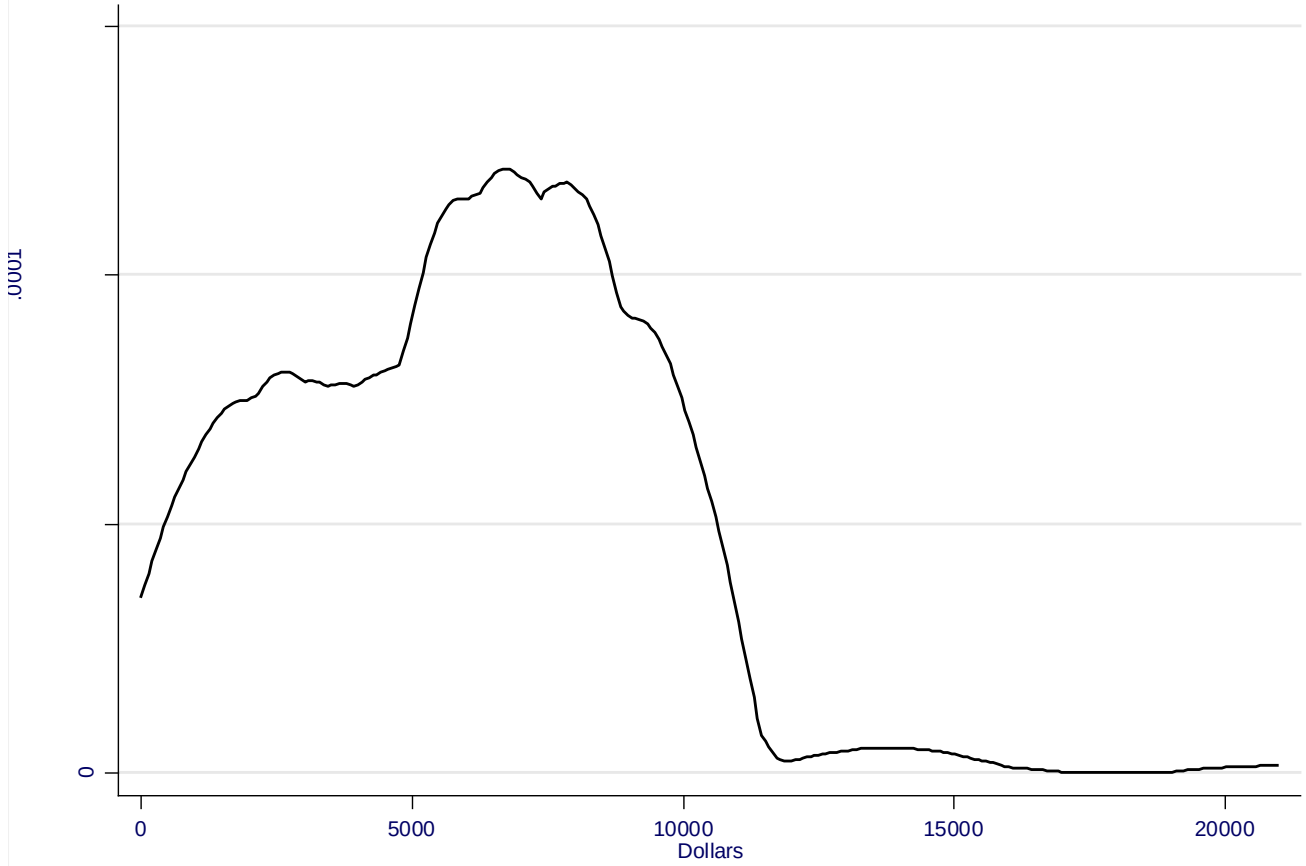
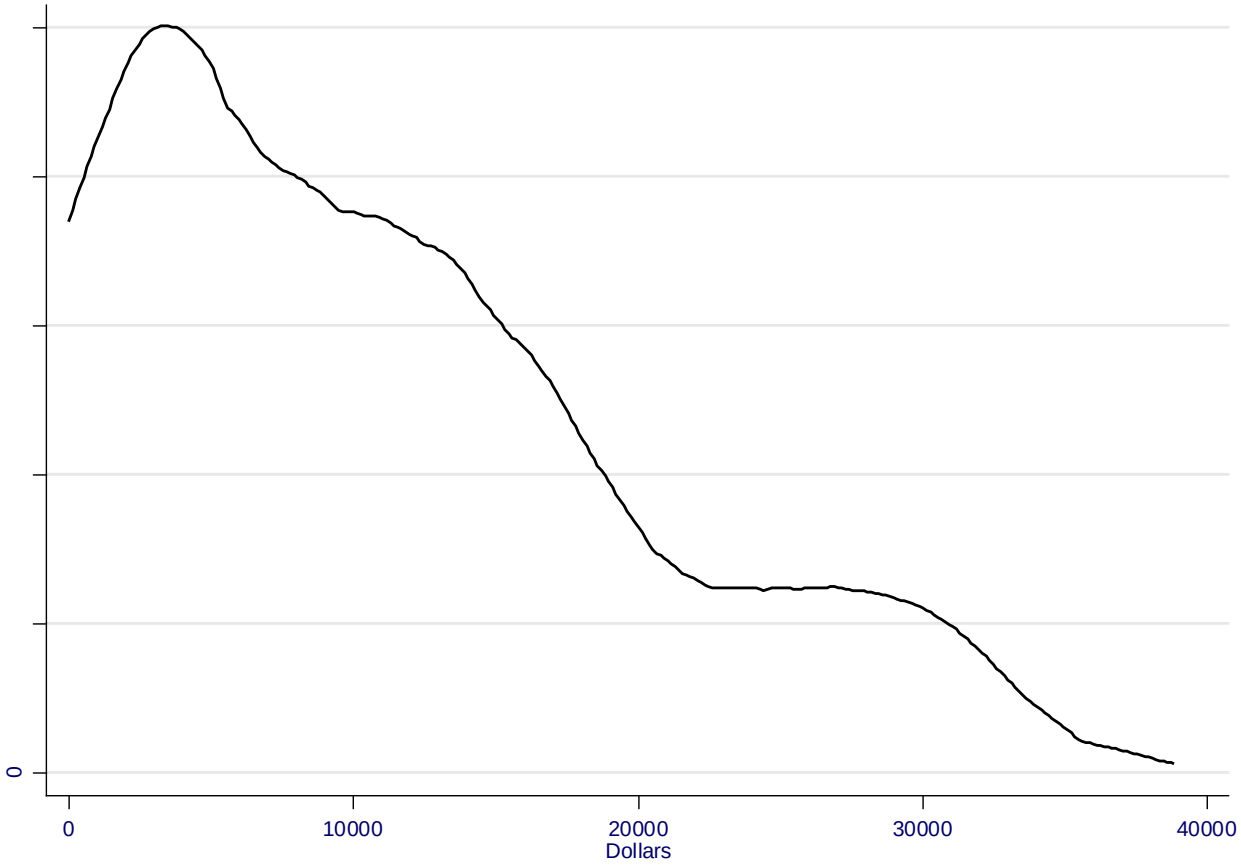


Figure 7
Distribution of Total Scholarship Amounts



Appendix

Table A1
Estimated Impact of WSA Scholarship on Outcome Variables at End of Freshman Year in College
IV Regressions/Probits

Controls	Enrolled (1)	Two-Year (2)	Amount of Loans (3)	Hours Worked (4)	Earnings (5)
Scholar	0.423 **	-0.099	-4518.518 *	-5.806	-68.98
	(0.204)	(0.400)	(2370.626)	(9.317)	(82.12)
African American	0.141 ***	0.180	-747.633	-3.022	-30.49
	(0.025)	(0.154)	(775.186)	(3.172)	(27.13)
Asian American	0.128 ***	-0.067	-730.651	-8.865 ***	-78.24 ***
	(0.038)	(0.090)	(623.343)	(2.527)	(22.56)
Latino	-0.079	-0.059	-1454.719	-4.323	-30.85
	(0.125)	(0.147)	(1048.812)	(3.329)	(28.45)
Other	0.073	0.050	186.038	2.415	28.85
	(0.053)	(0.163)	(702.631)	(4.140)	(37.00)
Male	0.026	-0.068	-224.680	-1.990	-9.83
	(0.039)	(0.066)	(439.072)	(1.768)	(16.64)
Any Ap Courses	0.075 *	-0.199 ***	837.968	-0.962	-8.81
	(0.044)	(0.077)	(713.693)	(2.238)	(19.69)
Mother: Some College	-0.017	-0.106	-647.686	-1.665	-16.43
	(0.045)	(0.072)	(483.125)	(1.875)	(16.41)
Mother: College or More	0.055	-0.082	242.340	1.036	10.67
	(0.050)	(0.082)	(669.513)	(2.276)	(19.44)
Mother: Missing	-0.002	0.075	2134.560	7.416	60.49
	(0.094)	(0.173)	(1457.088)	(5.403)	(49.44)
Father: Some College	0.088 **	-0.008	-103.702	1.236	12.89
	(0.037)	(0.073)	(452.654)	(1.927)	(17.42)
Father: College or More	0.016	-0.081	953.752	1.345	7.05
	(0.059)	(0.090)	(856.944)	(2.507)	(20.96)
Father: Missing	-0.042	0.113	-475.842	1.575	12.72
	(0.078)	(0.130)	(697.129)	(3.210)	(28.18)
Semester			-475.842	1.575	-13.57
			(697.129)	(3.210)	(17.34)
Foreign Middle School	-0.062	0.252	56.015	-3.365	-31.28
	(0.166)	(0.197)	(925.318)	(3.148)	(26.30)
Pell			335.168	-2.819	-25.56
			(508.738)	(2.036)	(17.84)
Had Physics	0.046	0.074	-745.573	-0.474	0.77
	(0.040)	(0.067)	(747.143)	(2.689)	(23.59)
Had Geometry	0.048	0.014	40.462	0.935	5.63
	(0.061)	(0.099)	(455.568)	(1.677)	(15.00)
Had Alegbra II	0.027	-0.061	542.123	1.120	11.54
	(0.053)	(0.091)	(572.130)	(2.347)	(20.93)
In Free Lunch Program	0.003	-0.098	-301.969	-0.448	-9.60
	(0.041)	(0.070)	(385.834)	(1.609)	(14.41)
Any IB Classes	0.030	-0.288 ***	3262.907 **	0.236	1.57
	(0.079)	(0.100)	(1658.552)	(3.811)	(31.04)
Total Non-Cognitive Test Score	-0.113 **	-0.076	1176.582 *	-0.871	-1.02
	(0.051)	(0.123)	(709.691)	(2.920)	(26.77)
Total Non-Cognitive Test Score Sq./100	0.062	0.095	-1821.118 **	4.422	34.11
	(0.077)	(0.165)	(918.563)	(3.930)	(35.86)

Clover Park	-0.266	-0.311 ***	2994.787 **	-4.927	-39.38
	(0.191)	(0.044)	(1219.189)	(4.193)	(35.45)
Kittitas	0.059		5411.620 **	-6.208	-53.09
	(0.083)		(2294.439)	(6.053)	(49.51)
Mabton	-0.075		1463.788	-5.024	-35.03
	(0.256)		(1609.086)	(5.810)	(50.19)
Mariner	-0.101	-0.086	1953.085	1.002	3.07
	(0.134)	(0.138)	(1215.682)	(3.799)	(31.75)
Cleveland	-0.596 ***	-0.247 ***	2866.831 **	5.107	55.32
	(0.202)	(0.064)	(1440.032)	(5.073)	(45.72)
Stevenson	0.110 ***	-0.228 ***	2344.331	-3.306	-38.21
	(0.038)	(0.083)	(1730.906)	(5.291)	(45.11)
Henry Foss	0.141 ***	-0.211 **	-501.500	-3.759	-32.31
	(0.032)	(0.094)	(966.113)	(3.571)	(31.27)
Lincoln	-0.350	-0.239 ***	1986.414	6.393	64.94
	(0.248)	(0.087)	(1432.211)	(4.964)	(42.51)
Mt. Tacoma	-0.123	-0.174	205.405	3.631	40.43
	(0.162)	(0.119)	(1238.980)	(7.150)	(68.19)
Tonasket	-0.053	-0.223 **	2221.234	-1.043	-17.06
	(0.141)	(0.089)	(1385.168)	(5.511)	(45.77)
Foster			1763.080	-1.411	-10.21
			(1349.326)	(4.547)	(38.73)
Davis	0.063	-0.204 *	1852.984	0.055	0.30
	(0.086)	(0.117)	(1304.961)	(4.108)	(35.71)
Yelm	-0.067	-0.210 **	1435.766	2.123	26.08
	(0.134)	(0.098)	(1399.285)	(5.601)	(50.02)
West Valley	0.065	-0.185 *	3268.766 *	-0.931	-9.67
	(0.062)	(0.104)	(1955.331)	(4.507)	(39.65)
Positive Self Concept	0.081	-0.035	29.263	-2.124	-21.93
	(0.053)	(0.087)	(601.546)	(2.098)	(18.39)
Realistic Self-Appraisal	0.174 ***	-0.039	-336.106	-3.262	-25.10
	(0.049)	(0.087)	(594.645)	(2.215)	(19.20)
Understand & Navigate Social System	0.101 **	0.094	-489.745	-0.996	-12.48
	(0.049)	(0.074)	(368.120)	(1.820)	(15.96)
Prefer Long Range Goals over Short Term	0.070	0.002	226.086	1.097	6.35
	(0.049)	(0.089)	(452.143)	(2.185)	(19.14)
Availability of Strong Support Person	0.094 **	0.091	274.426	0.133	-4.64
	(0.047)	(0.081)	(476.306)	(1.928)	(17.33)
Leadership	0.065	0.005	346.133	-1.765	-19.53
	(0.047)	(0.078)	(417.234)	(2.013)	(17.79)
Community Service Involvement	0.084 *	-0.039	-385.896	-3.461 *	-31.54 *
	(0.049)	(0.087)	(574.343)	(2.092)	(18.34)
F-Test P-values					
Race	0.018	0.381	0.482	0.002	0.001
High School	0.013	0.001	0.169	0.153	0.105
Non-Cognitive Sub-scores	0.039	0.517	0.526	0.211	0.281

Table A2
Estimated Impact of WSA Scholarship on Outcome Variables at End of Freshman Year in College
IV Regressions

Additional Controls	Credits Enrolled (1)	Time Studying (2)	Time Extra- (3)	Time Relaxing (4)	Time Sleeping (5)
Scholar	-0.027	2.034	-0.342	-0.268	-0.556
	(0.031)	(1.416)	(0.879)	(1.196)	(1.642)
African American	0.023	-0.528	0.267	-0.477	-1.138 **
	(0.015)	(0.495)	(0.305)	(0.503)	(0.567)
Asian American	0.010	-0.188	0.275	-0.340	-0.862 **
	(0.009)	(0.373)	(0.265)	(0.342)	(0.427)
Latino	-0.014	0.472	0.727 *	-0.625	-1.443 **
	(0.009)	(0.461)	(0.382)	(0.463)	(0.588)
Other	0.019	-0.504	0.330	-0.120	-0.264
	(0.012)	(0.584)	(0.353)	(0.530)	(0.714)
Male	-0.001	-0.339	0.073	0.591 **	0.421
	(0.005)	(0.249)	(0.184)	(0.239)	(0.289)
Any Ap Courses	-0.002	0.062	0.188	-0.151	0.039
	(0.008)	(0.340)	(0.226)	(0.319)	(0.458)
Mother: Some College	-0.006	0.072	0.095	0.048	-0.058
	(0.006)	(0.281)	(0.194)	(0.277)	(0.354)
Mother: College or More	0.004	0.185	0.211	-0.012	0.188
	(0.008)	(0.391)	(0.261)	(0.348)	(0.387)
Mother: Missing	-0.014	0.103	0.703	1.052	0.251
	(0.011)	(0.497)	(0.476)	(0.650)	(0.773)
Father: Some College	0.002	0.136	0.004	-0.125	-0.150
	(0.007)	(0.301)	(0.194)	(0.277)	(0.324)
Father: College or More	-0.007	0.321	0.009	-0.168	-0.092
	(0.008)	(0.361)	(0.267)	(0.315)	(0.423)
Father: Missing	0.011	0.400	-0.549 **	-0.088	0.585
	(0.010)	(0.401)	(0.223)	(0.445)	(0.627)
Semester	0.029 ***	0.052	-0.549 **	-0.088	0.637
	(0.006)	(0.326)	(0.223)	(0.445)	(0.368)
Foreign Middle School	-0.012	0.751	-0.734 ***	-0.115	-0.768
	(0.020)	(0.757)	(0.253)	(0.410)	(0.870)
Pell	-0.012	-0.201	-0.089	0.459 *	0.458
	(0.020)	(0.300)	(0.171)	(0.256)	(0.340)
Had Physics	-0.004	0.255	-0.331	-0.489	0.224
	(0.009)	(0.407)	(0.260)	(0.348)	(0.452)
Had Geometry	-0.003	0.085	0.137	0.042	0.433
	(0.006)	(0.263)	(0.178)	(0.231)	(0.282)
Had Alegbra II	-0.003	0.055	0.233	0.304	-0.219
	(0.008)	(0.308)	(0.205)	(0.295)	(0.364)
In Free Lunch Program	-0.009	0.352	-0.126	-0.129	-0.330
	(0.006)	(0.243)	(0.161)	(0.222)	(0.304)
Any IB Classes	-0.018	-0.041	0.142	0.188	0.406
	(0.013)	(0.520)	(0.365)	(0.455)	(0.677)
Total Non-Cognitive Test Score	0.012	-0.499	-0.036	-0.239	-0.306
	(0.011)	(0.551)	(0.312)	(0.422)	(0.560)
Total Non-Cognitive Test Score Sq./100	-0.018	0.948	0.133	0.629	0.968
	(0.015)	(0.740)	(0.432)	(0.555)	(0.730)

Clover Park	-0.032 **	-0.298	0.167	0.759	-0.550
	(0.016)	(0.696)	(0.416)	(0.602)	(0.786)
Kittitas	-0.006	0.084	0.602	0.322	0.175
	(0.019)	(0.696)	(0.636)	(0.696)	(1.294)
Mabton	-0.003	-1.544	-0.822	-0.973	0.769
	(0.019)	(0.977)	(0.626)	(0.833)	(1.352)
Mariner	0.004	-0.734	0.034	0.714	0.473
	(0.016)	(0.606)	(0.444)	(0.615)	(0.694)
Cleveland	-0.021	0.704	-0.020	0.103	-0.374
	(0.020)	(0.803)	(0.456)	(0.683)	(0.841)
Stevenson	-0.003	-0.363	0.195	-0.163	-0.276
	(0.021)	(0.773)	(0.456)	(0.651)	(0.912)
Henry Foss	0.004	0.069	-0.199	-0.330	-0.165
	(0.014)	(0.507)	(0.333)	(0.485)	(0.685)
Lincoln	-0.010	-1.154	-0.252	0.640	-0.251
	(0.018)	(0.747)	(0.479)	(0.759)	(0.910)
Mt. Tacoma	-0.022	-0.209	-0.055	-0.747	-0.987
	(0.020)	(0.805)	(0.621)	(0.689)	(1.062)
Tonasket	0.003	-0.765	0.583	0.284	0.468
	(0.020)	(0.802)	(0.605)	(0.606)	(0.901)
Foster	-0.007	-0.596	-0.238	0.231	0.585
	(0.019)	(0.704)	(0.430)	(0.623)	(0.874)
Davis	0.015	-1.438 **	-0.023	-0.393	-0.060
	(0.014)	(0.653)	(0.469)	(0.568)	(0.836)
Yelm	0.017	-0.591	0.230	0.257	0.378
	(0.019)	(0.733)	(0.598)	(0.712)	(0.899)
West Valley	-0.006	-0.763	0.311	0.731	-0.508
	(0.017)	(0.637)	(0.505)	(0.699)	(0.796)
Positive Self Concept	-0.003	-0.178	-0.266	0.262	0.254
	(0.007)	(0.304)	(0.199)	(0.294)	(0.386)
Realistic Self-Appraisal	-0.009	-0.029	0.020	-0.057	-0.440
	(0.007)	(0.368)	(0.213)	(0.292)	(0.391)
Understand & Navigate Social System	0.001	0.039	0.261	-0.292	0.059
	(0.006)	(0.287)	(0.172)	(0.279)	(0.341)
Prefer Long Range Goals over Short Term	-0.003	0.047	-0.216	-0.219	-0.102
	(0.008)	(0.333)	(0.200)	(0.303)	(0.389)
Availability of Strong Support Person	0.007	-0.278	0.139	-0.060	-0.232
	(0.007)	(0.266)	(0.187)	(0.263)	(0.343)
Leadership	-0.006	-0.374	-0.075	0.129	-0.015
	(0.006)	(0.263)	(0.177)	(0.275)	(0.345)
Community Service Involvement	-0.002	-0.053	0.178	-0.444	-0.556
	(0.008)	(0.362)	(0.234)	(0.321)	(0.382)
F-Test P-values					
Race	0.127	0.561	0.345	0.586	0.031
High School	0.051	0.298	0.562	0.516	0.874
Non-Cognitive Sub-scores	0.441	0.739	0.036	0.304	0.495