**Reducing Educational Inequity? An Analysis of the TRIO Program for First-Generation Low-Income Students**

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**Abstract**

This study examines whether the federal TRIO program, one of the policies designed to improve educational disparities, has achieved its goal. Specifically, we evaluate the effect of a Greek and Latin root intervention by comparing the SAT scores of students who did and did not receive the intervention and interacting indicators of being first-generation *and* low-income as opposed to being first-generation *or* low-income. Using the data from four high schools in the Treasure Valley in Idaho (2015-2018), we find that educational attainment measured with SAT scores is significantly associated with being a racial minority, limited English proficiency, parent education level, and GPA. However, the Difference-in-Difference (DID) regression analysis did not support that the Greek and Latin root intervention was statistically significant, contrary to the existing evidence. The findings call for attention to the potential biases of SAT scores and that helping FGLI students access higher education is more complex than SAT interventions.

**Introduction**

This research evaluates the effect of the federal education program designed to support underrepresented students and students with disadvantaged backgrounds. Historically, not all people in the United States have benefited from higher education. In the not-so-distant past, women, racial minorities, and people from the lower socioeconomic statuses (SES) were unable to attend due to discriminating admissions requirements that segregated participants based on gender, race, religion, and ability to pay (Gilbert & Heller, 2013). Education is touted as how historically underrepresented populations can pull themselves up by their bootstraps and reach the American dream. However, not all students receive an equal education, as is evident by the constant reform movements that seek to improve the sector and open access to higher education. On a national level, researchers have found that while the overall education level of the United States has increased, it has not increased equally across all racial and socioeconomic (SES) demographics (Deming & Dynarski, 2009). Enrollment rates among African American and Hispanic students have improved but still lag behind their White peers. In addition, once underrepresented students do enroll, they also fall behind their White peers in college graduation rates (Carey, 2008; Conner & Rabovsky, 2011). The inequity in educational opportunities and attainment warrants policy efforts and empirical research on their effectiveness in national and local settings.

In this study, we assess the effectiveness of the TRIO programs and a specific SAT intervention implemented in the State of Idaho since 2017.In Idaho, college enrollment rates follow national trends, with 28.5% of Caucasians having a bachelor’s degree compared to 24.6% of African Americans and 10% of Hispanics (U. S. Census Bureau, 2017). In 2016, Idaho spent $1.2 million on a statewide contract that allowed all 10th graders to take the PSAT and 11th graders to take the SAT for free (Gewertz, 2016). Before the COVID 19 pandemic, the test was an admission requirement for all two and four-year colleges in the state and was tied to scholarship funding at two state universities. A 2010 task force declared that 60% of Idahoans between the ages of 25-34 need to have a college degree by 2025 to sustain Idaho’s economic growth. However, only 42% of Idahoans between the ages of 25-34 had a college degree as of 2018. The legislature has supported the 60% goal and invested over $113 million into policies designed to improve the state’s education attainment level (Richert, 2019). These policies have funded more school counselors, scholarships, and marketing campaigns designed to shift the narrative surrounding college attendance. However, the degree attainment rate has stayed constant since 2013, implying that the influx of funding failed to change the educational environment and perceptions about the value of college education in Idaho.

This study examines whether the federal TRIO programs have reduced the gap in educational attainment among students with different backgrounds by focusing on the two TRIO programs for high school students: Upward Bound (UB) and Educational Talent Search (ETS). High school performance has been correlated with college success, leading to higher earning potential and breaking cycles of poverty (Bartik & Hershbein, 2018; Sawyer, 2013; Zwick, 2013a). In addition, UB and ETS are the two TRIO programs positioned to help Idaho improve its higher education enrollment rates. Each program seeks to help students overcome the barriers that inhibit access, such as lack of academic preparation, low SAT/ACT scores, lack of guidance counselors, and lack of scholarships to pay tuition. The grant guidelines require students be first-generation and/or low-income (FGLI) to join the program and provides students with an educational specialist who helps them through high school and prepares them for college.

First, this paper will outline the policy context of two TRIO programs in Idaho by explaining how the federally funded grants compare to each other and what the education context is of the state. Secondly, it will explore the literature relating to social construction theory of FGLI TRIO students who are the target population of the study and historically have lower education attainment levels. Finally, it will evaluate an intervention of Greek and Latin Roots on SAT scores that the TRIO programs introduced to their FGLI students. The purpose of this study is to evaluate an intervention implemented by the TRIO Upward Bound programs that seek to reduce education inequality and improve education attainment levels in FGLI students.

# Policy Context: The TRIO Programs

**The Treasure Valley in Idaho**

While Idaho has relatively low educational attainment rates, it provides an ideal location to compare educational attainment levels between different student populations because it encompasses urban, suburban, rural, high SES, low SES, and other variances. The average income in Idaho is climbing; however, educational attainment levels remain constant and have dropped through the pandemic. In a relatively close geographical area of the Treasure Valley, many different schools serve a variety of types of students. Geographically, the valley stretches from the capital city of Boise west to the Oregon border, and the schools in the study are indicated with stars (Image 1). The Treasure Valley was initially named because of its fertile farming land surrounding the Boise River aquifer (Bartolino 2017). It currently has a healthy economy and a growing population (Office of Policy Development and Research, 2018). The demographics of the Treasure Valley counties, Ada, Canyon, Gem, and Payette, are described in Table 1.

[Image 1 and Table 1]

Ada County has the highest median income and the highest percentage of people with bachelor’s degrees, which supports the findings that those with degrees earn more money. Ada is very different from Payette County, having a higher poverty rate of 11.5% and less than half the number of bachelor’s degrees. Gem County, with the smallest population and a poverty level of 11%, is a county with many towns that qualify as rural according to the U.S. Census Bureau’s definition. The schools chosen for this study are in Ada and Canyon County because that is where both the Upward Bound and ETS TRIO programs exist. These two counties have different educational attainment levels and provide interesting populations for comparison.

One of the policies designed to open access for underrepresented populations is the federal TRIO program (TRIO), which is a set of federally funded grants. In the 2021 appropriation bill, they were awarded a billion dollars and are budgeted to receive more in the 2022 budget (*Council for Opportunity in Education — Updates*, 2021). They are called the TRIO programs because there were initially three grants designed in the 1960s by Lyndon B Johnson as part of his War Against Poverty. The three grants have grown to eight, expanded across the country, and now serve students from middle school all the way up to graduate school at public and private agencies and institutions of higher education (*Mission*, 2011).[[1]](#endnote-1) The TRIO programs have received favorable evaluations from TRIO professionals and researchers. For example, nationally, 86% of Upward Bound students enrolled in higher education, compared to 46% of students of the same demographic who received no services but were from the same population (Heuer et al., 2016). Upward Bound students have also been found to earn more high school credits, suggesting they take more rigorous schedules in high school than their peers (McElroy & Armesto, 1998). If the TRIO programs are a successful policy, it is worth learning what they do to succeed.

**Upward Bound**

UB grants determine a set number of students that can be in the program at each school, and eligible students apply to join annually. Each high school has an educational specialist that works with students to help them with career research, college research, financial literacy, tutoring, course selection, college tours, SAT/ACT prep, and volunteer hours. For example, the specialists at the four schools in this study teach an elective class called UB, where the services are provided to students (*About TRIO Upward Bound*, n.d.). The class is a unique component that few UB programs have but is utilized by the UB in this study. The class allows UB mentors to have a significant amount of face time with students and provide more programming. In the summer, a residential program is also offered where students come to live at the university that houses the grant. During the day, students take high school level classes such as English, economics, Latino culture, etc. and in the evening, they participate in cultural activities such as rafting, the Shakespeare festival, feeding the homeless, planning a college carnival, and building strong relationships with peers from similar backgrounds. The summer program is an intense six weeks that significantly impact a student’s personal development and future goals.

The UB grants are written on five-year cycles and include a section titled the Competitive Priority Preference (CPP), where policymakers in Washington DC invite programs to write about how they will implement the Department of Education’s current priorities. The CPP topic is chosen by the federal Department of Education for each grant cycle, and topics historically have included tutoring, STEM programming, and college mentoring. Programs always write for the CPP because the extra points earned through the section can determine if the grant is funded. In 2016, writers were asked to use the *What Works Clearinghouse*, a database of education research hosted by the Department of Education, to find a successful practice and implement it in their own program[[2]](#endnote-2).

The grant writers for the TRIO UB program in this study chose an article by Holmes and Keffer (1995) from the *What Works Clearinghouse* that uses Greek and Latin roots to prepare students for the SAT in the State of Georgia. It was chosen because it was relatively low-cost to implement, and the study found statistically significant improvements in participants’ SAT scores, which earned it the seal of approval from the *What Works Clearinghouse*. However, the study did not control for demographic factors such as race, which historically is correlated with test scores, and had a relatively small number of participants because it was only at one school. The study also did not limit the participants to first-generation and/or low-income students, which are the groups the TRIO program serves.

**Educational Talent Search (ETS)**

The other TRIO program at the four high schools, ETS, does not implement the Greek and Latin roots intervention. Similar to UB, ETS has a specialist assigned to each high school which helps students with the college access process through college information, financial literacy, scholarship application help, and SAT/ACT prep. Also, both grants are federally funded and housed at the same university. They serve some of the same high schools due to the high concentration of eligible students in those areas, which is how four schools in the Treasure Valley of Idaho were chosen. ETS also has similar goals of raising high school graduation rates, college attendance rates, and college graduation rates.

However, ETS is different from UB in that ETS does not include high school classes with the specialist during the school year, summer program, and does not use Greek and Latin roots as an intervention to improve SAT scores. Instead, ETS is a pull-out program where a specialist visits the school for one day/week, pulls the students from class to review the content, and then follows up at their next meeting. On the other hand, UB cannot serve as many students due to the time-intensive services that are provided. Therefore, the number of students served by UB is much lower, and the program has a higher per-student cost than ETS. Although both programs seek to help students who are both FG and LI, only two-thirds of ETS’s population needs to meet those criteria, which means some students in the program do not qualify as first-generation or low-income. Recently, UB focused on improving SAT scores through a Greek and Latin root intervention due to a prior study that showed it was effective (Holmes and Keffer, 1995). Table 2 shows the similarities and differences between the two programs implemented in the Treasure Valley of Idaho.

[Table 2 about here]

Therefore, while the grant has similar goals, their services are delivered in a much less time-intense manner, making them a relevant comparison group at the schools that house both TRIO programs (*About Educational Talent Search*, n.d.). This raises the research question of whether the intervention did work and whether the intervention’s effectiveness varies based on different demographic characteristics. To better answer these questions, we first review the literature about why TRIO programs are effective from a social construction lens. We then detail why the SAT is an integral part of college access and why Greek and Latin roots could help overcome the bias in the test.

# Literature Review

**Social Construction: First-Generation Low-Income Students**

The target population of TRIO programs is first-generation low-income (FGLI) students that have historically not participated in higher education at the same rate as their middle and upper-class peers. We establish the argument that the TRIO program has changed the nature of the previously-marginalized group to an advantaged group based on the social construction theory developed by Schneider and Ingram (1993). The social construction theory explains how the framing of different target populations impacts the way these groups are viewed by policymakers and leads to different engagement levels in the democratic process based on deservingness. For example, some policies incentivize participation in society because the target population is deserving (i.e., social security benefits for the elderly), while other policies disincentivize participation in society because the target population is undeserving (i.e., ex-convicts prohibited from voting). Social construction is a valuable framework for our study because understanding how the framing of target groups impacts participation is helpful when evaluating the TRIO programs.

Schneider and Ingram (2008) developed a grid with four categories that explain this view and their ability for civic engagement: dependents (deserving but weak such as children), advantaged (deserving and strong such as the middle class), contenders (less deserving and strong such as oil companies), and deviants (less deserving and weak such as terrorists). They used several factors to evaluate the policy in question: the definition of the target population, the attributes of the policy, the location of the target group, the tools through which the policy motivates the target population, and the messages implicit within the policy. This section will briefly review each of these areas to demonstrate how the policy design of the TRIO Upward Bound moves a traditionally dependent population into the advantaged category of social constructionism.

First, as defined by the federal policy, the target population is FGLI students. First-generation is defined as neither biological parent has a four-year degree, and low-income is defined as meeting the federal poverty standards for the year students apply to the program (*Council for Opportunity in Education — TRIO*, 2020). The policy provides rigid boundaries around who is served and not served. Research has shown that FGLI students face more barriers to education due to the lack of social and financial capital needed to overcome the access barrier (Dennis et al., 2005; Engle et al., 2006; McCarron & Inkelas, 2006; Pérez & McDonough, 2008; Thayer, 2000; Tieken, 2016; Wildhagen, 2015). Additionally, those populations generally have lower citizen engagement in the democratic arena, which indicates how they are framed in policies has led to the suppression of their voices in the political and policy processes (Schneider & Ingram, 1993, 2019). Therefore, those who are FGLI are generally viewed as being powerless but not harming society, which qualifies as dependent in the social construction theory (Schneider and Ingram, 1993).

Second, the dependent category predicts several characteristics that underrepresented populations in education should express. One characteristic is that society carries the burden and cost for the services (Schneider & Ingram, 1993). The burden of cost falling on society is observed in all education policies for K-12 and the Pell grants for postsecondary education. While current taxpayers fund the TRIO programs, and the target population could be classified as dependent, there is also a burden on the students whose income has been lost due to educational pursuits and who is expected to pay off the government’s investment in the future. This portrayal of burdens as a more fair and equitable distribution follows how burdens are distributed among the advantaged group of social constructionism.

Thirdly, another characteristic of dependents is that they have little political power due to barriers such as age, SES, and geographic isolation that create physical and political distance from the policymakers. As there is little personal engagement of politicians with dependents due to the societal distance between them, policies benefiting dependents are generally passed to earn political favor but are the first to be cut when budgets are reduced. Therefore, TRIO professionals recognized this as a weakness and formed a professional coalition in 1981 called the Council for Opportunities in Education (*Council for Opportunity in Education — Who We Are*, 2020). The Council seeks to constantly inform state senators and representatives of the effectiveness of the programs in their home region. They also use alumni to share their stories with the representatives at an annual policy seminar in Washington D.C. to ensure the voices of those impacted by the policy are ringing in the ears of those who vote on funding for the program. The Council also works with the program monitors in Washington D.C. to inform and advocate for rule changes that are hindering the program’s effectiveness. Some of the rules require legislative approval, and some can be changed by the Department of Education, but the professional organization navigates the bureaucratic system for the target population. Therefore, the professional organization allows the target population to be more proximate to the policymakers and regulators than other dependent policies. This proximity emulates the advantaged groups in social constructionism more than the disadvantaged groups.

Fourth, the tools by which the policy motivates the target populations primarily relate to capacity building and how their capacity varies between dependents and advantaged (Schneider & Ingram, 1993). The TRIO programs seek to increase capacity by educating students to make informed decisions about their future, which is again similar to advantaged groups in the social construction theory and not like the dependents that are assumed to be irrational, thus requiring sanctions and force. College access professionals work with the target population through relationships and mentoring to build a community of students from similar backgrounds. The program also creates a network of alumni that can help students who lack social capital from their families. It also sets up a structured format where students can work on applications and scholarships with someone there to help them navigate the process. During the school year, these services are provided at the school or during Saturday workshops. During the summer, Upward Bound hosts a 6-week academic summer program where students take classes, volunteer, build friendships and participate in cultural experiences. According to Dansby and Dansby-Giles (2011), this community is effective because it shows students they are not alone, there are resources to help them, and these practices make some participants wish their high schools were more like Upward Bound. Ultimately, the increased capacity leads to an increase in educational attainment.

Finally, the messages implicit in the policy are that students can overcome barriers to access and graduate from higher education, which again contradicts what most dependent policies portray. According to Schneider and Ingram (1993), dependents are to be pitied by the government, which leads to disinterest in government policies and low political participation. TRIO acknowledges there are many challenges in education that act as barriers to historically underrepresented populations but seeks to provide the structure to remove those barriers for participants. TRIO programs are grant-funded, which again is a characteristic of advantaged populations where policies are designed to motivate through grants and incentives. The students see first-hand how their local representatives’ national votes impact the TRIO programming available for their school and why their voices are important to their community and democratic process.

**Disparities in Educational Attainment**

TRIO moves FGLI students from the disadvantaged to the advantaged categories of social construction; however, there are still many logistical challenges to navigate for students, including the national Scholastic Achievement Test (SAT). Statistically, FGLI students do poorly on the test compared to their wealthier peers because of slower reading speeds, lower math abilities, and lack of opportunities to practice test prep (Bowen et al., 1998; Camara & Schmidt, 1999; Everson & Millsap, 2004; Zwick, 2013b). Additionally, African American and Hispanic students do worse on the test compared to their white peers (Dixon-Román et al., 2013). The disparities based on race, income, and parent education level have led education reformers to question the validity of the test in the college admissions process. Some argue it is not a strong indicator of student ability and other aspects such as GPA and school attendance have a higher correlation with college success than SAT scores (Credé et al., 2010). In addition to being used for admission, the SAT as merit has been tied to many scholarships, and thus students need certain scores to obtain funding for their tuition and expenses. For these reasons, the SAT acts as a barrier for FGLI students, which may partially explain why FGLI students are more likely to attend a community college than a highly selective research institution (Dowd & Shieh, 2013). Finally, students who do not score well on the test are more likely to view themselves as unintelligent and not smart enough to succeed in college (Penrose, 2002), which creates imposter syndrome that can hinder their success.

The difference in testing ability among student groups is significant enough that some college systems have implemented test blind procedures to the admissions process by allowing students to write an essay instead of submitting a test score. Due to the limited testing opportunities in 2020 and 2021 caused by school closures, many colleges eliminated the testing requirements entirely. For example, the University of California system announced they will not require a standardized test until 2024, and they are trying to write their own, which will be a more accurate measure of the attributes they seek in their applicants (UC Office of the President, 2020). However, some universities have reinstituted the test as an admissions requirement as schools and universities have opened back up for testing.

Supporters of the SAT argue the test remains an essential aspect of admissions because highly selective institutions rely on it to differentiate among thousands of applicants with identical GPA and attendance records (Kobrin et al., 2008). They argue it demonstrates a student’s testing ability, and testing is an important skill for collegiate success and is also correlated with student success. As affirmative action has declined across the country, some colleges have shifted to the SAT to determine who should have access to their institution (Oakes et al., 2002). Some policymakers believe that all students have an equal playing field when only measuring merit and can thus academically demonstrate their abilities regardless of their background, and this test is a key indicator of merit.

The importance of the SAT on the students’ future college success is significant, therefore, SAT prep is a relevant and replicable programming component for TRIO programs because better scores have the potential to open more opportunities for the FGLI students served by the programs. Previous research has included test prep as an effective practice of UB (Rodriguez et al., 2015; Walsh, 2011). Therefore, our study is important because it will fill the gap in knowledge of specific practices that are effective with FGLI in SAT prep and leads to the research question of this study which seeks to see if TRIO Upward Bound interventions are effective with the populations disadvantaged by the current test.

# *H1: The degree of educational attainment will be different across student groups by their race, income, and parent education level.*

**The Greek and Latin Root Intervention**

Due to the continued emphasis on merit through test scores, the TRIO programs plan workshops, teach Greek and Latin roots, and assign study regimes to help students study for the test so they can have access to more rigorous higher education institutions and win the scholarships necessary to pay the fees. Due to the grant writing process that required the use of an article from the *What Works Clearinghouse*, the Upward Bound program chose a Greek and Latin root intervention to see if it would improve the FGLI student’s test scores. Freedle (2003) argues that the SAT is biased culturally and statistically against underrepresented populations in higher education. His study proposed mathematically weighting questions to statistically reduce bias but neglected the cultural bias of the test. The Holmes and Keffer (1995) study used in the CPP proposed an approach to address the cultural bias embedded in the test by teaching Greek and Latin roots as a method better understand language and the vocabulary tested by the SAT. Curriculum designers have argued the use of Greek and Latin roots is a more efficient way to teach vocabulary because one root can be found in multiple words (Rasinski et al., 2011). The test has entire sections devoted to English, reading, and writing (ERW), and the cultural foundation of Greek and Latin roots could help FGLI students score higher in those sections. Therefore, the TRIO Upward Bound program set out to test these claims and see if teaching the roots helps build vocabulary and improve SAT scores.

The two TRIO programs serving high school students provide an ideal test group and a control group. The UB students did receive the Greek and Latin root intervention, while the ETS students did not. The students come from the same high schools and geographical area, which allows some of the variation in background factors to be eliminated when comparing test scores. Among the program’s target population, this study examines whether the intervention effects vary by the intersectionality of being low-income *and* first-generation as opposed to first-generation *or* low-income. The UB grant requires two-thirds of students to be both first-generation *and* low-income, and one-third to be first-generation *or* low-income. The ETS grant requires two-thirds of students to be first-generation and/or low-income, and the other third can be neither, creating a small population of students who are neither first-generation nor low-income in the program.

# *H2A: The degree of educational attainment will be different between the Upward Bound students who were given the Greek and Latin roots treatment and the Educational Talent Search students who were not.*

# *H2B: The Greek and Latin root intervention will be more effective in students who are both first-generation and low-income, compared to students who are either first-generation or low-income.*

# Data and Methods

**Data**

The data for our analysis comes from two TRIO programs, Upward Bound (UB) and Educational Talent Search (ETS). The data was collected through four academic years (2015-2018) at four different high schools in the Treasure Valley of Idaho as part of the grant reporting requirements. The schools were chosen because that is where both UB and ETS TRIO grants serve students. The TRIO grant writers determine the high schools because they serve the highest proportion of first-generation or low-income students in the area. The TRIO UB and ETS programs serve over 500 students annually at the four different high schools in this study, and approximately 80 students were chosen from each year for analysis. UB is a smaller program, so all participants were included in this study. ETS is a much larger program, so students were randomly selected for comparison purposes to match the number of UB students. In total, 324 students were included in the analysis, among which 33 were not low-income but were first-generation, and 15 were low-income but not first-generation. The remaining 276 were first-generation and low-income. The students in UB received the intervention, and the ETS students were used as a control group.

The control variables were collected as part of the demographic information the TRIO programs are federally required to collect. Consequently, the programs have a database called Blumen with race (white or minority), gender, GPA (simple 4.0 scale), income level (determined by federal poverty guidelines), limited English proficiency (defined as qualifying for English as a second language service), and parental education level (defined as first-generation where neither biological parent has a 4-year degree). These variables have been found in other studies to be correlated with SAT scores and thus warrant being a control variable.

The dependent variable is the English, Reading, and Writing (ERW) section scores from the SAT. We did not include math scores as they were irrelevant to the Greek and Latin root intervention. Although the grants do not collect SAT scores, they collect transcripts containing SAT scores broken down by section every year. Therefore, the high school transcripts for all participants were read as part of this research. The SAT information on the transcripts is detailed and indicates the number of times each student takes the SAT, and the highest scores were used for analysis to not penalize students for having a bad testing day. All students in the program take the SAT as a college entrance requirement on a mandatory state testing day, which is the primary time the students take the test. The mandatory testing date means most students took the exact same version of the test, which is helpful for comparison purposes.

The data from Blumen and the SAT scores from the high school transcripts were all combined into a codebook in Excel format as part of the data gathering process. The privacy of student academic information is paramount to the TRIO programs. They store the information in a password-protected online system that passes security tests from the higher education institutions that house the TRIO programs. As an employee of TRIO, the primary author had access to the password-protected database and academic records that require dual authentication. There was only one codebook with identifying names, which was also kept in a password-protected location. The codebook includes only numeric identifiers to keep the anonymity of study subjects. The data used for this research were accessed with permission from grant directors.

**Methods**

This study uses a difference-in-difference (DID) method for statistical analysis to test our hypotheses regarding the effectiveness of the Greek and Latin root intervention. Our data with four different groups (i.e., program and control group by pre- and post-intervention) offers a unique empirical setting for the DID analyses. The data includes four year period from 2015 to 2018, with the first two years functioning as the program’s pretreatment time frame and the last two as the post-treatment and control time frame. The UB students received the treatment, and the ETS students did not. Table 3 shows the four groups of which approximately 80 students are included (Table 3). The equation for double-difference regression is as follows:

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, where X is a column vector of five control variables: minority, gender, income, GPA, and English as a second language. A test for multicollinearity shows no multicollinearity among independent variables.

[Table 3 about here]

# Findings and Discussion

First of all, we graphically present the trend graphs of the scores between the groups (UB and ETS) varied across the four years. There was no parallel trend between the two lines for DID analysis to demonstrate the effectiveness of an intervention implying the Greek and Latin root intervention did not produce the desired effect of raising SAT scores. Graph 1 shows no initial improvement in scores; on the contrary, scores dropped the year the intervention started. One explanation for this counter-intuitive trend is that the test questions are not weighted equally for FGLI students compared to their middle and upper-class peers. Freedle (2003) found the test questions designed to be easy were answered correctly by more white students than minority students. In contrast, the test questions designed to be hard were more frequently answered correctly by minority students than white students. Therefore, in 2017 the questions may have had similar weighting issues as Freedle found in his study that led to a drop in scores among FGLI students. In addition, there may be external factors that are outside the scope of this research and are not being controlled for in the data. Further analysis of the coefficients and t-values supports those findings (see Table 3).

[Graph 1 and Table 3 here]

Table 3 shows a statistically significant correlation between SAT scores and minority, first-generation, limited English proficiency, and GPA. The results of the DID analysis test the intersectionality of being first-generation *and* low-income compared to being first-generation *or* low-income. There was no significant difference between those two groups, and there is collinearity between income level and being first-generation *and* low-income. A possible explanation for the collinearity is the limited number of non-low-income students in the study due to the limited number of participants that are non-low-income. Another explanation is the high amount of overlap between students who are low-income and first-generation as opposed to being only first-generation.

The first hypothesis (H1) proposed a difference in SAT scores based on factors such as being a minority, income, and parent education, as suggested by previous studies. The findings support this hypothesis for being a minority and parent education level but not income. One explanation of the null finding for income may be the limited number of non-low-income students included in the study. The TRIO programs primarily serve low-income students, which means the data contains a limited number of non-low-income students. The findings do support being a racial minority, parent education level, limited English proficiency, and GPA as statistically significant.

The second hypotheses expect that the Greek and Latin root intervention would be effective at raising scores for FGLI students (H2A) and that the scores would be higher in students who were first-generation *and* low-income as opposed to first-generation *or* low-income (H2B). The findings were null for both hypotheses, with the intervention not being effective and the interaction between being first-generation and low-income not being statistically significant. These findings contradict the Holmes and Keffer (1995) study that this research was conceptually reevaluated with FGLI students. Our study is important because it is advantageous to know what does not work with FGLI students just as it is to understand what does work, and there are multiple potential explanations for the null findings.

One possible explanation is that the SAT is a multi-hour test and assesses many aspects of English besides vocabulary. Greek and Latin roots may have helped the students improve their vocabulary decoding ability, as Holmes and Keffer claimed, but the intervention alone was not enough to compensate for the other test challenges such as reading speed, knowledge of grammar, and use of syntax, which are also assessed in the ERW section. The diverse set of questions on the SAT suggests simple vocabulary approaches may help, but not enough to make a statistically significant difference in overall ERW scores in SAT. Therefore, more complex methods of intervention may be necessary to address the multiple components of the ERW score.

The null findings for the intervention suggest the effectiveness of TRIO programs found in prior studies is not solely based on their ability to help students improve their SAT scores but includes assisting students to overcome additional barriers. Even though these TRIO students receive lower SAT scores than state and national averages, they are still more likely to attend college than their FGLI peers. Theoretically, the TRIO programs help students achieve through multiple interventions, as was explained in the literature review. Therefore, while the SAT scores may not significantly change with the intervention, the program is still effective because it locates the target population in the advantaged category instead of the dependent category of social construction. For example, when students view themselves as not being powerless like a dependent but empowered like the advantaged, lower SAT scores are not seen as a significant barrier to their educational attainment in the long term. Instead, capacity is built through teaching resiliency and the ability to overcome challenges. Multiple postsecondary options are discussed for students who may not be as successful in traditional schooling models but still want to work towards better career outcomes. Through mentoring, career information, assistance with college funding, and other interventions, the higher educational attainment outcomes for FGLI TRIO students can still be improved, even without significantly impacting SAT scores.

The null findings that intersectionality between FG *and* LI, as opposed to FG or LI, was again contrary to our expectation but not inexplainable. Possible explanations for the lack of support for H2B relate to the lower number of students who met the "or" requirement. Among the total 324 students included in the data, 48 were FG *or* LI, and all other 276 were FG *and* LI. The low number in the sample is due to the grant requirements, which require two-thirds of the students served to be both FG and LI. In addition, among the 48 who were FG *or* LI, 33 were LI, which explains the collinearity with the income variable in the t-test, which may have suppressed the statistical significance. There were no students in this study who were mid-income with college-educated parents. Therefore, for comparison purposes, all students in this study were FG, LI, or FGLI. Future studies could expand the data set to increase the sample population to include more students with FG or LI alone. It could also expand the data set to look at non FGLI students to see how TRIO programs compare to their middle and upper-class peers. However, due to the grant requirements, the data sample may need to expand beyond the TRIO programs to include a more diverse set of students. For example, future research could include mid and high SES students who are not part of TRIO to compare their test scores. Expanding the sample population to a wider range of income levels will portray more detailed findings.

# Conclusion

Using the data from the four high schools in the Treasure Valley in Idaho over four academic years (2015-2018), this study evaluated whether the Greek and Latin root intervention was effective in improving their SAT scores for TRIO students as the program intended. Our study is important because it reevaluates Holmes and Keffer (1995), claiming that the Greek and Latin Root intervention was effective but only used it in one high school that did not primarily serve students who are FGLI.The study found statistical significance for racial minorities, parent education level, GPA, and English as a secondary language. However, the findings did not support income, the Greek and Latin root intervention, and the intersectionality between being FG and LI. This suggests the cultural barriers written into the SAT cannot be overcome with Greek and Latin roots alone. Culture is a broad term that includes language, customs, symbols, and traditions that are all passed through generations. SAT interventions may require more proactive measures to alleviate the cultural bias written into the test, which is evident in the differences based on being a racial minority, parent education level, GPA, and language factors that can be included in the culture of a student, family, and community. The findings call attention to barriers faced by students from diverse backgrounds and suggest these barriers are present and may be contributing to why some cultures are underrepresented in higher education.

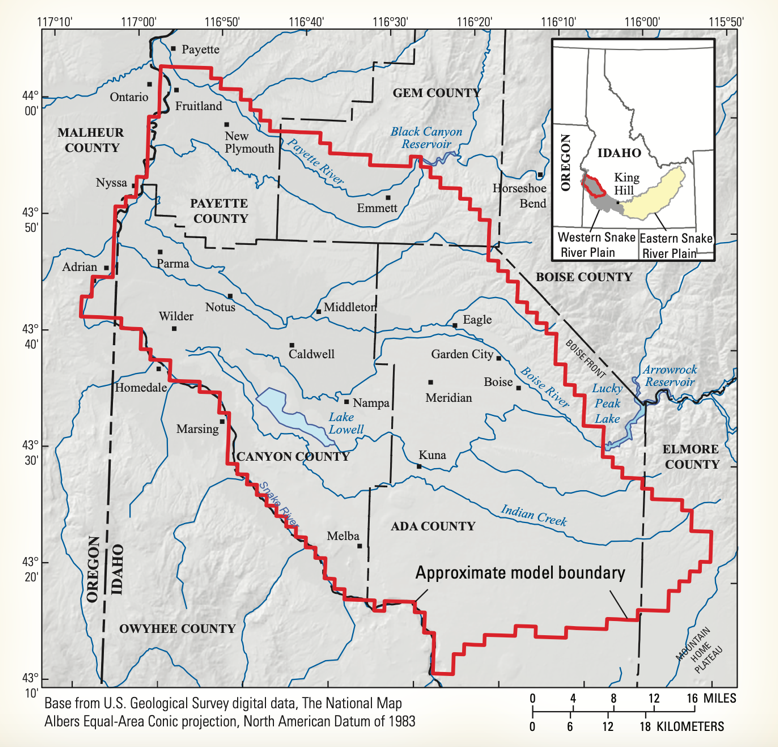
The findings can inform high school and universities practitioners of the TRIO program’s effectiveness and potential biases of SAT scores. SAT scores continue to be a complex indicator of high school student success. The stubbornness of improving SAT scores and their general correlation with GPAs suggests that other indicators may be just as helpful for colleges seeking to learn more about the students they are admitting. This raises important questions for colleges, such as whether they are creating inequality in the applicant pool by requiring a minimum SAT score, SAT scores are a good indicator of future success, or other indicators such as writing ability, school attendance, and GPA are equally valid.

The closure of all testing venues in 2020 has forced college admissions to reevaluate the purpose of the SAT, and many are shifting away from its use for admissions. Harvard saw a significant increase in applications due to the lack of SAT requirements for the 2021-2022 year, suggesting many students see their low test scores as a barrier to applying, and the scores impact a student's academic self-concept. Other institutions do not require it for admissions but do use it for placement purposes in English and math. While this is a significant shift, future studies could look at student performance in English and Math on a test such as the SAT, which is administered at the end of their junior year and the beginning of their senior year when they are not finished with their high school curriculum. Research should also look at other indicators contributing to success in college to determine if the SAT is a helpful indicator or if it can be replaced by other indicators that are perceived as more attainable by students from FGLI backgrounds.

One of the primary limitations of this study is the small number of students in the sample due to grant requirements and the limited number of schools qualified for the study implementing both UB and ETS. There are a few students who meet the FG or LI criteria which influenced the results and created collinearity with income. The four schools included in the study provide a snapshot but are not generalizable to the larger population. The limited number of students available for data means these results will not be generalizable to the whole population. Finally, this study uses purely quantitative methods and does not include the qualitative perspective of the FGLI students working on getting into college. Future research could benefit from in-depth interviews for students after taking the SAT and learn what barriers they perceived with the test, as opposed to what Greek and Latin roots attempt to improve.

Finally, the use of Greek and Latin Roots as an intervention should be reanalyzed by TRIO grant writers and those that manage the *What Works Clearinghouse*. As governments continue to make policies encouraging the use of data, they need to consider the quality of the study. Encouraging grants to base their practice on Holmes and Keffer (1995) is relatively simple and fails to consider various indicators such as race and SES, which suggests that the findings of one study cannot be transferred into another environment context with guaranteed results. Education pedagogy is limited by the students and staff seeking to implement it, which are as unique as the individuals in the setting. Therefore, while it is commendable that the federal government would want the TRIO grants to use research-based practices, the *What Works Clearinghouse* should vet the studies more rigorously to ensure practitioners are implementing effective interventions for diverse demographics.

**Image 1** Boundaries of Treasure Valley from the U.S. Geological Survey



*Note:* Bartolino (2017)

**Table 1** 2019/2020 Demographic Data for Idaho and the counties in the Treasure Valley

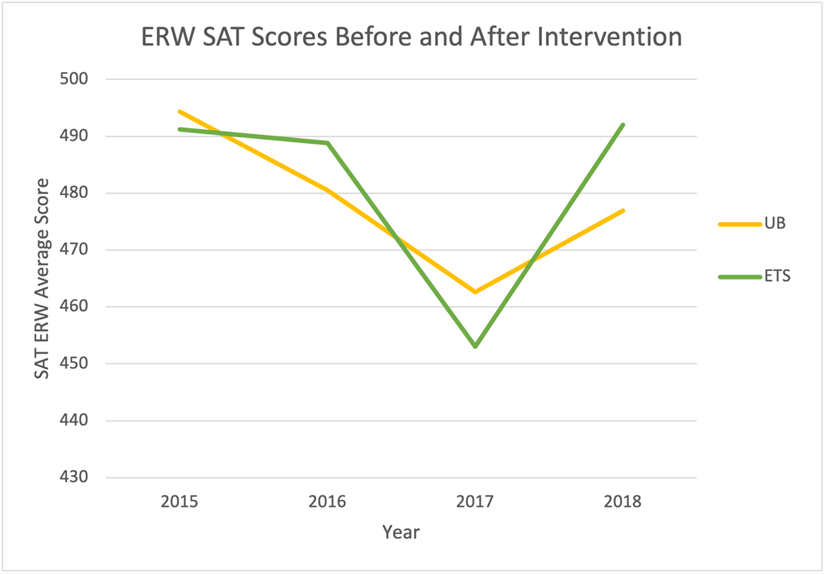
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Idaho | Ada County | Canyon County | Payette County | Gem County |
| Population | 1,839,106 | 494,967 | 231,105 | 25,386 | 19,123 |
| % with a High School Diploma | 90.8% | 95.2% | 85.1% | 85.7% | 87.8% |
| % with Bachelors Degree+ | 27.6% | 38.5% | 18.7% | 15.7% | 17.5% |
| Median Household Income | $60,830 | $72,295 | $58,670 | $53,643 | $53,733 |
| % Poverty | 10.1% | 7.7% | 10.6% | 11.5% | 11% |

(U.S. Census Bureau, 2019; USDA Economic Research Services, 2020)

**Table 2** Explanation of similarities and differences between Upward Bound and ETS

|  |  |  |
| --- | --- | --- |
| Upward Bound | Both Programs | ETS |
| Academic class at high school  5-week residential summer program  Specialist serves 1 school  High number of contact hours with students  Annually serve about 250 students  Grant requires all students must qualify as being first-generation and/or low-income | Help with career exploration, college information, college applications, financial literacy, SAT/ACT prep, etc.  Take students on college tours on school breaks  Specialists employees of university  Goals are improving high school graduation rates, college attendance rates, and college graduation rates  Students apply to join  In reality, most students are *both* first-generation and low-income | No class  Pull out program  No summer program  Specialists serve 2-3 schools  Fewer contact hours with students  Annually serves over 1000 students  Grant requires 2/3 of students must qualify as being first-generation or low-income |

**Graph 1** SAT scores (ERW section) before and after intervention

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**Table 4** Correlation Between SAT Score and Student Indicator

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Without Controls | | With Controls | |
| Variables | Coefficients | t | Coefficients | t |
| Control (ETS) | -16.13 | -1.41 | -16.77 | -1.61 |
| After Intervention (Greek and Latin Roots) | 3.28 | 13.38 | -2.84 | -0.23 |
| Gender | 25.42\*\* | 0.009 | 6.62 | 0.74 |
| Minority | 43.60\*\*\* | 0.000 | 32.13\*\*\* | 0.001 |
| Low-Income † | \_\_ | \_\_ | -11.19 | -0.79 |
| First-Generation | \_\_ | \_\_ | -45.51\*\* | -0.027 |
| Limited English Proficiency | \_\_ | \_\_ | -48.43\*\*\* | 0.000 |
| GPA | \_\_ | \_\_ | 46.84\*\*\* | 0.000 |
| Constant | 456.69 | 47.93 | 389.27 | 11.73 |
| N | 326 | | 324 | |
| R-squared | 0.088 | | 0.2765 | |
| Prob > F | 0.000 | | 0.000 | |

\*\*\* *p* < .001, \*\* *p* < .05, \* *p* < .10; The interaction variable, *First-Generation* ***and*** *Low-Income*, was omitted due to collinearity with *Low-Income*.

**Table 3** Groups for Difference-in-Difference method analysis

|  |  |  |
| --- | --- | --- |
|  | Upward Bound (Program with Greek and Latin roots) | ETS (Control) |
| 2015-2016 | Group 1  Pretreatment (Program) | Group 3  Pretreatment (Program) |
| 2017-2018 | Group 2  Treatment (Program\*After) | Group 4  No Treatment (After) |

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**Endnote**

1. Famous alumni include actress Viola Davis and astronaut Ronald McNair, who died in the Challenger explosion. While those are just two examples of successful alumni, there are countless others who have not gained the same notoriety but are daily improving their communities and building a better life for themselves and their children. [↑](#endnote-ref-1)
2. The What Works Clearinghouse is a collection of academic articles that evaluate various programs, products, practices, and policies in the field of education. It seeks to be a resource of evidence-based research that practitioners can use and organizes content-based topics relevant to education such as behavior, subjects, and grade. An article receives a seal of approval from the Clearinghouse by including statistically significant findings that can be expanded to other populations. [↑](#endnote-ref-2)