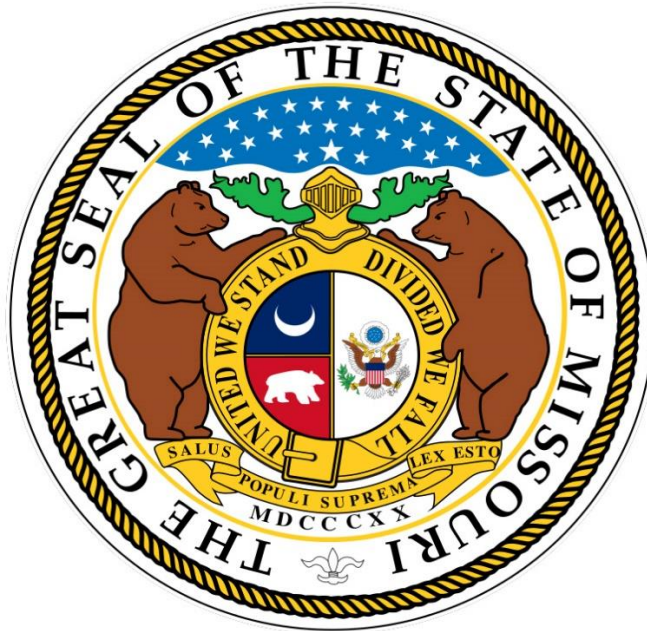


The Missouri State Aid Scholarship Programs Access, A+ and Bright Flight



Prepared for the Missouri General Assembly Joint Committee on
Education

by

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EXECUTIVE SUMMARY

While Missouri offers a number of state funded student financial aid programs, this examination considers only the most prominent, the Missouri A+ Scholarship, the Access Missouri Student Financial Assistance Program, and the Higher Education Academic Scholarship (i.e., Bright Flight Scholarship). Together these programs serve the largest number of students, represent a continuum from purely need-based to purely merit-based programs, and account for more than 99 percent of all state aid distributed to Missouri students. To establish a pragmatic understanding of whether these programs function as designed -- and at what costs -- the Missouri General Assembly Joint Committee on Education examined these programs to determine whether they serve their intended purposes.

Access Missouri: Access Missouri has three basic purposes. First -- streamline and simplify need-based aid by creating a single program with a single application and a single set of eligibility requirements. Second -- enhance award predictability. Third -- increase school choice by providing a portable award that students can use at a variety of in-state institutions (Missouri Department of Higher Education, 2012). Estimates indicate funding levels should increase award levels to near 65 percent of the statutory maximums in FY16. In fiscal year 2014, 53,206 students participated at a cost of \$59,878,157 (Missouri Coordinating Board for Higher Education, 2015).

Access -- As indicated by enrollment, Access Missouri (AM) appears to have increased access to postsecondary education -- particularly for the students with acute financial needs. Since FY12 however, program participation has held relatively constant. This may be explained by a general decline in the population of high school graduates in Missouri during the time period examined.

Persistence -- The odds of those who received AM awards persisting to a second year of postsecondary education were about 1.5 times greater than those who qualified for the award but did not receive or choose to utilize it.

Graduation -- While controlling for a host of significant socioeconomic conditions, the log-odds of AM recipient graduation at two- and four-year public institutions were 1.12 and 1.32 times greater than the log-odds of the closest comparable group of students who did not receive the award.

Because Access awards are significantly below the statutory maximums (approximately \$965 in FY14 at public four-year institutions compared to the \$2,850 statutory maximum, and \$375 of \$1,300 at community colleges) (Missouri Coordinating Board for Higher Education, 2015) the findings suggest that richer awards could strengthen the program's impact on persistence and graduation.

The Missouri A+ Schools Program: The primary purpose of the A+ Schools Program is to “improve education for non-college bound students.” Hence, the Outstanding Schools Act of 1993 (Senate Bill 380) established the program to improve student achievement as well as the quality of Missouri’s public schools. Improving school quality is accomplished by requiring participating schools to improve curriculums, graduation rates, and community engagement/involvement. Individual student achievement is improved by requiring early program commitment, good attendance and grades, and participation in community service and mentoring activities. Public high school graduates from Missouri Department of Elementary and Secondary Education (DESE) approved and designated A+ schools who have met the student program requirements can receive full tuition to attend Missouri technical schools or community colleges (Missouri Department of Higher Education, 2015). MDHE reports it is too early to determine whether the program will be fully funded in FY16. During the 2014 -2015 fiscal year, 13,000 students benefitted from A+ at a cost of more than 32 million dollars (Missouri Coordinating Board for Higher Education, 2015).

Access – A+ was found to increase overall college going rates in Missouri by (Muñoz, Harrington, Curs, & Ehlert, under review) and the tremendous growth of the program provides anecdotal evidence that A+ has increased access. During 2006, 11,031 high school graduates were eligible to participate. By 2010 that number grew to 17,879 -- a remarkable period of growth.

Persistence -- While controlling for the effects of a host of important variables, the log- odds that A+ recipients would persist were 1.55 times greater than students who did not receive the award.

Graduation -- While controlling for the effects of many important variables, the log-odds that A+ students would graduate within three years were twice the log-odds of the closest comparable group of students those who did not receive A+ reimbursements.

The Missouri Higher Education Academic Scholarship (aka Bright Flight) -- Bright Flight (BF) is Missouri’s only financial aid program based solely on academic merit. Its primary purpose is to prevent brain drain by encouraging Missouri’s best and brightest high school graduates to attend college in Missouri – thereby increasing the odds that they will remain in Missouri to live and work. House Bill 1356 created BF in 1986 for students with ACT/ SAT scores that rank in the top three percent of all Missouri test takers. Later, Senate Bill 389 (2007) expanded eligibility to those in the top fourth and fifth percentiles and increased the maximum award. Senate Bill 733 further modified BF to require the top three percent receive the full \$3,000 annual award before students in the top fourth and fifth percentiles

can realize any benefit. To date, appropriations have been insufficient to fund scholarships for those in the fourth and fifth percentiles. FY16 appropriations will remain unchanged from FY15 levels (\$17,476,666). It is unclear if MDHE will be able to fully fund statutory maximum awards for the top three percent in FY16 and it is unlikely the top fourth and fifth percentiles will receive awards at all (Missouri Coordinating Board for Higher Education, 2015).

Bright Flight (BF) was not necessarily intended to enhance postsecondary persistence or graduation statistics. However, to underscore the high ability of BF students -- the persistence rate of BF recipients is more than 10 percent higher than the best persistence rates of students in other state financial aid programs. Nearly 95 percent of BF recipients have persisted to their sophomore year and slightly more than 80 percent of the 2008 Bright Flight four-year sector cohort graduated within 6 years. Graduation rates were much lower at two-year public institutions. About 29 percent of BF students graduated within three years while nearly 35 percent of the students in the closest comparable group did the same. The very low two-year sector graduation rate is likely explained by high percentages of BF students beginning their careers at two-year institutions with the primary intention of transferring to four-year colleges and universities.

Retention of High Achieving Citizens – Using Missouri Department of Higher Education (MDHE) data Harrington, Muñoz, Curs, and Ehlert (under review) found that, while the effect size was small, the Bright Flight program increased the likelihood of Missouri work force participation. Considering it is highly likely that BF students will be successful earners -- the increased probability that they will enter the state's work force is certainly a plus for the Missouri economy. On the other hand, a negative relationship was observed between the probability of in-state employment and ACT score suggesting a possible brain drain problem which Bright Flight was found to reduce.

Research has shown that award size and merit program effectiveness are positively related. However, at \$3,000 -- BF covers only a small fraction of the costs of college attendance in Missouri. At present the BF scholarship covers approximately 28 percent of tuition at the University of Missouri and six percent of tuition expenses at Washington University. Thus, the purchasing power of Bright Flight is very low, especially in comparison to merit programs in other states. This may help to explain brain drain because it is fair to believe the program's impact would be improved if the value of the scholarship were increased.

Generally, this report attempts to provide an overview of the impact of Missouri's major student financial aid programs. However, for as many questions that have

been examined and addressed, many more could, and probably should be explored -- including those suggested in each section. Because funding levels and opinions about program purposes and goals are constantly changing and evolving – continued research will be necessary to increase insight and understanding.

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BACKGROUND

While Missouri offers a number of state student financial aid programs, this examination considers the most prominent; specifically the Missouri A+ Scholarship, the Access Missouri Student Financial Assistance Program, and the Higher Education Academic Scholarship (i.e., Bright Flight Scholarship). Together these financial assistance programs serve the largest number of students, represent a continuum from purely need based to purely merit based programs, and represent more than 99 percent of all state aid distributed to Missouri students. The report is intended to accomplish one overarching goal: to establish a pragmatic understanding of whether these programs function as intended -- and at what costs.

Access Missouri

Developed in 2007 in close collaboration with the financial aid community, the Coordinating Board for Higher Education (CBHE), and the Missouri General Assembly -- Access Missouri was designed to significantly increase student participation by creating a simpler, more predictable program (i.e., eliminate multiple applications and sets of eligibility standards). Thus, Access consolidated and replaced the Gallagher and Guarantee student aid programs. To qualify for the minimum award, students must be Missouri residents and U.S. citizens or permanent residents. Further, students must indicate Expected Family Contributions (EFC) on the Free Application for Federal Student Aid (FAFSA) of \$12,000 or less, have their FAFSA on file by April 1, re-apply each year, and maintain a 2.5 cumulative GPA (Missouri Department of Higher Education, 2015a).

In FY16, Access will receive an appropriation of \$59,682,507 -- maintaining the FY15 level. Governor Nixon recently released \$11 million in funds that were restricted for distribution in FY15 and those funds will be available to the program for FY16. MDHE estimates award levels will be near 65 percent of the statutory maximums in FY16 (Missouri Coordinating Board for Higher Education, 2015).

The A+ Schools Program

According to the Missouri Governor's Office (1993), the A+ Schools Program was implemented to "improve education for non-college bound students." Hence, the Outstanding Schools Act of 1993 (Senate Bill 380) established a two pronged program to improve student achievement as well as the quality of Missouri's public schools. Prong one was designed to improve schools by making A+ participation

and designation contingent upon review, revision, and improvement of curriculum, graduation rates, and community engagement/involvement. The second prong provides incentives to strengthen individual student achievement by requiring early A+ program commitment, good attendance and grades, and participation in community service and mentoring activities. If all requirements are met, public high school graduates can receive full tuition to pursue approved programs of study at Missouri technical schools or community colleges (Missouri Department of Higher Education, 2015). A+ award recipients must complete a full-time course load each semester and maintain a 2.5 cumulative GPA, to continue to receive the scholarship for up to five semesters (Missouri Department of Higher Education, 2015).

A+ requires schools to satisfy 11 requirements. Five curricular requirements obligate districts to prepare students for postsecondary educational and/or career opportunities. Two needs based items require schools to institute early intervention programs and to mentor those who enter the work force directly after high school. Three community service based requirements are intended to foster apprentice and internship opportunities as well as to promote school-community relationships/partnerships. Finally, to ensure the program is effectively administrated, districts are required to employ an A+ program administrator to implement and oversee the program (Missouri General Assembly, 2009).

Student commitment requirements are substantial and systematic. Students must attend an A+ designated high school for 3 consecutive years prior to graduation; maintain a 2.5 cumulative grade point average, have a 95 percent high school attendance rate (i.e., between grades 9 and 12); volunteer for 50, A+ coordinator supervised and approved, hours of tutoring or mentoring; and remain alcohol and drug free (Department of Elementary & Secondary Education, 2009).

During the 2013 -2014 fiscal year, 12,090 students benefitted from A+ at a cost of \$28,579,570. About 14,000 Missouri students received funding through the program during the 2014-2015 school year. While the FY16 appropriation includes an additional \$2 million for distribution, MDHE indicates it cannot yet determine whether resources will be sufficient to fully fund the program due to projected growth. Therefore MDHE forecasts that additional resources will be necessary to fully fund A+ (Missouri Coordinating Board for Higher Education, 2015).

The Missouri Bright Flight Program

Created in 1986 (House Bill 1356) the Higher Education Academic Scholarship -- better known as Bright Flight -- is the only state funded purely merit based financial

aid program. Implemented to keep Missouri's highest achieving students studying and working in Missouri, Bright Flight has benefitted the top three percent of high school graduates (as determined by SAT or ACT scores) by providing financial incentives to attend a Missouri institution. Students who are Missouri residents, citizens or permanent residents of the United States, and who have SAT or ACT scores that are in the top three percent of all Missouri test takers are automatically eligible for awards of up to \$3000 per academic year. In addition, and with some exceptions for hardship or military service, a candidate must enroll as a first-time student at an accredited Missouri institution in the year immediately following high school graduation. Recipients may not pursue degrees or certificates in theology or divinity (Missouri Department of Higher Education, 2015). Awards can be renewed for up to 10 semesters if recipients: (a) remain continuously enrolled, (b) maintain a cumulative college grade point average of at least 2.5, and (c) remain in satisfactory institutional standing.

Bright Flight expenditures account for about two-percent of Missouri's higher education budget. (Missouri Coordinating Board for Higher Education, 2015). During the 2014-2015 school year, Missouri's Bright Flight Scholarship was fully funded for the top scoring tier for the first time since the 2009-2010 academic year. Total appropriations for FY16 will be \$17,476,666, which reflects no change from FY15. Governor Nixon released \$4 million in restricted funds appropriated for FY15, but because of the timing of the release, the funds could not be awarded in FY15 and will therefore be carried over into FY16. Even with the addition of the FY15 carry over funds, spending authority limits make it unclear whether MDHE will be able to fully fund statutory maximum awards for the top three percent of Missouri ACT and SAT test takers in FY16. As has been the case in years past, it is unlikely that students in the top fourth and fifth percentiles will receive Bright Flight awards (Missouri Coordinating Board for Higher Education, 2015).

REVIEW OF RELEVANT LITERATURE

Traditionally, state scholarship/aid programs have been categorized as either need or merit based. Need-based awards depend on individual or family income while merit-based programs distribute benefits based primarily on academic achievement. More recently, an increasing number of programs are neither purely need nor merit. Instead, contemporary programs are often need/merit mixtures designed to maximize effectiveness.

Scholars have long contemplated the value of student scholarship/aid programs using theoretical frames that encourage examination based on effectiveness and efficiency as well as how those programs impact the choices students make. Hossler

and Gallagher (1987) suggested a model of student college choice that can help illustrate how state scholarship/aid programs influence student decisions to pursue postsecondary opportunities. The model suggests a three-stage decision making process: predisposition, search, and choice.

Predisposition is the phase when students contemplate the most basic decision -- whether they wish to attend college or not. During the search stage, students explore the specifics of their higher educational options and decide which elements of those options are important for their personal goals. Finally, when students digest what they have learned they enter stage three, choice – or the actual selection of a postsecondary institution.

Another important theoretical frame posited by Tierney and Hagedorn (2002) suggests that effective and efficient student aid programs should feature/emphasize: a) academics in conjunction with parental involvement, b) strong relationships with colleges and universities, c) reliable financial support, d) prepare students to succeed in a variety of postsecondary settings, and e) feature early commitment and intervention mechanisms. Notions derived from the Hossler and Gallagher (1987) and Tierney and Hagedorn (2002) frameworks have influenced and are impacting the design of financial aid programs nationwide. The following abbreviated review enumerates and describes some of the best known and most researched.

Need-Based

The District of Columbia Tuition Assistance Program (DC TAP) provides financial support for District of Columbia high school graduates to attend college. DC TAP provides up to \$10,000 toward the difference between in-state and out-of-state tuition at public four-year colleges and universities throughout the US, Guam and Puerto Rico. It can also provide up to \$2,500 per academic year toward tuition at private colleges and universities in DC, private historically black colleges and universities, and two-year colleges nationwide (DC.gov, 2015). Abraham and Clark (2006) found that DC TAP increased the likelihood that graduates apply to eligible institutions. Kane (2007) found that DC TAP increased DC high school graduate postsecondary enrollment.

Students graduating from the Kalamazoo School District in Michigan may take advantage of the Kalamazoo Promise which can cover 100 percent of tuition to any public college or university in Michigan. The percentage of tuition coverage is based on the length of continuous attendance and residency in the Kalamazoo Public School system (The Kalamazoo Promise, 2014). To be eligible, students must attend full-time, and take a minimum of 12 credit hours per semester. Andrew, Desjardins, and Ranchhod (2010) found that the incentive provided students from

lower socio-economic backgrounds more opportunity to consider and attend more discerning and costly postsecondary institutions. Other researchers have suggested that Promise may increase the probability that participants earn additional school credits, decrease the number of high school suspension days served by students, increase the grade point averages of African American students, and improve student, teacher, and administrator perceptions of school climate (Bartik & Lachowska, 2012; Miron, Jones, & Kelaher-Jones, 2011).

Merit-Based

Eligible Georgia students can receive the Georgia Helping Outstanding Pupils Educationally (HOPE) scholarship that pays for most or all undergraduate tuition (to a maximum of 15 hours) whether a student is full- or part-time. Students attending eligible private colleges or universities can receive HOPE awards to pay part or all undergraduate tuition costs, up to a maximum of 12 hours (GAcollege411, 2015).

HOPE provides several eligibility avenues. Students can graduate from eligible public high schools or complete a qualifying home study program. Both require a 3.0 grade point average. Students may also establish eligibility if they graduate from an ineligible high school, complete an ineligible home study program, or earn a GED if they score in the 80th percentile or higher on the SAT or ACT prior to graduation, home study completion date, or GED test date. If students do not achieve eligibility before entering college, they may do so afterward by earning a 3.0 grade point average on degree coursework after attempting 30, 60, or 90 semester hours. This is true regardless of high school graduation status (GAcollege411, 2015).

HOPE has been much researched and has generally been found to have positive effects on Georgia postsecondary enrollment statistics (Cornwell, Mustard, & Sridhar, 2006; Dynarski, 2004). Cornwell, Mustard and Sridhar (2006) found that overall first-year enrollment rates at Georgia public universities increased by about six percent after HOPE's initial implementation and that Georgia's four-year institutions enjoyed the lion's share of the enrollment increases.

To motivate the state's brightest students to remain in the state, West Virginia created the Promise Scholarship in 2002. In FY15, Promise recipients will receive annual awards valued at the lesser of tuition and mandatory fees -- or \$4,750 to be used at an in-state public or private postsecondary institution (College Foundation of West Virginia, 2015). To earn eligibility, students must complete high school graduation requirements at a West Virginia public or private high school, achieve a cumulative grade point average of at least 3.0 on a 4.0 scale, complete minimum core class requirements, score an ACT composite score of 22 with a minimum of 20 in English, Mathematics, Science, and Reading or a SAT combined score of 1020

with a minimum of 480 in Mathematics and 490 in Critical Reading (College Foundation of West Virginia, 2015).

Because Promise emphasizes persistence, students must complete 30 credit hours each year. The annual 30 hour credit requirement is believed to be responsible for increasing on-time graduations, ACT scores, and high school grade point averages. In contrast, the need-based West Virginia Higher Education Grant, which requires less yearly credit hours for eligibility (i.e., 24), seems to discourage students from dropping out but has not improved graduation rates (College Foundation of West Virginia, 2015).

Hybrid

The Indiana 21st Century Scholars Program pays full tuition costs to an in-state public, or partial tuition costs at a private institution. To be eligible for this primarily need-based program household income must conform to the federal free and reduced lunch program. In addition, students must be in the 7th or 8th grade and enrolled in an Indiana charter school, freeway school, or other school recognized by the Indiana Department of Education. Home schooled students are not eligible. Students must also sign a pledge to graduate from high school, maintain a 2.0 GPA, stay away from illegal drugs and alcohol, remain crime free, and meet financial aid application deadlines (Indiana Commission for Higher Education, 2009).

Researchers have found that the 21st Century Scholars program positively influences postsecondary student participation. St. John, Musoba, Simmons, Chung, Schmit and Peng (2004) found that students who signed the pledge in middle-school were more likely to aspire to attend, and more likely to actually enroll, at postsecondary institutions. Moreover, students who completed the program were around five times more likely to enroll and persist in a postsecondary institution (St. John et al., 2004). However, the program was found to have significantly less impact on aspiration and enrollment when more rigorous research methods were employed. Toutkoushian, Hossler, DesJardins, McCall, and Canche (2013) found a significantly smaller impact of the 21st Century Scholars program on college aspiration and enrollment when self-selection controls were employed.

Oklahoma students can have tuition covered at public two- or four-year postsecondary institutions, and at least a portion of tuition charges paid at accredited private institutions, by becoming eligible for the Oklahoma Promise Grant (OPG) (Oklahoma State Regents for Higher Education, 2015). To be eligible, students must apply during eighth, ninth, or 10th grade, have less than \$50,000 per year in family income, take 17 units of required high school course work to enhance college readiness, maintain a cumulative 2.5 grade point average, apply for other financial

aid as a high school senior, be a U.S. citizen or lawfully present at college enrollment time, and abstain from drug use and criminal activity (Oklahoma State Regents for Higher Education, 2015).

Research finds that OPG recipients have high retention rates and were more likely to persist (Mendoza, Mendez, & Malcolm, 2009). De La Rosa (2006) suggests that the higher rates of retention and persistence are because participants graduate high school better prepared for college due to the program's focus on academic preparation.

Missouri State Aid Programs in Relation to the Literature

As a purely need-based program, the literature suggests that Access Missouri might be expected to increase the likelihood that graduates will apply to eligible institutions -- as Abraham and Clark (2006) observed when examining the District of Columbia Tuition Assistance Program. Additionally, as Bartik and Lachowska (2012) and Miron, Jones, and Kelaher-Jones (2011) found when examining the Kalamazoo Promise, Access Missouri may be increasing the probability that participants earn additional school credits as well as grade point averages among particular student groups. Access may also be improving high school student behavior and school climate perceptions.

Cornwell, Mustard and Sridhar (2006) found that the Georgia HOPE scholarship increased overall first-year enrollment rates by about six percent at Georgia public universities and that Georgia's four-year institutions enjoyed the largest share of the enrollment increases. If the Missouri Bright Flight Scholarship functions similarly, it may also increase in-state enrollment and in particular, enrollment at four-year schools. Of central interest to this inquiry however is whether Bright Flight motivates -- and in fact causes -- students to remain in Missouri to study, work and live.

While Missouri's A+ program has no need-based criteria, which technically makes it a merit program, its multiple eligibility requirements make it more similar to hybrid programs like the Indiana 21st Century Scholars Program and/or the Oklahoma Promise Grant. Therefore, we may expect that A+ positively influences postsecondary participation by making students more likely to aspire to enroll, to actually enroll, and to persist as St. John et al. (2004) and Mendoza, Mendez, & Malcolm (2009) found when examining the Indiana and Oklahoma programs.

Because the major Missouri financial aid/scholarship programs now account for more than 100 million dollars in expenditures each year, it behooves policymakers to assess whether the programs serve their intended purposes -- especially in an era of increasing completion from other budgetary items. For that reason, the Missouri General Assembly Joint Committee on Education (JCED) examined the programs to

determine whether they perform as intended. When appropriate to the individual program, the inquiry focused on addressing the following questions/phenomena:

- Program usage
- Program costs
- Impact on access to postsecondary education
- Persistence rates
- Graduation rates
- Four-year transfer
- Retention of the state's most capable citizens
- Potential changes for improved program performance

Because each financial aid program was designed to serve different student populations and narrowly defined purposes, comparing between or among programs may be of little value or altogether inappropriate. For example, Bright Flight was designed to retain Missouri's most capable citizens (students who can often choose from many attractive postsecondary educational opportunities). On the other hand, Access Missouri was designed specifically to expand opportunity by offering very low-income students what may be their only chance to attend college. Therefore, while examining postsecondary access for Bright Flight students makes little sense – access considerations should be an important part of evaluating the performance of programs like A+ and Access Missouri.

DRAFT

Access Missouri

ACCESS MISSOURI

Created in 2007 (Senate Bill 389), as a result of collaboration between the Missouri Coordinating Board for Higher Education and a wide-cross section of the financial aid community (Missouri Department of Higher Education, 2012), Access Missouri (AM) replaced the Charles Gallagher Student Financial Assistance Grant and Missouri College Guarantee grant. AM is purely a need-based program and as such its primary eligibility criterion is family income. The program has three basic purposes. First, it was designed to streamline and simplify need-based aid by creating a single program with a single set of eligibility requirements and single application process (i.e. submit the Free Application for Federal Student Aid (FAFSA) by April 1). This change was important because research suggests that simplification (e.g., program consolidation, application simplification) is necessary so that students can better understand and participate (Brookings Institution Brown Center for Education Policy, 2012). AM's second purpose was to enhance award predictability. Thirdly, AM was designed to increase school choice by providing a portable award that students can use at a variety of in-state postsecondary institutions (Missouri Department of Higher Education, 2012).

To be eligible students must: a) have a Free Application for Federal Student Aid (FAFSA) on file by April 1, b) be a U.S. citizen or permanent resident and a Missouri resident, c) be an undergraduate student enrolled full time at an eligible Missouri school, d) have an EFC of \$12,000 or less, e) not be pursuing a degree or certificate in theology or divinity, f) not have received a first bachelor's degree, completed the required hours for a bachelor's degree, or completed 150 semester credit hours (Missouri Department of Higher Education, 2015a).

The maximum award (subject to General Assembly Appropriation and program demand) for four-year college students (and State Technical College of Missouri) is \$2,850 (\$1,500 minimum). This is so whether students attend an approved public or private/independent institution. Students attending institutions classified as part of the "public two-year" system are awarded \$1,300 maximum (\$300 minimum). MDHE estimates that total funds for Access in FY16 will be \$59,682,507, which maintains the FY15 funding level. However, the Governor recently released \$11 million in funds that were restricted for FY15. MDHE was unable to spend those funds in FY15 due to the timing of the release so the money will be available to the program for FY16. Taking this into account, late estimates indicate funding levels should increase award levels to near 65 percent of the statutory maximums. In fiscal year 2014, 53,206 students participated in Access Missouri at a cost of \$59,878,157 (Missouri Coordinating Board for Higher Education, 2015).

Research on Access Missouri is somewhat rare but it is reasonable to expect that the program has and will continue to promote/support increased access/enrollment. This is so for two main reasons. First, research has found that state-funded financial aid programs of all types increase postsecondary enrollment (Dynarski, 2004; Zhang & Ness, 2010). Second, AM program participation continues to grow. These phenomena can be better understood when AM is examined using lenses suggested by student choice and effective and efficient state financial aid program scholarship.

Access Missouri: Hossler and Gallagher's Model of Student Choice

Hossler and Gallagher's (1987) model of student choice suggests that students' decisions to pursue a postsecondary education consists of three distinct stages: predisposition, search, and choice. During predisposition, students are vacillating between the decisions to attend or not to attend. While in search mode, students learn about the particulars of their postsecondary options and become aware of program/institutional attributes that are germane to their particular goals. Finally, students evaluate what they have gathered and learned to formulate a *choice*. It would appear that Access Missouri works to influence/motivate student choice, to some degree, in all three stages.

Predisposition

Typically, state postsecondary enrollment programs aim to assuage the single most prominent barrier to postsecondary participation -- financial need. Access Missouri (AM) is no exception. In fact, alleviation of financial need is AM's central feature. Notwithstanding students can count on the financial resources needed to attend college -- which logically impacts predisposition to attend -- AM has no other *explicit* elements to influence predisposition. For example, unlike Missouri's A+ Schools Program, participation in AM contains no mechanisms that require schools to increase instructional quality which may help inculcate higher educational aspirations in students. Moreover, AM's lack of incentive for schools to improve curricular rigor may actually harm students' ability to become college ready by neglecting to improve their ability to meet college eligibility/entrance requirements (Engberg & Wolniak, 2010). Finally, and again unlike Missouri's A+ Schools Program, AM has no requirements that motivate schools to establish community partnerships or engage parents in relationships that are designed to increase student cultural capital. These types of experiences/relationships inform students and parents of postsecondary opportunities and resources that have been found to benefit those with limited exposure to, and/or awareness of, higher educational opportunities (Perna & Titus, 2005).

In sum then, while AM ameliorates the single most prominent barrier to student postsecondary participation -- financial need – in theory it has minimal impact on predisposition because it does not require student commitment. In addition, and again unlike A+, AM has no school quality/academic rigor conditions and contains no mechanisms to increase student postsecondary awareness/readiness or cultural capital.

Search

As was suggested previously, besides the award, Access Missouri (AM) contains no other explicit elements that support the search stage. For instance, A+ features early high school career intervention by requiring schools to provide rigorous academic preparation as well as postsecondary cultural capital resources which have been found to influence which postsecondary institutions a student will consider (Engberg & Wolniak, 2010; Perna & Titus, 2005). In other words, while AM offers a financial award that may affect which colleges a student can afford to attend and thus *choice*, A+ goes further by generating awareness of the need for academic success early in a student's high school career. That awareness serves to increase the probability that students are eligible and able to attend and flourish in postsecondary situations (De La Rosa, 2006). De La Rosa (2006) found that design elements of the types just mentioned help prevent students from experiencing limited options and choices after graduation. More importantly, such design items create opportunities for students to make higher quality choices about the educational options that best meet their needs.

Choice

Hossler and Gallagher (1987) posited that choice involves two stages: the creation of a collection of eligible institutions and the subsequent selection of a winner from the list. AM offers only the financial award as an explicit motivator for both choice stages. That situation may be both good and bad. Because cost is likely the primary motivator for the high-need students AM was designed to serve -- decisions based on cost may supersede choices that would better accommodate interests, talents and career goals. For that reason, while AM's financial award almost certainly improves postsecondary access (a good thing) because it has no student enrichment design elements to inform and enhance decisions, AM may actually encourage less than optimal postsecondary choices. More research around this idea is needed because students from low socioeconomic backgrounds are often the most culturally needy (Terenzini, Cabrera, & Bernal, 2001; Tierney & Venegas, 2009) and therefore are more likely to make choices based solely on cost – not on the best fit for their educational/career goals/needs.

In line with the previous discussion, Table 1 indicates that AM’s financial award can influence all three of Hossler and Gallagher’s (1987) college choice categories. However, when AM is closely examined in relationship to Tierney and Hagedorn’s (2002) effective and efficient program measures, shortcomings emerge. For example, AM lacks an early high school career program commitment component (e.g., a signature pledge to graduate, promise to complete a rigorous program of study) that improves students’ program awareness (Perna, Rowan-Kenyon, Bell, Thomas, & Li, 2008). Design omissions of this sort make AM less than ideal because effective enrollment programs should explicitly emphasize academics and parental involvement, strong postsecondary institutional relationships, predictable financial support, student preparation for multiple postsecondary options, and early intervention (Tierney & Hagedorn, 2002). Access Missouri (AM) features only one *explicit* design elements -- financial dependability. Table 1 summarizes Access Missouri, Missouri A +, and Bright Flight in relation to Hossler and Gallagher’s (1987) college choice stages and Tierney and Hagedorn’s (2002) effective and efficient program measures.

Table 1

Program Evaluation/Critique: Choice/Effectiveness and Efficiency

	Tierney and Hagedorn (2002)							
	<u>Effective and Efficient Program Measures</u>							
	Hossler and Gallagher (1987)			Academics/		Stable	Many	
	<u>College Choice Model</u>			Parental	Institutional	Financial	College	Early
	<i>Predisposition</i>	<i>Search</i>	<i>Choice</i>	<i>Involvement</i>	<i>Relationships</i>	<i>Support</i>	<i>Options</i>	<i>Intervene</i>
Access Missouri	Yes	Yes	Yes	No	No	Yes	No	No
Missouri A+	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MO Bright Flight	Yes	Yes	Yes	No	No	Yes	No	No

NOTE: “Yes” indicates that the program has an explicit element/requirement that addresses the specific design element.

Access

Access refers to how policies or programs attempt to guarantee that students have equal and equitable opportunities to take advantage of postsecondary education. So when policies attempt to increase access they provide incentives for institutions to deliver more services and/or eliminate barriers that prevent students from enrolling and participating equitably. A host of elements (e.g., race, religion, gender, disability,

intellectual ability, past performance, income and/or family educational-attainment, community influence/affluence) can contribute to students having more or less “access” to educational opportunities than others. Therefore, measuring the exact impact of Access Missouri, and for that matter, the Missouri A+ Scholarship on postsecondary access is beyond the scope of this particular report. An inquiry addressing access, as strictly defined, would require student level data that either does not exist or could not be collected and analyzed within the given time frame. Another barrier to a rigorous access analysis is confounded by Access’s (and the Missouri A+ Schools Program) relationship with the federal Pell grant program as well as other state funded financial aid awards.

Access reimbursement is calculated after any Pell (and/or A+) award is used to pay for tuition and fees. 173.1105.2, RSMo specifies that AM awards must be reduced by the amount of any Missouri A+ Schools Program payments a student may be entitled to. Moreover, 173.093, RSMo, or the “no better than free” provision, states that actual awards to students receiving need-based aid must be reduced to ensure that financial assistance does not exceed the cost of attendance. For students eligible for AM, the Missouri A+ Schools Program, and the federal Pell grant, the “no better than free” provision often means the AM award is significantly reduced – or eliminated (student loans and aid based solely on academic performance, such as the Missouri Bright Flight Scholarship are not so effected). In short, some students who qualify for AM may actually receive little or no reimbursement from the program -- making them hard to track for research purposes. This leaves an important student demographic largely unexamined which introduces substantial bias in research efforts. For those reasons and others, this report frames access in terms of enrollment trends.

As was mentioned previously, state-funded financial aid programs of all types increase postsecondary enrollment (Dynarski, 2004; Zhang & Ness, 2010) however, no rigorous study has yet found that Access Missouri (AM) actually does so. To provide an indication of the AM’s success in increasing postsecondary access for financially needed students, this inquiry examines trends in the number of AM recipients who have enrolled in postsecondary institutions.

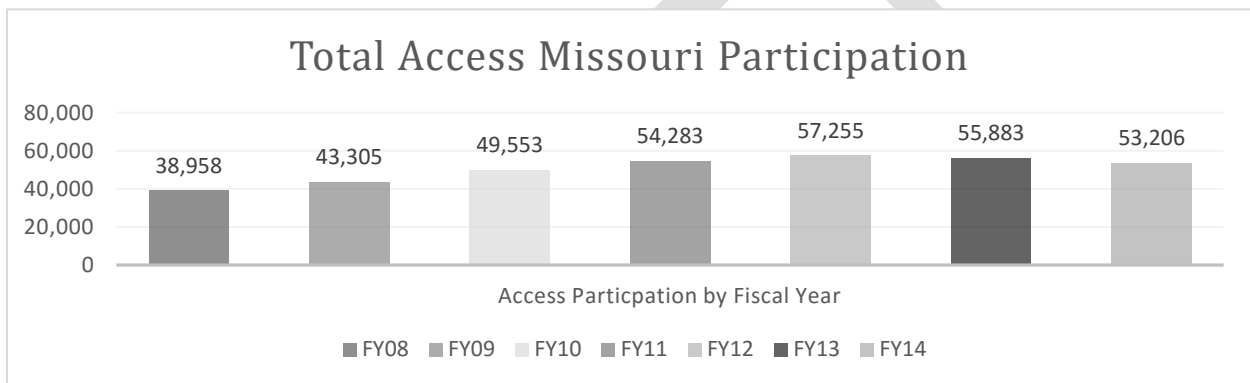
As Figure 1 indicates, student participation in Access Missouri (AM) increased quickly and significantly between 2008 and 2014. In FY14 more than 53,000 students received an AM award -- an increase of more than 36 percent when compared with the 38,958 that received payments in FY08, AM’s first year of operation. The trend suggests that AM has enhanced access, at least as anecdotally indicated by enrollment, to postsecondary educational opportunities for students with acute financial needs who received AM awards. Again, these figures ignore the “no better than free” students discussed previously, a significant source of bias. The

trend also suggests that since FY12, program participation has held relatively constant. This may be explained in large part by a general decline in the population of high school graduates in Missouri during the time period examined.

Figure 2 illustrates Access Missouri expenditures. From a high of nearly 93 million in FY09, expenditures have since leveled off at an average of 59.6 million between FY11 and FY14. While Access has been funded at lower levels than originally intended, the program has, as it was designed to, provided a fairly predictable and steady source of financial assistance for many of Missouri’s neediest students.

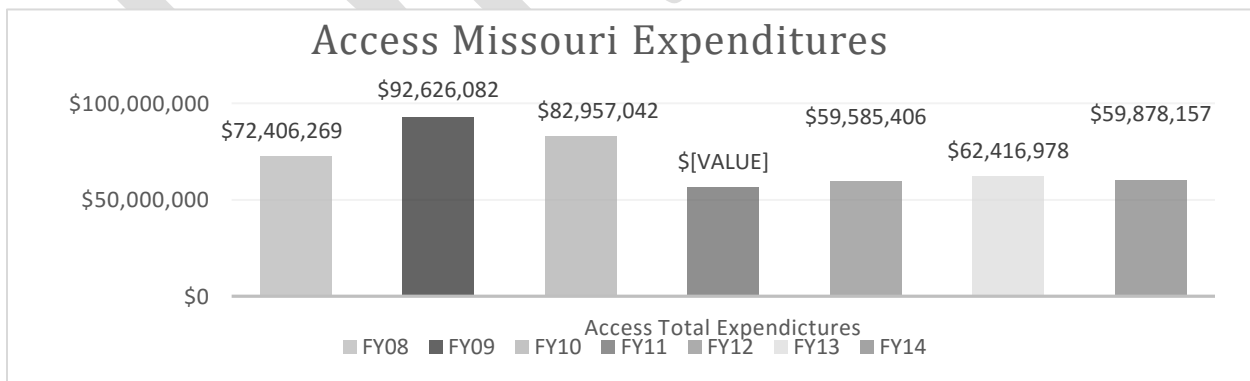
Figure 1

Total Access Missouri Participation by Fiscal Year



Source: Missouri Department of Higher Education

Figure 2



Access Missouri Expenditures by Fiscal Year

Source: Missouri Department of Higher Education

According to Missouri Department of Higher Education statistics, 43 percent of Access expenditures and 50 percent of Access recipients attend Missouri public

baccalaureate institutions. Private four-year institutions in Missouri attract 26 percent of AM recipients and account for 46 percent of expenditures. Twenty-one percent of expenditures benefit the seven percent of AM recipients who attend Missouri public institutions offering associates degrees and certificates. Finally, three percent of AM expenditures go to vocational/technical/specialized schools for the three percent of AM recipients who attend them.

Persistence

Persistence to postsecondary graduation is defined herein as a student's postsecondary education continuation behavior that leads to graduation. It is measured by whether first-time, full-time, degree seeking (FTFTDS) undergraduate students enrolled in a postsecondary institution were subsequently enrolled in the following academic year. In a 2012 report produced for the Missouri Governor, the Missouri Department of Higher Education (MDHE) asserted that Access Missouri (AM) recipients -- in both the two- and four-year sectors -- had slightly higher persistence rates when compared to all FTFTDS students who began their educations in the fall of 2007 (Missouri Department of Higher Education, 2012).

While interesting, comparing AM recipients to the entire student population may not provide the type of information needed to inform a deeper understanding of program impact. For example, some students in the overall population will be from affluent family backgrounds and will therefore benefit from high expected family contributions (EFC) to their postsecondary educational efforts. On the other hand, many AM recipients are extremely needy (EFC of \$12,000 or less) and experience daunting financial challenges when attempting to attain postsecondary education. Because the literature has over and over again shown socio-economic indicators to be a strong predictors of many measures of academic success -- comparing very affluent students to financially challenged students creates an apples and oranges scenario. For that reason, this inquiry focused on examining students from groups that have more similar socio-economic situations in an effort to create a clearer picture of possible AM impacts.

Using data provided by the Missouri Department of Higher Education (MDHE) – 2008 through 2013 Missouri public high school graduates were examined (see Appendix J, Table J2 for demographic description of data). Data for that period of time includes the most consistent/complete Free Application for Federal Student Aid (FAFSA) information available to MDHE. To be included in the analysis, the students must have enrolled in a Missouri two- or four-year public college or university in the fall immediately following graduation. These first-time full-time degree-seeking (FTFTDS) students were selected so that gaps in enrollment or time spent pursuing other postsecondary interests wouldn't complicate persistence performance. Six

iterations of persistence data were examined for both two and four year institutions (e.g., 2008 graduates into fall 2009 enrollments and 2010 reenrollments). The following comparisons groups were established:

- Access recip. (N = 40,344)
- EFC<=\$12,000, FAFSA filed pre-April 1, but Access non-recip. (N = 13,789)
- EFC<=\$12,000, FAFSA post April 1 (N = 17,835)
- EFC \$12,000 - \$15,000 (N = 5,323)

Access recip. (N = 40,344) are students who qualified for and did indeed received an Access Missouri award. Students with EFCs of 12,000 dollars or less, and who met the FAFSA filing deadline requirement -- but did not receive Access awards for any number of reasons including receiving assistance from alternative financial aid sources (e.g., A+, Pell, other state financial aid, athletic scholarships) are labeled *EFC<=\$12,000, FAFSA pre-April 1, non-recip.* (N = 13,789). *EFC<=\$12,000, FAFSA post-April 1* (N = 17,835) are students who would have been financially qualified to

Table 2

Access Missouri Persistence at Missouri Public Four-Year Secondary Institutions

Student Groups	Number of Students who Persist to Second Year		Total	Total Percentage Retained.
	NO	YES		
Access recip.	4,395	21,028	25,423	82.7%
EFC<=\$12,000, FAFSA pre-April 1, non-recip.	573	1,352	1,925	70.2%
EFC<=\$12,000, FAFSA post-April	1,164	2,299	3,463	66.4%
EFC \$12,001 - \$15,000	291	2,330	2,621	88.9%
Total	6,423	27,009	33,432	80.8%

FTFTDS Missouri public high school graduates (i.e., classes of 2008-2013) who enrolled in four-year public colleges and universities during the fall following high school matriculation. NOTE: See Appendix J, Table J1 for a more comprehensive demographic description.

receive an Access Missouri (AM) award, however, they did not receive payments because they missed the FAFSA filing deadline.

Finally, EFC \$12,001 - \$15,000 (N = 5,323) are students who did not meet AM financial need criteria so they did not receive awards. However, those students were somewhat similarly situated in terms of financial need so they were used as a comparison group. The number of students in each comparison group are presented in Tables 2 and 3. Table 2 describes students in four-year schools and Table 3 describes students who attended two-year institutions.

Figure 3 indicates that four-year (4Y) AM recipients persisted at much higher percentage rates (more than 12 percent) than the closest comparable group (i.e., EFC≤\$12,000, FAFSA pre-April 1, non-recip.). Furthermore, the gap increases to more than 16 percent when Access recipients are compared to students who were financially eligible but did meet the FAFSA filing deadline. These statistics tend to

Table 3

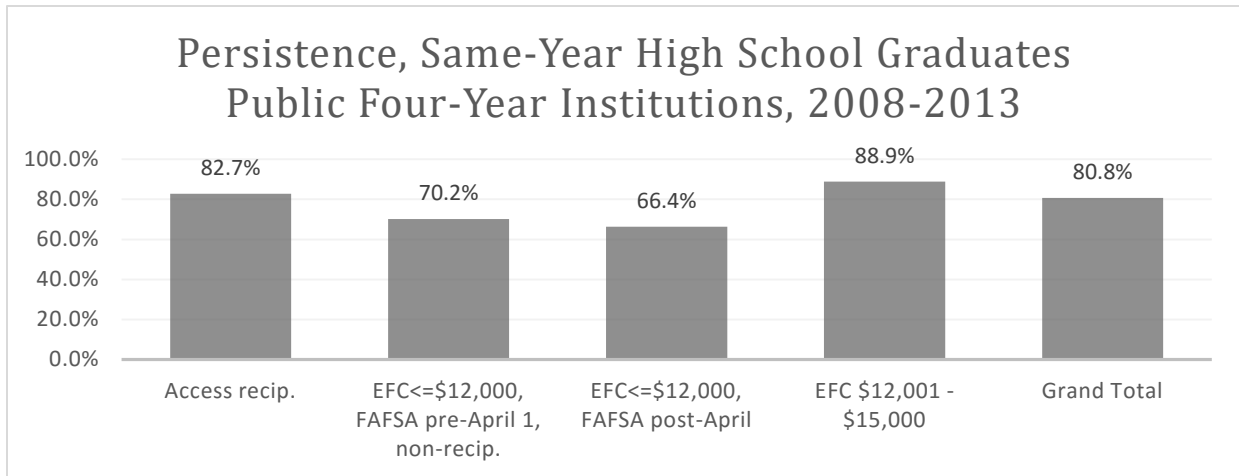
Access Missouri Persistence at Missouri Public Two-Year Secondary Institutions

Student Groups	Number of Students who Persist to Second Year		Total	Total Percentage Retained.
	NO	YES		
Access recip.	5,060	9,861	14,921	66.1%
EFC≤\$12,000, FAFSA pre-April 1, non-recip.	4,246	7,618	11,864	64.2%
EFC≤\$12,000, FAFSA post-April	6,457	7,916	14,372	55.1%
EFC \$12,001 - \$15,000	780	1,922	2,702	71.1%
Total	16,543	27,317	43,860	62.3%

FTFTDS Missouri public high school graduates (i.e., classes of 2008-2013) who enrolled in two-year public colleges and universities during the fall following high school matriculation. NOTE: See Appendix J, Table J1 for a more comprehensive demographic description.

Figure 3

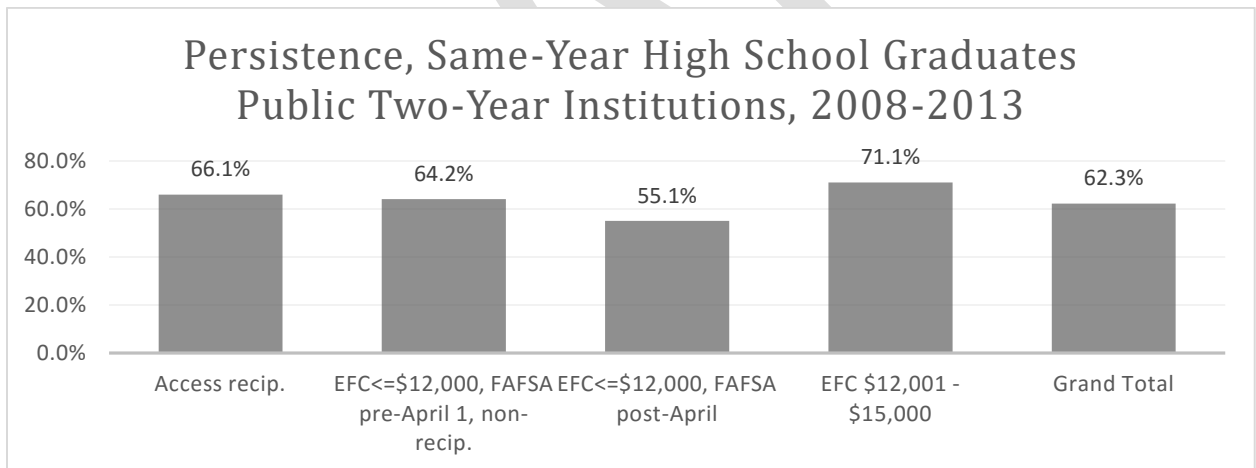
Access Missouri Four-Year Persistence



Source: Missouri Department of Higher Education.

Figure 4

Access Missouri Two-Year Persistence



Source: Missouri Department of Higher Education

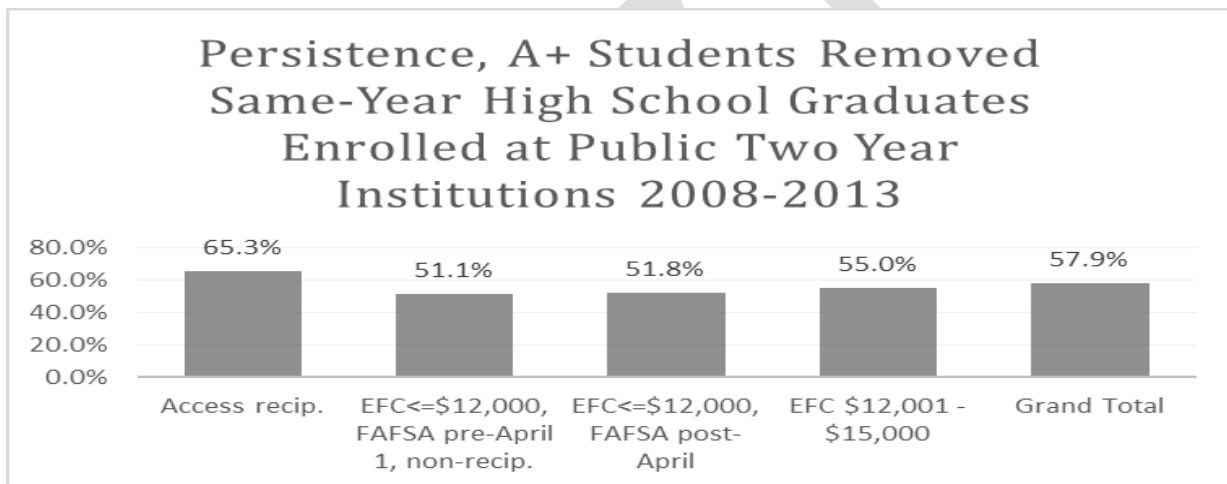
support the assertion that Access directly and positively impacts the most significant barrier to postsecondary enrollment for needy students -- availability of financial resources. This should come as no surprise because logic suggests that students without the financial assistance offered by AM (i.e., EFC ≤ \$12,000, FAFSA pre-April 1, non-recip., EFC ≤ \$12,000, FAFSA post-April) would persist at lower rates because without AM financial assistance, those students will be less likely to have the wherewithal to reenroll for a second year. That argument is supported by the persistence rates of students with higher, but similar, levels of family financial support. Students with EFC's of \$12,001 - \$15,000 persist at rates more than six

percent greater than Access recipients. Results of that sort are in line with research that has found lack of financial resources to be the greatest barrier to postsecondary participation (Dynarski, 2004; Zhang & Ness, 2010).

The same sort of findings were observed when the inquiry focused on AM students who attended two-year (2Y) institutions. Figure 4 suggests that students in 2Y institutions who received AM awards persisted at higher rates -- but by narrower margins -- than 4Y sector students (less than two percent when compared to the closest comparable group).

Figure 5

Access Missouri Two-Year Persistence, A+ Students Removed



Source: Missouri Department of Higher Education

This result was anticipated because A+ scholarship award recipients were initially included in the 2Y data set. While A+ scholarship awards generally can't be used by students in 4Y institutions, A+ awards are a significant part of many students' financial aid portfolios in 2Y institutions. Therefore, 2Y students who qualify for AM awards may also be eligible to receive funds from A+. Many of those students would logically choose to utilize the A+ scholarship instead of an AM award because A+ can cover *all* tuition costs which would more significantly impact the financial barrier to enrollment and subsequent reenrollment than would the AM award. For those reasons, A+ recipients were removed and the data were reanalyzed.

While all financial aid received by students was not accounted for in the re-examination, when students receiving A+ awards were removed from the data set, Figure 5 suggests the persistence percentages of all comparison groups were substantially lowered except for the group that actually received Access funds. That suggested, in line with theory, that the persistence of A+ students is enhanced by

the academic and personal cultural capital improvement aspects of participating in an A+ program at a DESE approved A+ school.

Logistic Regression Modeling

While the percentages of particular groups of students who persist or do not persist to a second year of postsecondary education provides interesting insights, the intention of this inquiry was to increase understanding of the particular conditions and elements that most influence persistence and graduation. For that reason, logistic regression modeling was utilized.

Logistic regression is one of a category of statistical models that belong to the generalized linear model family and is used here because it allows the prediction of discrete outcomes (e.g., whether students persist or do not persist) from a set of other variables that may be a mix of continuous, discrete, and/or dichotomous variables. Generally, the dependent or response variable is dichotomous (e.g., graduate or not graduate). Logistic regression calculates the probability of success over the probability of failure, so the results of the analysis are in the form of a logarithmic odds ratio (i.e., log-odds). Results provide knowledge of the relationships and strengths among the variables (e.g., having a high grade point average in high school increases the log-odds of persistence when compared to earning a lower grade point average). For a more thorough explanation of logistic regression see Appendices B and C.

Interpreting log-odds ratio output from logistic regression software routines can be challenging. Generally speaking, a persistence log-odds ratio describes the log-odds of persisting for the group of interest divided by some reference group's log-odds of persistence. For example, let us say we are interested in the relationship between the odds of persistence of those who had high school grade point averages (hsgpa) of between 2.01 and 2.5 and the odds of persistence of those who had hsgpa's of between 0.0 and 1.5. The log-odds ratio that would describe that relationship would be the odds of persistence of those with an hsgpa of between 2.01 and 2.5 divided by the odds of persistence of those who earned an hsgpa of 0.0 to 1.5. According to Table D1 in Appendix D, that log-odds ratio is 1.19. Therefore, the log-odds of persisting to a second year of college are 1.19 times greater for students with grade point averages of between 2.01 and 2.5 than those with averages between 0.0 and 1.5.

Limitations

The findings of this investigation suggest that Access Missouri (AM) does impact the targeted student demographic with varying degrees of success. However, the results should be considered in the context of design and data limitations.

Efforts were made to ameliorate bias introduced by student self-selection and to control for as many socioeconomic conditions/situations as possible (e.g., student demographics, academic ability, economic background, school attended) in the logistic regression models. However, the possibility of bias not associated with the model error terms is possible.

Completely controlling for the intentions, motivations, and/or particular situations (e.g., institutional choice based on cost rather than best fit for interests and talents, decision to attend a Missouri college or university because of family issues as opposed to remaining in-state to take advantage of a Bright Flight scholarship) that impact student enrollment decisions is not possible because variables to capture all aspects of choice are simply unavailable in the data (i.e., omitted variable bias). Therefore, the findings should be regarded as best estimates given that variables that would lend greater insight were not present. It should furthermore be noted that the study relies in part on data provided by students themselves (e.g., family income, high school grade point averages). Because students often complete the ACT and FAFSA applications, it is possible that they could misinterpret questions, answer with guesses, or fail to respond altogether. For example, students may not always be aware of parental educational history, have accurate knowledge of household income, or correctly report high school grade point averages. Therefore, it is certainly possible that that data contains inaccurate or erroneous information which is another source of error.

To account for the impact of other financial aid/scholarship programs (e.g., A+, Pell), control variables were utilized when they existed. However the data did not contain variables for every possible source of financial aid (e.g., athletic scholarships, other Missouri financial aid awards, out-of-state aid offers, scholarships from private entities, etc.). The availability of multiple real and/or potential financial aid/awards almost certainly impacts the postsecondary decisions of students. For instance, it is fair to believe that a very high performing AM eligible student will have several scholarship opportunities to consider in addition to the AM award. That situation has the potential to significantly influence choice of institution, institutional sector, as well as in- or out-of-state attendance decisions. The non-existence of variables to control for every possible choice element faced by students also introduces the potential for omitted variable bias.

Another limitation of note stems from grouping students by expected family contribution (EFC) to achieve adequate sample sizes. While Access Missouri (AM)

recipients (i.e., EFC \leq \$12,000) and the comparison group of those who had EFCs in excess of the statutory limit for eligibility (i.e., EFCs between \$12,001 and \$15,000) have very similar income levels near the \$12,000 EFC statutory limit – the economic gap between students becomes considerable near the endpoints of the range (i.e., no expected family contribution to EFCs of \$15,000). Because research has time and again shown that socio-economic variables are positively correlated with measures of academic success -- comparing relatively affluent students (e.g., EFCs of \$15,000) to independent or very needy students (EFCs much less than \$12,000) is clearly less than ideal. However, the goal was to compare metrics of success (e.g., persistence and graduation statistics) of AM students to an adequate sample of those from similar economic circumstances but who also had enough family support to disqualify them from receiving the AM award. This was done to explore the impact of receiving the award versus being ineligible but similarly situated.

Logistic Regression Modeling -- Persistence

While the percentages of particular groups of students who persist or do not persist to a second year of postsecondary education provides valuable insights, the intention of this inquiry was to increase understanding of the particular conditions and elements that most influence persistence and graduation. For that reason, logistic regression modeling was utilized.

Table D1 of Appendix D presents the log-odds ratio for each variable (the first variable in a comparison group (numerator)) when compared to a reference group (the second variable in a comparison group (denominator)). For instance, according to Table D1 the log-odds of persistence for male students (first variable) would be 0.89 times the odds of persistence of female students (second variable). Therefore, male AM students had lower log-odds of persistence when compared to the log-odds of persistence of female students who accepted AM awards. Figure 6 graphically depicts log-odds ratios for variables in Table D1.

The analysis compared students in similar economic situations to assuage self-selection error while controlling for the effects of a host of important conditions (e.g., ethnicity, achievement, economic status, and high school attended) as well as the effects of the federal Pell grant and the Missouri A+ scholarship. The results indicated that the factors that most impacted student persistence were those most closely associated with high school achievement. Table D1 indicates that the log-odds of persistence for students with the highest ACT scores are nearly two times the log-odds of persistence for students who had ACT scores between 13 and 16. While the impact of ACT score on persistence was substantial, high school grade point average (hsgpa) was even more so. Compared to students with the lowest high school grade point averages (i.e., between 0.0 and 1.5), the log-odds of

persistence for students with the highest hsgpa's (i.e., between 3.51 and 4.0) were 3.69 times greater. Moreover, the highest achieving student's log-odds of persistence were about 1.54 times the log-odds of persistence of those who had hsgpa's between 3.01 and 3.50. Results of that type concurred with the large body of literature that suggests high school grade point average is a strong predictor of positive postsecondary outcomes and brightly underscored the important relationship between secondary achievement and postsecondary success.

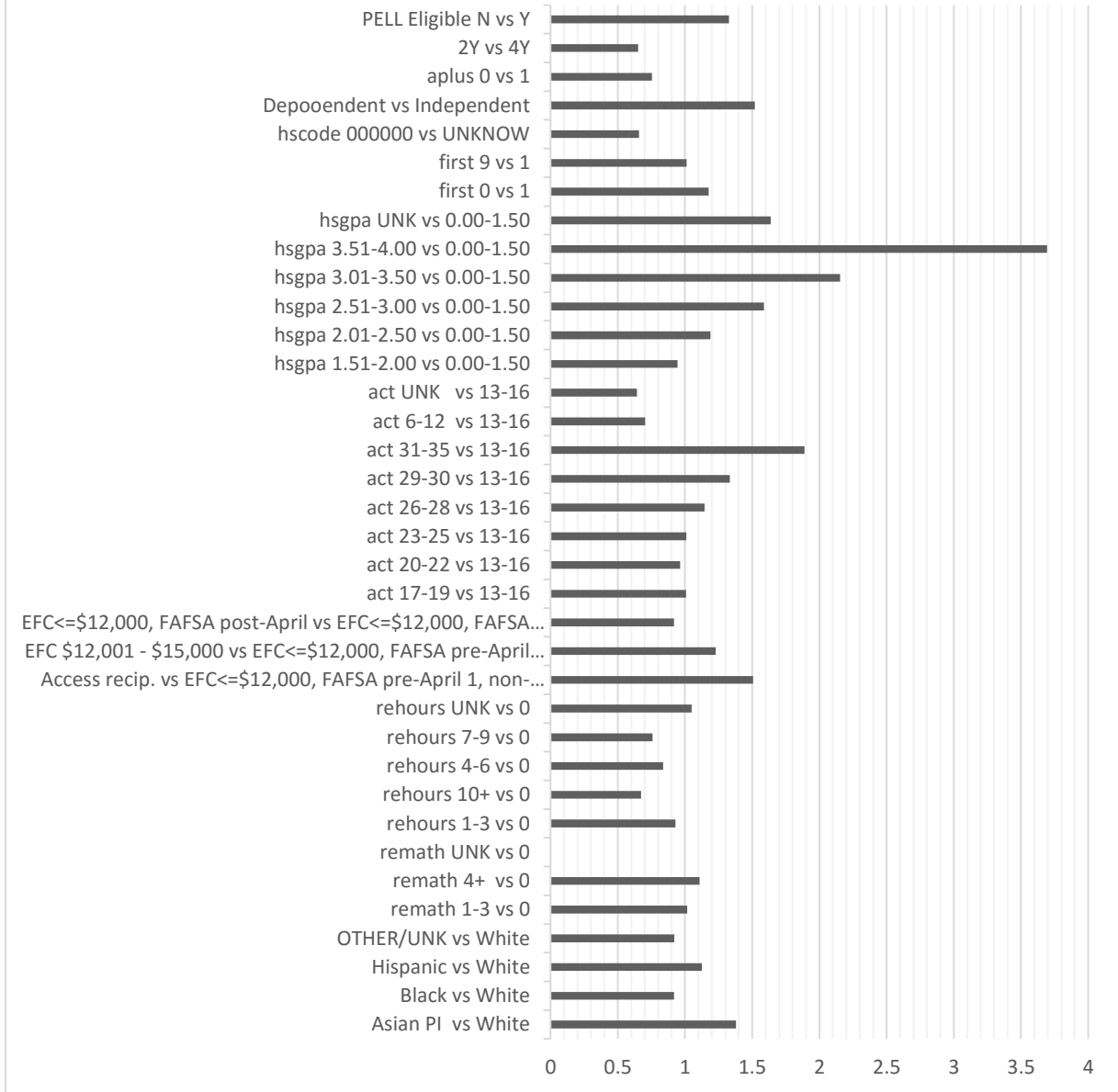
Results of the logistic regression analysis supported the descriptive statistics which suggested AM students in two-year (2Y) institutions had lower persistence percentages than their counterparts in four-year (4Y) colleges and universities. 2Y students' log-odds of persistence were 0.65 times the persistence log-odds of 4Y students. Also, the findings suggested that students who reported they were financially dependent had better persistence log-odds than financially independent students. That result aligned with the finding that the persistence log-odds of students who were ineligible to receive a federal Pell grant were 1.46 times greater than the log-odds of those who received Pell aid. Because socio-economic measures have been closely associated with measures of student success, it followed that more affluent students had better log-odds of persisting. This may be because students who were not burdened with making a living (e.g., dependent students, students who had EFC's in excess of Pell eligibility limits) had more time to dedicate to school as well as the reliable financial support needed to consistently pay tuition and fees.

Access Missouri (AM) impacts persistence positively. The findings suggest that the log-odds of persistence for AM recipients were 1.5 times the persistence log-odds of the closest comparable group (i.e., EFC \leq \$12,000, FAFSA pre-April 1, non-recip.) of students who qualified for the AM award but did not receive it for whatever reason. Confidence in this finding was supported by examining the log-odds ratios of other similar groups of non-recipients. In line with the literature, more affluent AM ineligible students (i.e., EFC \$12,001 - \$15,000) had log-odds ratios that were 1.23 times those of less affluent students (i.e., EFC \leq \$12,000, FAFSA pre-April 1, non-recip.). Additionally, the persistence log-odds of students who were more-or-less equally financially situated (i.e., EFC \leq \$12,000, FAFSA post-April vs EFC \leq \$12,000, FAFSA pre- April 1, non-recip.) were nearly identical. These findings are important

Figure 6

Access Missouri Odds Ratios Two-Year Persistence, A+ Students Removed

Access Missouri Odds Ratio Estimates 2 Year Student Persistence



Access recip. = Access Missouri award recipient, act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, EFC = Expected Family Contribution, first = first generation student, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours UNK = Unknown. NOTE: NOTE: See Appendix J, Table J1 for a more comprehensive demographic description of the data.

because they suggest Access Missouri is indeed improving Missouri’s lowest income students’ log-odds of persistence by helping to remove the most significant barrier to postsecondary educational participation – lack of financial resources (Dynarski, 2004; Zhang & Ness, 2010).

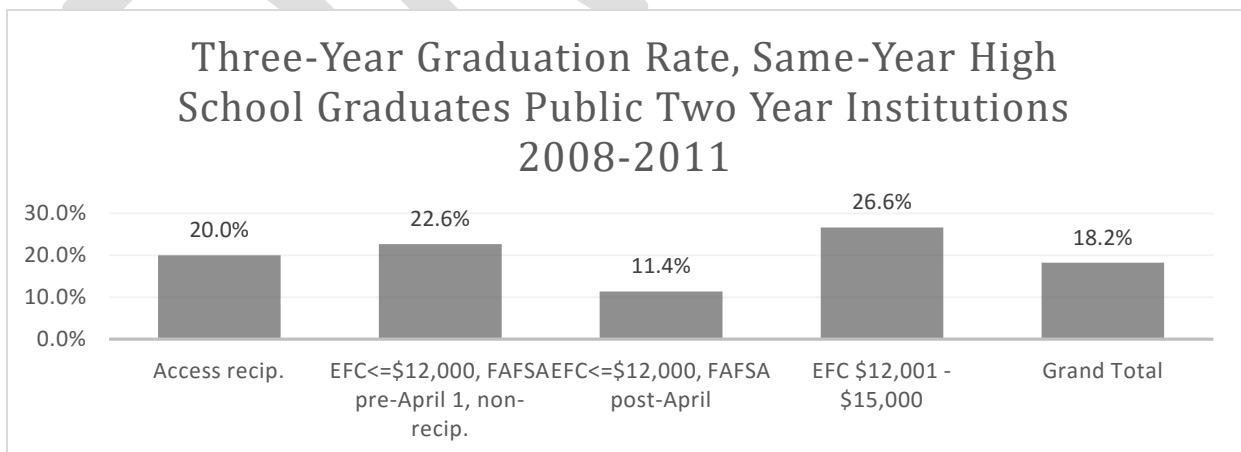
At this time average Access Missouri awards are far below statutory maximums (approximately \$965 in FY14 at public 4Y institutions compared to the \$2,850 statutory maximum, and \$375 of \$1,300 at the community colleges). Because AM appears to improve recipients persistence odds to near those of the more affluent student group when both groups were compared to those who qualified for AM awards but did not receive them -- it seems fair to conclude that AM helps to level the persistence playing field. While further analysis would be needed to explore such a question, this inquiry’s findings suggest that larger awards may result in stronger persistence effects.

Graduation

The Missouri Department of Higher Education (2012) found that AM recipients who attended public community colleges graduated within three years at higher levels than the student population at large (21 percent and 18 percent respectively). Since the 2012 MDHE study, sufficient time has elapsed to examine the six-year graduation rate for the 2008 cohort as well as three-year graduation rates for the 2008, 2009, 2010, and 2011 cohorts.

Figure 7

Three Year Graduation Rate – Public Two Year Institutions 2008-2011



Source: Missouri Department of Higher Education

Figure 7 paints a rather gloomy graduation picture for lower income students at Missouri’s public two-year public institutions. Students in all of the comparable groups had three year graduation rates of less than 30 percent. In other words, less

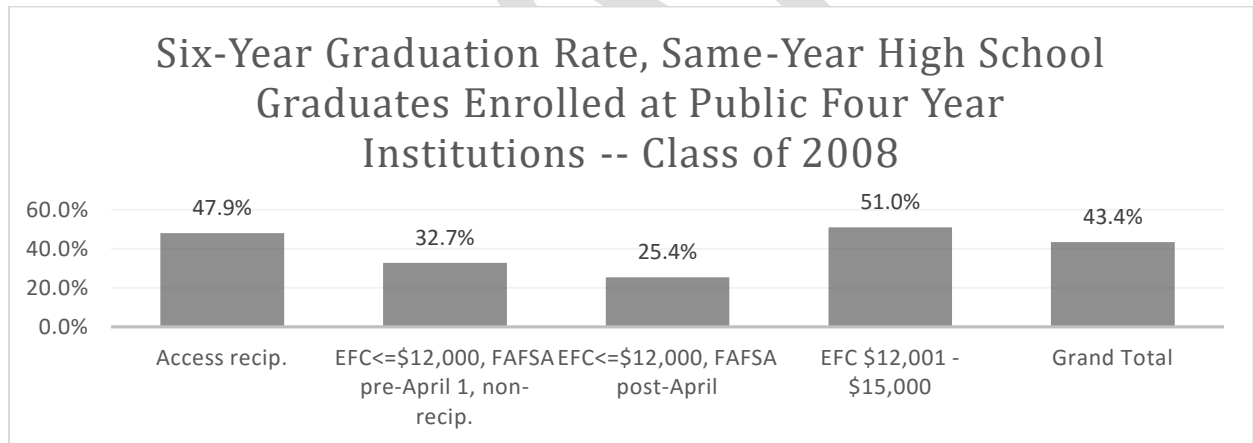
than three in ten lower income students graduated within three years and for most groups that number was closer to just two in ten. Again, and in line with the literature, more affluent students (EFC \$12K to \$15K) had higher graduation rates than any of the other comparable groups and the least affluent group (EFC <= \$12K access non-recip.) had the lowest -- with slightly more than one student in 10 graduating in three years or less.

Graduation rates at four-year (4Y) institutions were better, however only half of the students in the group with the highest rate graduated within six years. While the available data allowed only one six-year cohort to be examined (2008 high school graduates through 2013-2014), the results more-or-less mirrored the 2Y findings.

Figure 8 suggests that AM students graduated at a markedly higher percentages than the closest comparable group of non-recipients (i.e., other pre-April 1, EFC<=\$12,000 non-recip.). Again the most affluent students had the highest graduation rates while the neediest students experienced the lowest.

Figure 8

Six Year Graduation Rate – Public Four Year Institutions



Source: Missouri Department of Higher Education

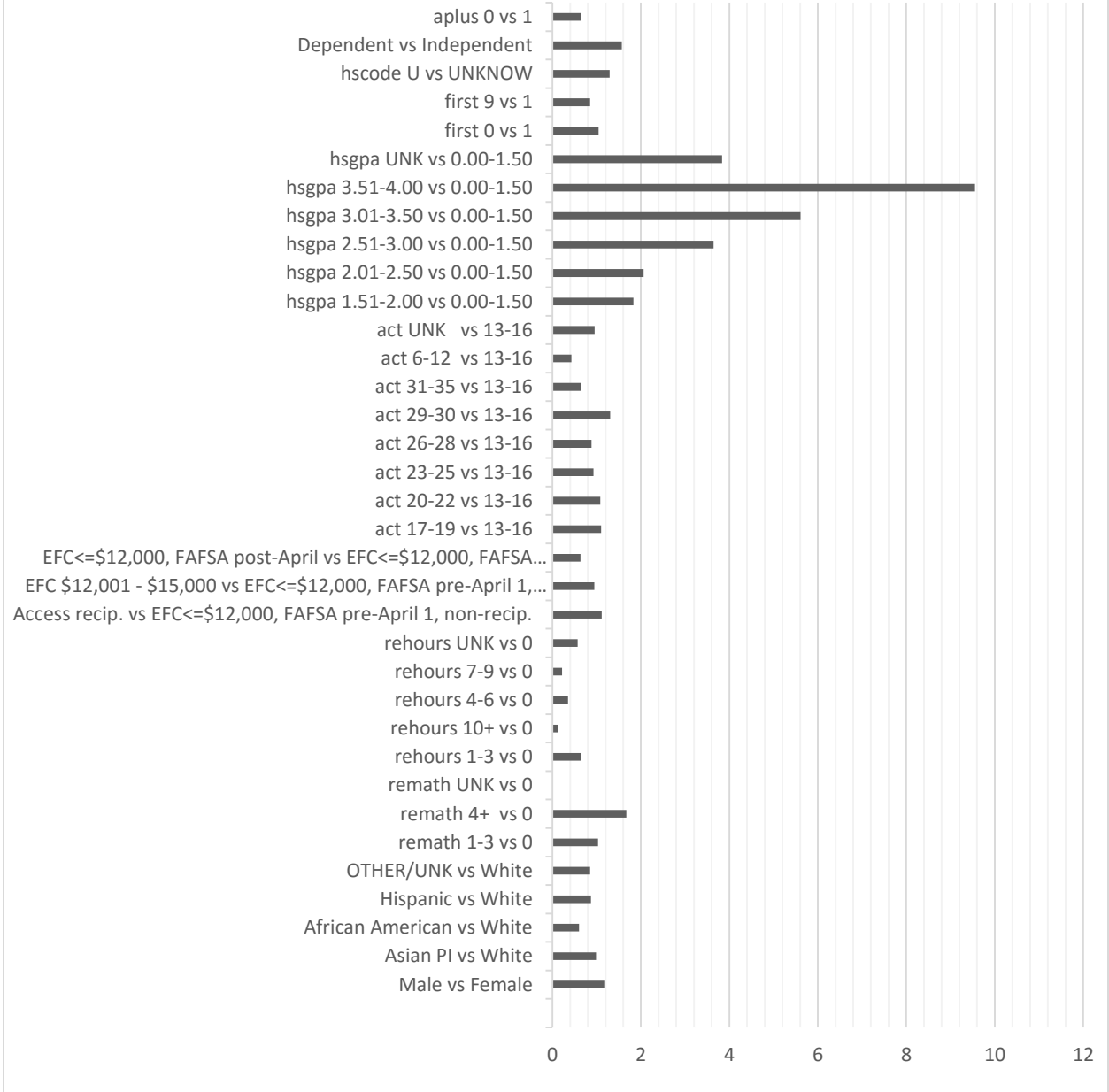
Graduation: Logistic Regression Modeling

Controlling for the same sorts of conditions and elements and considering the same sorts of limitations previously discussed, logistic regression modeling was again utilized to model the dichotomous outcome graduate or not graduate.

Figure 9

Access Missouri Odds Ratios – Two-Year Institution Graduation

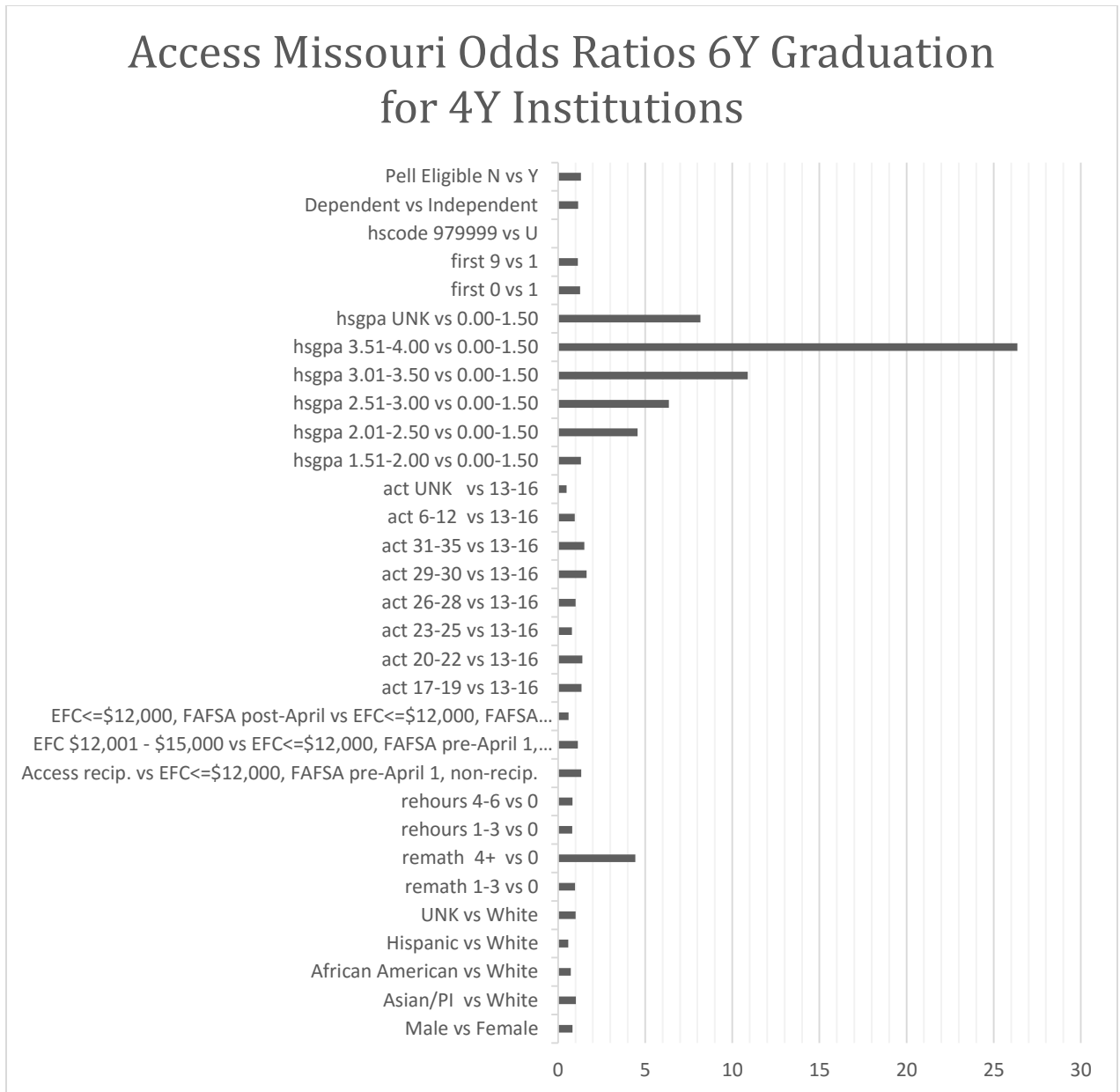
Access Missouri Odds Ratios 3Y Graduation for 2Y Institutions



Access recip. = Access Missouri award recipient, act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, EFC = Expected Family Contribution, first = first generation student, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours UNK = Unknown. See Appendix J, Table J1 for a more comprehensive demographic description of the data.

Figure 10

Access Missouri Odds Ratios – Four-Year Institution Graduation



Access recip. = Access Missouri award recipient, act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, EFC = Expected Family Contribution, first = first generation student, hscode = high school identification code, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours UNK = Unknown. See Appendix J, Table J1 for a more comprehensive demographic description of the data.

Once again, and in line with existing literature, the results suggested (see Tables E1 and E2 of Appendix E) that among the variables examined, nothing impacts postsecondary graduation more than high achievement at the secondary school

level. For two-year (2Y) institutions, Figure 9 indicates that compared to the lowest achieving students (i.e., student group with hsgpa's between 0.0 and 1.5), the highest achieving students (i.e., students with hsgpa's between 3.51 and 4.0) odds of persistence were more and 9.5 times greater. That multiplier was greater than 26 for the single 4Y cohort examined (see Figure 10 and Appendix E, Table E2). Other significant graduation predictors mirrored the predictors of persistence. Generally, students had better odds of graduation within six-years if they were more, rather than less affluent, dependent vs. independent, ineligible to receive Pell assistance, placed in fewer hours of remedial coursework, and scored higher on the ACT.

While controlling for a host of significant socioeconomic conditions including the Missouri A+ scholarship and federal Pell program, the results suggest that 2Y AM recipients odds of graduation were only 1.12 times those of the closest comparable group of students who did not receive the award (i.e., EFC≤\$12,000, FAFSA pre-April 1, non-recip.). Further, the graduation odds of AM recipients were only slightly lower (0.95) than the more affluent student group (EFC \$12,001 - \$15,000).

The impact of Access was larger in the four-year sector. Access Missouri (AM) recipients odds of graduation within six years were 1.32 times those of the closest comparable student group that did not receive the award (i.e., EFC≤\$12,000, FAFSA pre-April 1, non-recip.). This was nearly the same result observed (1.28) when the more affluent group (EFC \$12,001 - \$15,000) was compared to the group of students who were financially qualified and filed the FAFSA on time, but did not receive the award (i.e., EFC≤\$12,000, FAFSA pre-April 1, non-recip.). That outcome strongly suggests that the AM award can help “even the odds” so to speak because students who received the AM award were nearly as likely as the more affluent group of students (i.e., EFC \$12,001 - \$15,000) to graduate within a six year period of time. With that in mind it appears that AM is performing as intended. AM lowers the financial barrier to college attendance for needy students to the extent that their odds of graduation become nearly equal to students with better financial resources/support.

Because Access Missouri was found to increase the odds of persistence and graduation for Missouri's neediest students it is fair to say the program benefits those it was designed to help. However, because AM awards have been substantially lower than statutory maximums (approximately \$965 in FY14 at public 4Y institutions compared to the \$2,850 statutory maximum, and \$375 of \$1,300 at the community colleges (Missouri Coordinating Board for Higher Education, 2015)) the findings suggest that richer awards could strengthen the program's impact on persistence and graduation. These are certainly opportunities for future research.

Conclusions

Access Missouri was designed to increase access to higher education for very low income students and because it provides a relatively stable source of financial support, it certainly ameliorates financial need -- a significant barrier to postsecondary participation. This support may be contributing to enrollment trends that imply the program has increased access to postsecondary education for students with acute financial needs.

When examined using lenses provided by Hossler and Gallagher's (1987) model of student choice and Tierney and Hagedorn's (2002) effective and efficient program measures, substantial shortcomings come to light. AM appears to have minimal impact on student choice and further because AM explicitly addresses only one of Tierney and Hagedorn's (2002) effective and efficient program measure (i.e., stable financial support) it fails to positively impact school improvement or influence the augmentation of student cultural capital.

This inquiry has suggested that those who received AM awards had log-odds of persistence that were about 1.5 times those of a group of similarly situated students who qualified for the award but did not receive or choose to utilize it. The completion picture for Access students in Missouri's two-year public institutions was discouraging but in line with national statistics. Notwithstanding student transfer from two-year to four-year institutions -- which almost certainly depresses two-year sector persistence and graduation statistics -- students in all comparison groups had three-year graduation percentages of less than 30 percent and for most groups that number was closer to just two in ten. The findings also suggested that Access recipients in 2Y institutions had only slightly higher log-odds of graduation (1.12 times) than the closest comparable group of students who did not receive the award, and had marginally lower odds of graduation (0.95) than the slightly more affluent student group.

In line with national statistics, graduation rates at four-year (4Y) institutions were better, however only half of the students in the group with the highest rate of graduation completed within six years. Access Missouri (AM) recipients graduated at a markedly higher percentage rate than the most similar group of students who did not receive the award (i.e., 48% and 33% respectively). Logistic regression analysis results suggested that AM recipients at four-year (4Y) institutions had log-odds of graduation within six years that were 1.32 times those of students in the closest comparable group of non-recipients. Furthermore, AM awards seemed to help "even the playing field" because students who received the award were nearly as likely as students from more affluent backgrounds to graduate within six years. Students were also more likely to complete if they were more, rather than less affluent; dependent vs. independent; ineligible to receive Pell assistance; placed in fewer hours of remedial coursework; and scored higher on the ACT.

Recommendations

Theory strongly suggests that the effectiveness of Access Missouri might be improved if the program were modified to include, for example, elements that improve schools and increase student levels of cultural capital. As is, AM lacks an early high school career program commitment component (e.g., a signature pledge to graduate, promise to complete a rigorous program of study) that research indicates improves program awareness (Perna, Rowan-Kenyon, Bell, Thomas, & Li, 2008). For that reason, it is fair to believe that many AM recipients may not become aware that the program exists until shortly before the deadline to apply. The literature indicates that lack of awareness limits postsecondary options, and more importantly time to prepare for those options.

Theory also suggests that AM could become more effective by including mechanisms that encourage student achievement, parental involvement, and the establishment of ties to postsecondary institutions and mentors. Further, AM might be modified to encourage schools to offer improved programs and curriculums to better prepare students for multiple postsecondary opportunities (Tierney & Hagedorn, 2002). Changes such as these might ensure that students -- especially those who may believe that they are less than capable of pursuing higher education -- graduate high school with the *academic and personal* skills needed to succeed in a variety of postsecondary settings.

At present, Access Missouri features only one *explicit* design element of effective and efficient programs -- stable financial support (Tierney & Hagedorn, 2002) and the "stability" of that support is questionable. Average AM awards are far below statutory maximums (approximately \$965 in FY14 at public 4Y institutions compared to the \$2,850 statutory maximum, and \$375 of \$1,300 at the community colleges). Nonetheless, the program was found to increase the log-odds of persistence and graduation for Missouri's neediest students. Therefore, it is logical to believe that the impact of the program could be improved if the awards were richer -- an interesting question for future research.

DRAFT

The Missouri A+ Schools Program

THE MISSOURI A+ SCHOOLS PROGRAM

The Outstanding Schools Act of 1993 (Senate Bill 380) established the Missouri A + Schools Program (A+). Since its creation, A+ has had no financial eligibility requirements, it is therefore classified as a merit-based program. From the beginning A+ was designed to be much more than the typical one dimensional financial aid program targeting only financial barriers to college access. Instead the Outstanding Schools Act established a two pronged approach for improving schools *and* enriching students while at the same time powerfully addressing financial barriers by promising a near free ride if students choose two-year institutions.

Prong one requires high schools to attain A+ designation which allows their graduates to be eligible for scholarship awards. To be certified, Department of Elementary and Secondary Education (DESE) must confirm that schools have satisfied 11 requirements. Five requirements address reform, revision, and redesign of school performance standards, teacher education/professional development programs, curriculums, and student assessment methods. Two requirements address early academic intervention and mentoring for high school graduates who directly enter the work force. Three community service requirements specify that students must participate in apprenticeships, internships, and school-community relationships/partnerships. Finally, to ensure that the program is properly implemented and administered, DESE also requires that schools designate a program coordinator (Missouri General Assembly, 2009).

The second prong of A+ is designed to enrich students by increasing their human capital levels. For students to become eligible to receive A+ awards they must first attend an A+ designated high school for 3 consecutive years immediately prior to graduation; maintain a 2.5 grade point average between grades 9 and 12, attend school regularly (95 percent of the time or more); volunteer for 50 -- A+ program coordinator supervised and approved -- hours of tutoring and/or mentoring; and remain alcohol and drug free as a demonstration of good citizenship (Department of Elementary & Secondary Education, 2009). These measures were designed to ensure that all students (especially those who may believe that they are not cut-out for higher education) can graduate high school with the *academic and personal* skills needed to succeed in a variety of postsecondary settings (Department of Elementary & Secondary Education, 2009).

At this point, nearly every Missouri high school is an A+ school. However, MDHE believes A+ participation will continue to grow due to program popularity and because it will take time for lately certified high schools to develop the program capacity that will lead to significant numbers of students meeting the eligibility requirements (Missouri Coordinating Board for Higher Education, 2015).

FY16 appropriations include two-million additional dollars. However, MDHE reports it is too early to determine whether the program will be fully funded for FY16 (Missouri Coordinating Board for Higher Education, 2015). During the 2014 -2015 fiscal year, 13,000 students benefitted from A+ at a cost of more than 32 million dollars (Department of Higher Education, 2014).

Missouri A+: Hossler and Gallagher’s Model of Student Choice

Hossler and Gallagher’s (1987) model of student choice suggests that students’ decisions to pursue postsecondary education consists of three distinct stages: predisposition, search, and choice.

Predisposition

Table 1, page 34 indicates A+ impacts all three choice stages. Because becoming eligible for A+ awards can only be accomplished over the span of the entire high school experience, A+ encourages early postsecondary education awareness, contemplation, consideration, and commitment. Heller (2006) suggests that when students commit to postsecondary education early in their high school careers (as A+ requires), those years are often used to enhance personal levels of eligibility and preparedness. Furthermore, the program’s focus on improving school quality may ultimately instill aspirations of higher educational attainment in students. This may be so because, as Cabrera and La Nasa (2001) observed, better curriculums and increased rigor result in improved opportunities for students to meet college eligibility requirements.

We may expect increases in high school graduation and postsecondary enrollment rates when students attend high schools that well prepare them for postsecondary success. Using the same line of reason, we may also expect decreases in negative statistics such as dropout rates. Those assertions are supported by research indicating that program design elements which bolster student capacity to improve themselves -- while at the same time improving awareness of postsecondary benefits and opportunities. Self-improvement elements are particularly beneficial for students with low levels of cultural capital (Perna & Titus, 2005).

Search

It is reasonable to suspect that multiple A+ elements assist students during search. For example, the early intervention design aspects of A+ (e.g., academically improved schools, strong relationships with postsecondary institutions) logically inform and influence which postsecondary options students think about. Requiring that students’ commit -- very early in their high school careers -- to a course of action designed to prepare them for postsecondary success may encourage them to attain

and maintain sufficient levels of academic achievement. That assertion is supported by research.

De La Rosa (2006) found that adequate time to prepare, in conjunction with access to sufficient resources, increases the likelihood that students will become academically capable and eligible to attend college. Logically, the program's cultural capital augmenting elements (e.g., mentoring and advising, community service) create opportunities for students to make more informed decisions about postsecondary options. Furthermore, it seems obvious that the required parent/school partnerships serve to increase parental capacity to give advice about postsecondary possibilities. This is an important program feature because as Cabrera and La Nasa (2001) observed, parents who are postsecondary savvy have students who are also postsecondary savvy -- especially regarding potential institutions and sources of financial aid.

Choice

The A+ School Program's goals of improving students' cultural capital, academic preparation, and knowledge of postsecondary options should, at least in theory, provide the requisite information for students to formulate better postsecondary choices. However, research suggests that increasing students' capacities in those areas may also have an unintended but interesting consequence. Because A+ awards are in fact grants, students have no repayment obligations. Further, A+ awards must be used to attend approved two-year programs in Missouri. In combination those circumstances have caused scholars to hypothesize that A+ may be driving students to enroll in programs where the grant can be used (i.e., two-year institutions). There is evidence to support that supposition.

Research suggests that scholarship programs like A+ may be discouraging some students from choosing four-year institutions (Terenzini, Cabrera, & Bernal, 2001; Tierney & Venegas, 2009). Muñoz, Harrington, Curs, and Ehlert (under review) found that students who graduated from A+ schools had overall college going rates that increased by 1.5 percentage points. However, the researchers also found that two-year college-going rates increased by 5.3 percentage points while four-year college-going rates decreased by 3.8 percentage points. These findings strongly suggest that A+ has increased enrollment at two-year institutions at the expense of four-year colleges and universities.

Theory suggests that multiple A+ elements significantly impact all three of Hossler and Gallagher's (1987) stages of college choice. In addition and in accordance with Tierney and Hagedorn (2002), A+ features multiple elements that emphasize academics and parental involvement, strong connections with postsecondary

institutions, stable financial support, student postsecondary preparedness, and early intervention. Unlike the majority of postsecondary access programs that target the most common enrollment obstacle (i.e., financial need), A+ features a host of approaches designed to target multiple enrollment barriers, thus making A+ an effective postsecondary enrollment program (see Table 1). This multi-pronged approach is likely what has made, and continues to make, the Missouri A+ Schools Program both popular and successful.

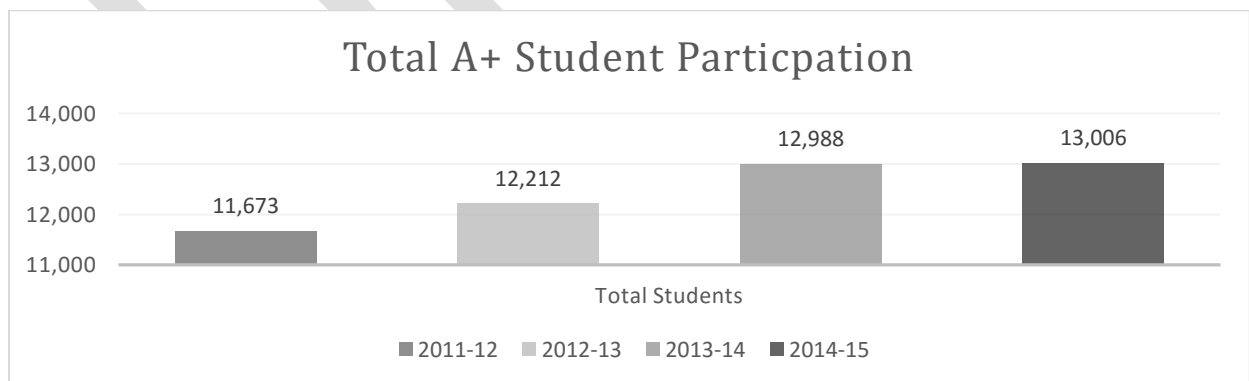
Access

Missouri’s A+ program increases access – at least in the sense that rigorous empirical research efforts have found that it increases overall college going rates (Muñoz, Harrington, Curs, & Ehlert, under review). Moreover, the tremendous growth of the program provides anecdotal evidence that A+ has increased student access to postsecondary educational opportunities.

At inception, the Missouri Department of Elementary and Secondary Education (DESE) designated 26 A+ high schools in 1997 and in doing so, 433 students became eligible to receive reimbursement payments. Since then, the number of high schools that have attained A+ designation has exploded. During a particularly notable growth period, 11,031 high school graduates were eligible to benefit from A+ in 2006 -- by 2010 that number grew to 17,879 (Muñoz, Harrington, Curs, & Ehlert, under review). The Missouri Department of Higher Education (MDHE) assumed administration of A+ from DESE in FY11.

Figure 11

Total Student A+ Participation by Fiscal Year



Source: Missouri Department of Higher Education

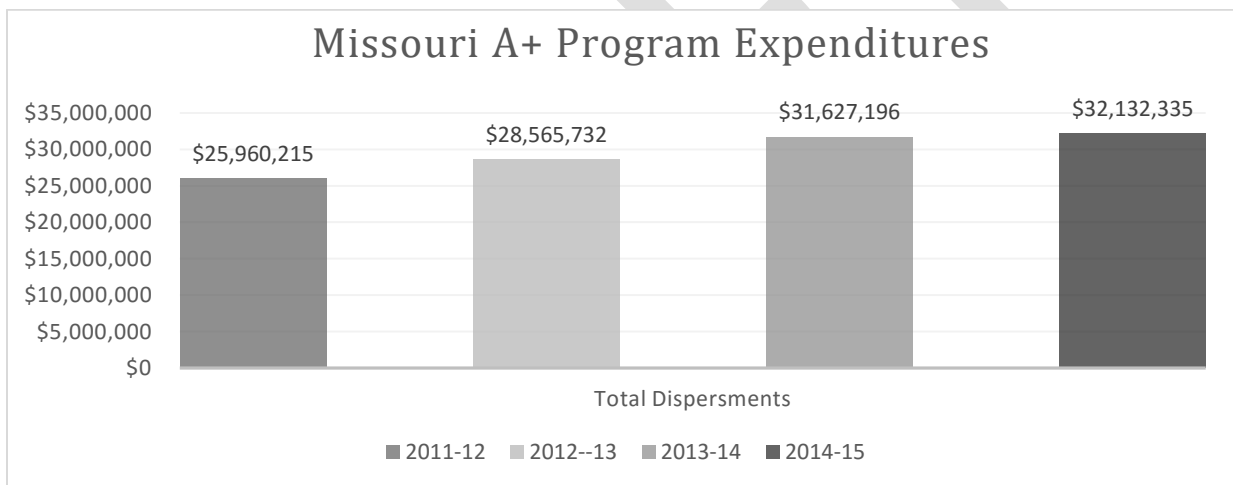
Data for Figure 11 comes from MDHE. It indicates that student participation has increased significantly from 11,673 students during the 2011-2012 school year to 13,006 students during the 2014-2015 school year. Late figures suggest that of the

623 public and public charter high schools in Missouri, 533 are now A+ designated (Missouri Department of Elementary and Secondary Education, nd).

Figure 12 depicts A+ expenditures since MDHE assumed administration. From a low of nearly 26 million dollars in FY11, expenditures have since increased steadily to a high of more than 32 million dollars. Figures from the Missouri Department of Higher Education indicate 83 percent of total A+ expenditures and 90 percent of A+ recipients attend Missouri community colleges. Linn State/State Technical College account for 11 percent of A+ expenditures and five percent of recipients. Approximately four percent of A+ expenditures go to the three percent of A+ students who attend area career centers, and Missouri State University at West Plains captures two percent of A+ recipients and expenditures.

Figure 12

A+ Expenditures by Fiscal Year



Source: Missouri Department of Higher Education

As was explained previously in the Access Missouri section of this paper, accurately describing the impact of the A+ scholarship on student access -- as strictly defined -- is complicated and beyond the scope of this particular report. However a late, well designed, empirical research effort examined the effect of the A+ Schools Program on college-going rates. Muñoz, Harrington, Curs, and Ehlert (under review) used school-level administrative data provided by DESE as well as data from the National Center for Education Statistics, and the Common Core of Data to control for school-level demographic data (e.g., number of students, percentage of free and reduced lunch, percent of minority student enrollment), and took advantage of the fact that Missouri high schools implemented the A+ program at different times. This allowed a quasi-experimental research design (i.e., comparative interrupted time-series (CITS)). The CITS design was used to estimate the effect of A+ as the deviation of

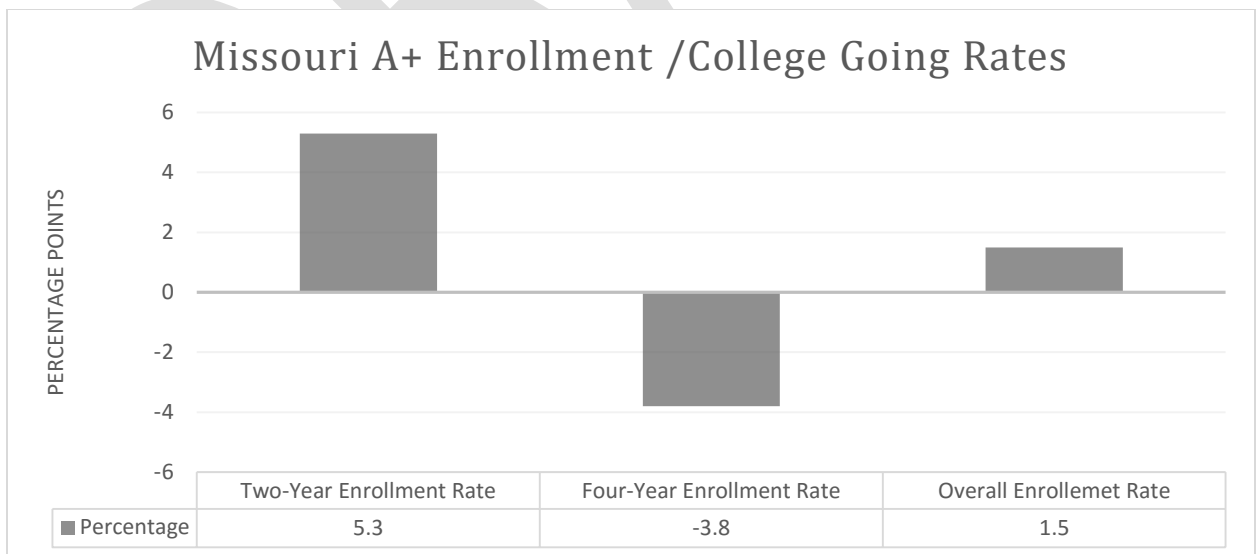
the observed outcome from a predicted outcome based on the observed outcome trend in previous periods. These deviations were then compared to a group that was not affected by the policy change (i.e., schools who did not implement the program). The researchers examined data from approximately 500 high schools in Missouri for each year in an eighteen-year period to determine whether the college-going rates were altered in response to A+ incentives.

To properly understand the results, it is important to explain that the researchers estimated the effects of the introduction of the A+ program *in high schools* on its students' postsecondary enrollment rates. In other words, the analysis took place at the school level -- so it did not distinguish between whether students participated or did not participate in the A+ program. The results are therefore not an average treatment effect of the program's effects on individual students. Rather it is correct to think of the results as an average *intent to treat effect* of the A+ Schools Program.

Muñoz et al. (under review) found that A+ increased the number of Missouri high school graduates who choose to pursue postsecondary education. Based on an overall college attendance rate of 55.8 percent for non-A+ schools in the first year, A+ designation was found to increase overall postsecondary enrollment by 1.5 percentage points (see Figure 13). On closer inspection however, very different effects were observed when looking at different types of institutions.

Figure 13

Missouri A+ Enrollment College Going Effects



Source: Muñoz et al. (under review)

The Missouri A+ Schools Program has been very good for two-year institutions. When schools attained A+ status, their two-year postsecondary enrollment rate

increased 5.3 percentage points -- more than three times greater than the rate of overall postsecondary enrollment (i.e., 1.5 percent). Based on an average two-year college going rate of 16.8 percent, the 5.3 percentage point increase in the number of students enrolling in 2-year colleges translated to a 31.5 percent increase in that rate -- a very substantial increase.

On the other hand, the news was not so good for four-year institutions. Muñoz et al. found that when schools became A+ designated they experienced a *decrease* in the four-year enrollment rate of 3.8 percentage points. So based on a 39 percent average enrollment rate -- the four-year college-going rate suffered a 9.7 percent decline. This led Muñoz et al. to conclude that A+ incentives are strong enough to encourage two-year college enrollment at the expense of four-year institutions. Other research efforts support such a conclusion.

In a study conducted in Ohio, Long and Kurlaender (2009) found that when students begin their postsecondary careers at two-year institutions (as A+ strongly encourages many students to do) the likelihood of them completing a bachelor's degree is decreased by 14.5 percent when compared to students who started at four-year institutions. This suggests that if A+ is motivating students to attend two-year programs -- when they would have pursued bachelor's degrees at a four-year institutions -- it may also be decreasing levels of personal educational attainment. On the other hand, the findings also indicate that two-year enrollment increases greatly offset the four-year decreases. This may be positive for a few reasons. First, because the A+ grant can only be used at Missouri institutions, the program creates a strong incentive for high school graduates -- and potential college graduates -- to stay in Missouri (Zhang & Ness, 2010). Secondly, A+ may improve access by offering students, especially low-income students with no or nearly no intentions of participating in higher educational opportunities, two years of education at nearly no cost. Thirdly, even while A+ may lower average levels of personal educational attainment by increasing two-year enrollment and diverting capable students from bachelor degree programs -- it increases the overall numbers of students participating in postsecondary education. Larger numbers of students accessing postsecondary opportunities should create a population with higher levels of human capital. That is a desirable situation because research suggests that populations with higher levels of human capital benefit communities through decreased rates of unemployment and increased wages, tax revenue, and economic productivity (Trostel, 2009).

Theory suggests that students who attend A+ schools are enriched by improved curriculums, educational supports, and community resources and relationships. In concurrence with recent scholarship, Muñoz, Harrington, Curs, and Ehlert (under review) demonstrate that when students have access to programs and elements that

increase personal capital and academic preparation (i.e., Cabrera & La Nasa, 2001; Engberg & Wolniak, 2010; Perna & Titus, 2005) postsecondary educational opportunities and thus access is expanded.

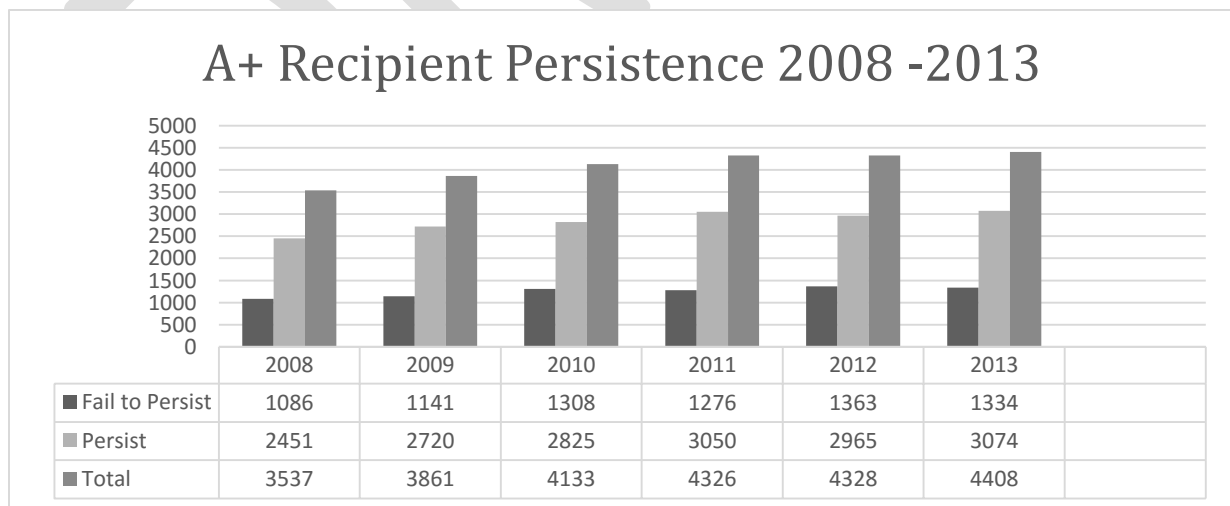
Persistence

A 2012 MDHE report prepared for the Governor, suggested that the Missouri A + Schools Program recipients persist at rates consistently higher than non-eligible FTFTDS students (Missouri Department of Higher Education, 2012). For example, MDHE observed that in 2008 more than 72 percent of the A+ eligible students enrolled in community colleges were subsequently enrolled in the following academic year. Conversely, only 56 percent of non-eligible students were found in their community colleges a year after initial enrollment. Interestingly, the MDHE study indicated mixed results for students who actually received A+ awards.

Students who received A+ payments persisted at rates exceeding the rate for A+ eligible community college students not receiving an award in some years while no significant difference was observed in other years (Missouri Department of Higher Education, 2012). Examining additional cohorts (i.e., 2008, 2009, 2010, 2011, 2012, and 2013) revealed that A+ recipients persist at much higher percentages than they fail to persist. Generally, Figure 14 indicates that in each year, roughly 70 percent of FTFTDS A+ recipients were reenrolled in two-year (2Y) institutions after their initial year.

Figure 14

A+ Recipient Persistence 2008-2013

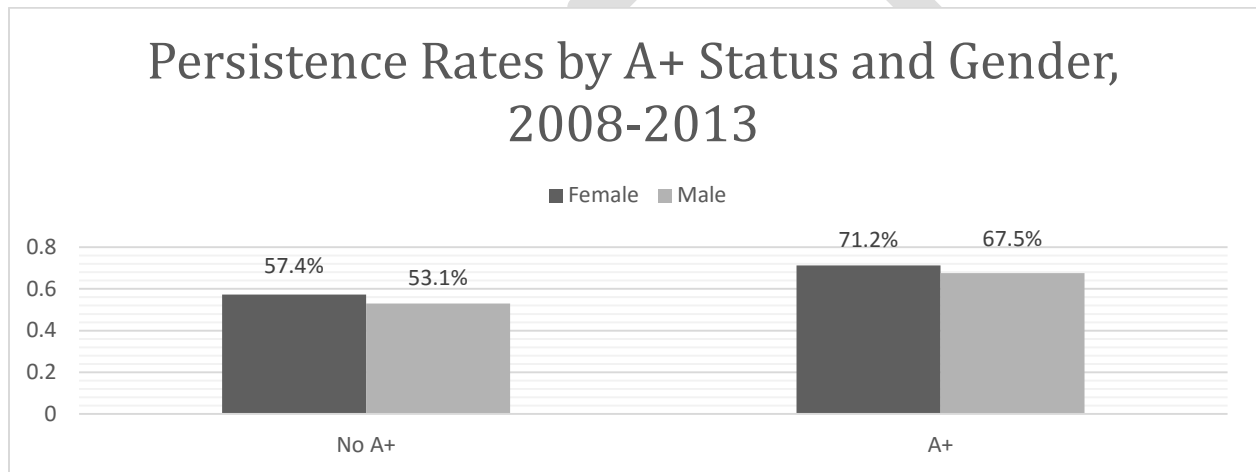


Source: Missouri Department of Higher Education

Comparing A+ recipients (N = 24,593) to students who did not receive the award (N = 38,150) during the 2008-2013 period revealed that A+ recipients persisted at rates nearly 14 percent higher. That percentage was nearly identical for male (14.4%) and female (13.8%) students (see Figure 15). Figure 16 indicates that A+ recipients persist at greater rates regardless of race/ethnicity. That is not to say that some groups weren't much more impacted than others. African American students who received A+ payments persisted at rates nearly 25 percent higher than African American students who did not receive awards. The same was true for White (13% higher for recipients than for non-recipients) and Hispanic students (9% higher for recipients than for non-recipients).

Figure 15

A+ Persistence by Gender

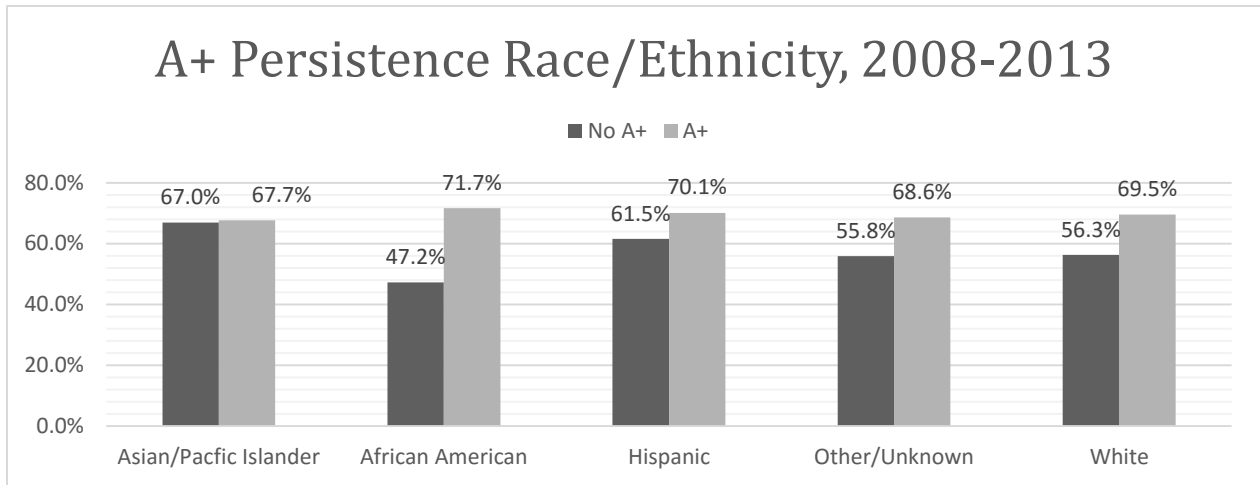


Source: Missouri Department of Higher Education. FTFTDS students enrolled in Missouri public postsecondary institutions 2008-2013. Female N = 33,677, Male N = 29,058.

A+ award recipients who identified as Asian/Pacific Islander persisted at higher rates as well, however the difference between recipients and non-recipients was extremely narrow (less than 1%). Results like those were particularly interesting because the groups seemed to exhibit persistence benefits that were inversely related to achievement. In other words, ethnic groups that traditionally achieve at higher levels exhibited smaller gaps in persistence between those who received A+ awards and those who did not and visa-versa. That pattern appears to validate program design elements that were specifically intended to increase the capacity of students to improve themselves -- particularly those with lower levels of cultural capital (Perna & Titus, 2005). This is certainly an interesting and possibly fruitful area for further research because identifying and isolating specific A+ program elements that most impact traditionally low achieving student groups may have potential for narrowing achievement gaps – an area of intense interest.

Figure 16

A+ Persistence Race/Ethnicity



Source: Missouri Department of Higher Education. FTFTDS students enrolled in Missouri public postsecondary institutions 2008-2013. Asian/Pacific Islander (N = 1063), African American (N = 5,437), Hispanic students (N = 1,416), Other/Unknown (N = 6,996), White (N = 47,831)

Logistic Regression Modeling

To increase understanding of the particular conditions and elements that most influence persistence and graduation, logistic regression modeling was utilized. Logistic regression software routines calculate the probability of success over the probability of failure, so the results of the analysis are in the form of a logarithmic odds ratio (i.e., log-odds). Results provide knowledge of the relationships and strengths among the variables (e.g., having a high grade point average in high school increases the log-odds of persistence when compared to earning a lower grade point average). A more thorough explanation of logistic regression is provided in Appendices B and C.

As was the case when examining the Access Missouri program, a persistence log-odds ratio describes the log-odds of persisting for the group of interest divided by some reference group's log-odds of persistence. For example, let us say we are interested in the relationship between the odds of persistence of A+ students who had high school grade point averages (hsgpa) of between 2.01 and 2.5 and the odds of persistence of those who had hsgpa's of between 0.0 and 1.5. The log-odds ratio that would describe that relationship would be the odds of persistence of those with an hsgpa of between 2.01 and 2.5 divided by the odds of persistence of those who earned an hsgpa of 0.0 to 1.5. According to Table F1 in Appendix F, that log-odds ratio is 1.12. Therefore, the log-odds of persisting to a second year of college are

1.12 times greater for students with grade point averages of between 2.01 and 2.5 than those with averages between 0.0 and 1.5.

Limitations

While the findings of this inquiry suggest that the Missouri A+ Schools Program has substantial positive impacts, the results should be considered in light of design and data limitations. Steps were taken to diminish bias introduced by student self-selection (i.e., creation of similar student comparison groups) and to control for as many socioeconomic conditions/situations as possible (e.g., student demographics, academic ability, economic background, school attended) in the logistic regression models. However, the possibility of bias not associated with the model error terms is a distinct possibility.

Completely controlling for the situations, conditions, intentions, and motivations that impact student choices (e.g., institutional choice based on cost rather than best fit for interests and talents, decision to attend a Missouri two-year institution as opposed to enrolling in a four-year college or university) is not possible. This is so because variables to capture every possible aspect of those decisions did not exist in the data. Therefore error due to omitted variable bias is nearly certain and the findings should be regarded as best estimates.

Another limitation is error caused by inaccurate data. Students often self-report ACT and FAFSA application information from which data for the inquiry has been gathered. This poses a problem because students may misinterpret questions or answer with best guess estimates due to the fact that they may not be aware of -- for example -- household income levels or their exact high school grade point averages. For those reasons and others, the data almost certainly contains erroneous information which impacts the findings.

Control variables were utilized when they existed to describe the impact of other financial aid/scholarship programs (e.g., Access Missouri, Pell). However the data did not contain variables for every financial aid source that a student may have had or was offered (e.g., athletic scholarships, other Missouri financial aid awards, out-of-state aid offers, scholarships from private entities, etc.). The non-existence of variables to control for every possible choice faced by students also introduced the potential for omitted variable bias. As was the case in the analysis of Access Missouri, the availability of real and/or potential financial aid/awards almost certainly impacts the postsecondary decisions of students.

Logistic Regression Modeling -- Persistence

While the descriptive statistics strongly imply that A+ positively impacts student persistence, logistic regression modeling was utilized to provide a more in depth

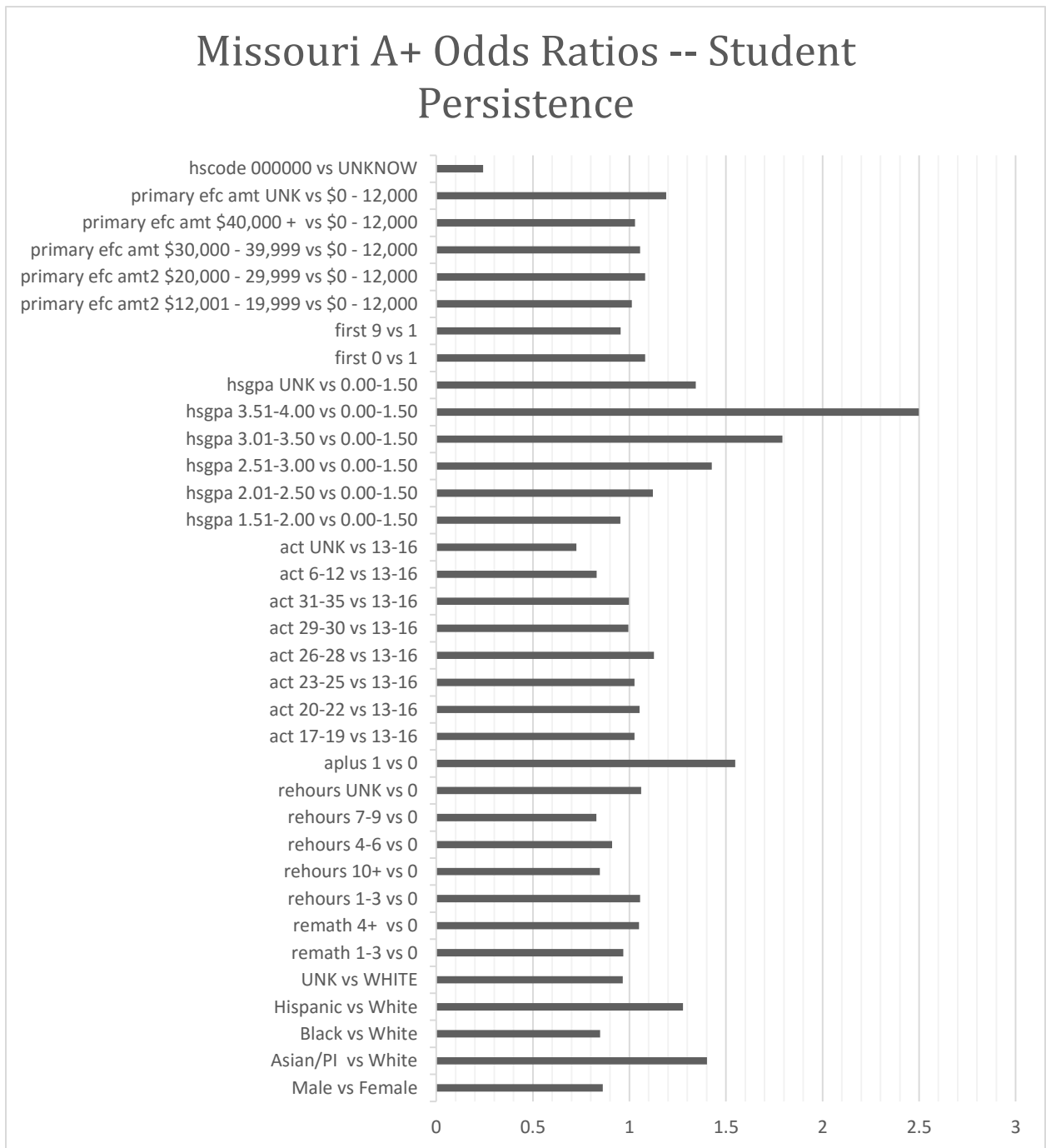
understanding of the degree to which A+ impacts persistence in relation to other important variables. Using data provided by the Missouri Department of Higher Education (MDHE), 2008 through 2013 Missouri public high school graduates were examined. To be included in the analysis, the students must have enrolled in a Missouri public two-year institution in the fall immediately following graduation. First-time full-time degree-seeking (FTFTDS) students were selected so that gaps in enrollment or time spent pursuing other postsecondary interests wouldn't complicate persistence performance (N = 62,743). See Appendix J, Table J2 for a comprehensive demographic description of the data.

Figure 17 indicates that while controlling for important conditions (e.g., socio-economic status, hours of remediation, student achievement, high school attended), high school achievement as measured by high school grade point average (hsgpa) most influenced persistence. Students with the highest hsgpa's (i.e., 3.51-4.0) had log-odds of persistence that were 2.5 times those of the lowest achieving students (i.e., 0.00-1.50). Further, the highest achieving students' log-odds of persistence were about 1.70 times those of the next highest achieving group (i.e., hsgpa's between 3.01 and 3.50). The results mirrored the Access Missouri 2Y and 4Y persistence findings and concurred with previous research that has found achievement during students' high school careers to be a very strong predictor of postsecondary success measures.

While other variables positively influenced the log-odds of persistence to a second year (e.g., higher ACT scores, being from a more affluent family) none besides high school grade point average impacted persistence so much as being an A+ student. Appendix F, Table F1 indicates that while controlling for the effects of a host of important variables, the log-odds of persistence of students who received A+ awards were 1.51 times those who did not receive awards. Therefore, it is fair to suspect that the design features (e.g., improved curriculums, educational supports, access to community resources and relationships) of the Missouri A+ Schools program enrich students to the extent that their postsecondary persistence statistics are positively impacted.

Figure 17

Missouri A+ Odds Ratios -- Persistence



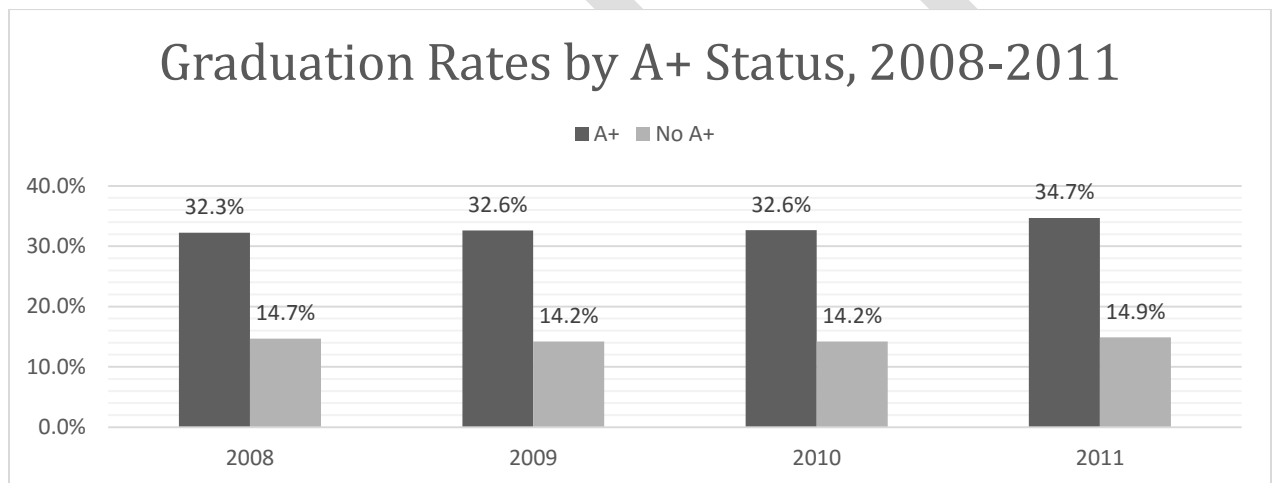
NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hscode = high school identification code, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 62,743. See Appendix J, Tables J2 and J3 for a comprehensive demographic description of the data.

Graduation

The Missouri Department of Higher Education (MDHE) (2012) found that students who were eligible for A+ awards and who attended public community colleges graduated at higher rates than the at-large FTFTDS student population. The report indicated about 30 percent of A+ eligible students were completers (i.e., students who completed a certificate or degree program within three years) while 19 percent of all students accomplished the same task. Since the MDHE study, sufficient time has elapsed to examine the three-year graduation rates for the 2008, 2009, 2010, and 2011 Missouri A+ cohorts (N = 15,857, see Appendix J, Table J4 for more detailed data description).

Figure 18

A+ Graduation Rates 2008 - 2011



Source: Missouri Department of Higher Education. 2008 (N = 3,537), 2009 (N = 3,861), 2010 (N = 4,133), 2011 (N = 4,326)

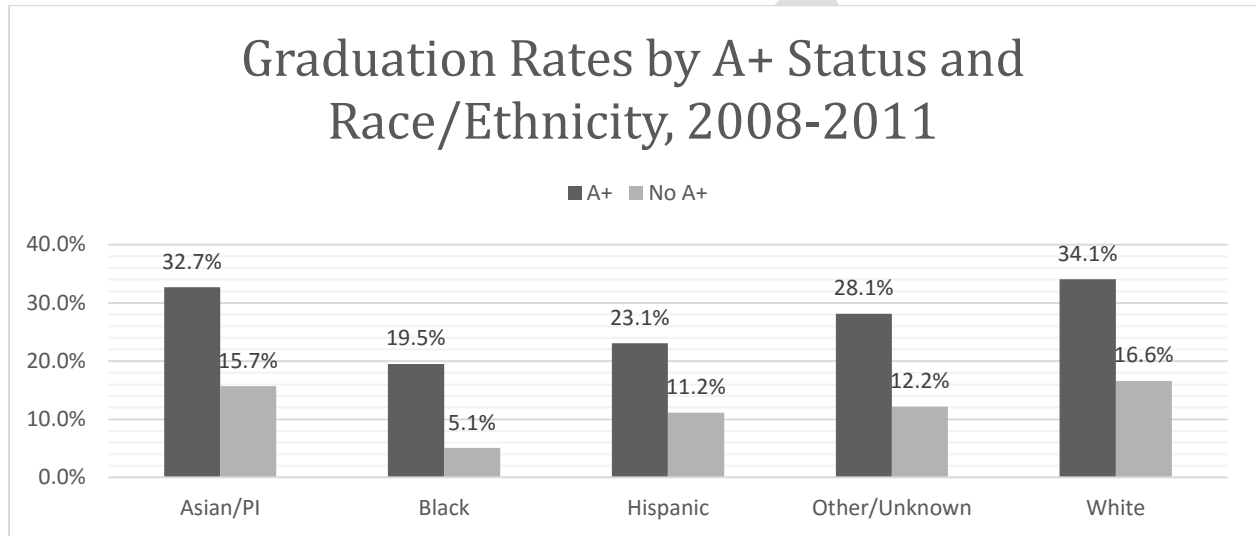
Figure 18 indicates that the 2008, 2009, 2010, and 2011 cohorts had an average three year program completion rate of 33 percent which was significantly higher than students who did not receive A+ awards (14%) and Access Missouri students (20%). Notwithstanding the potential for rather acute bias due to among other things, the fact that not all students attended A+ schools, descriptive statistics of this type suggest that the school and student improvement aspects of A+ may result in improved graduation rates when compared to students who did not benefit from an A+ scholarship or received aid from a program that doesn't require student academic and cultural capital enrichment elements as conditions of participation.

At first glance, these statistics suggest that about one in three A+ students complete their programs of study and graduate. However, it should be noted that the primary

intent of many students (and possibly especially so among A+ students) who begin their careers at community colleges is to transfer coursework into a four-year institution to attain bachelor’s degrees rather than to complete two-year degrees or certificates. Consequently, community college graduation rates are almost certainly depressed.

Figure 19

A+ Graduation Rates Race/Ethnicity



Source: Missouri Department of Higher Education. FTFTDS students enrolled in Missouri public postsecondary institutions 2008-2013.

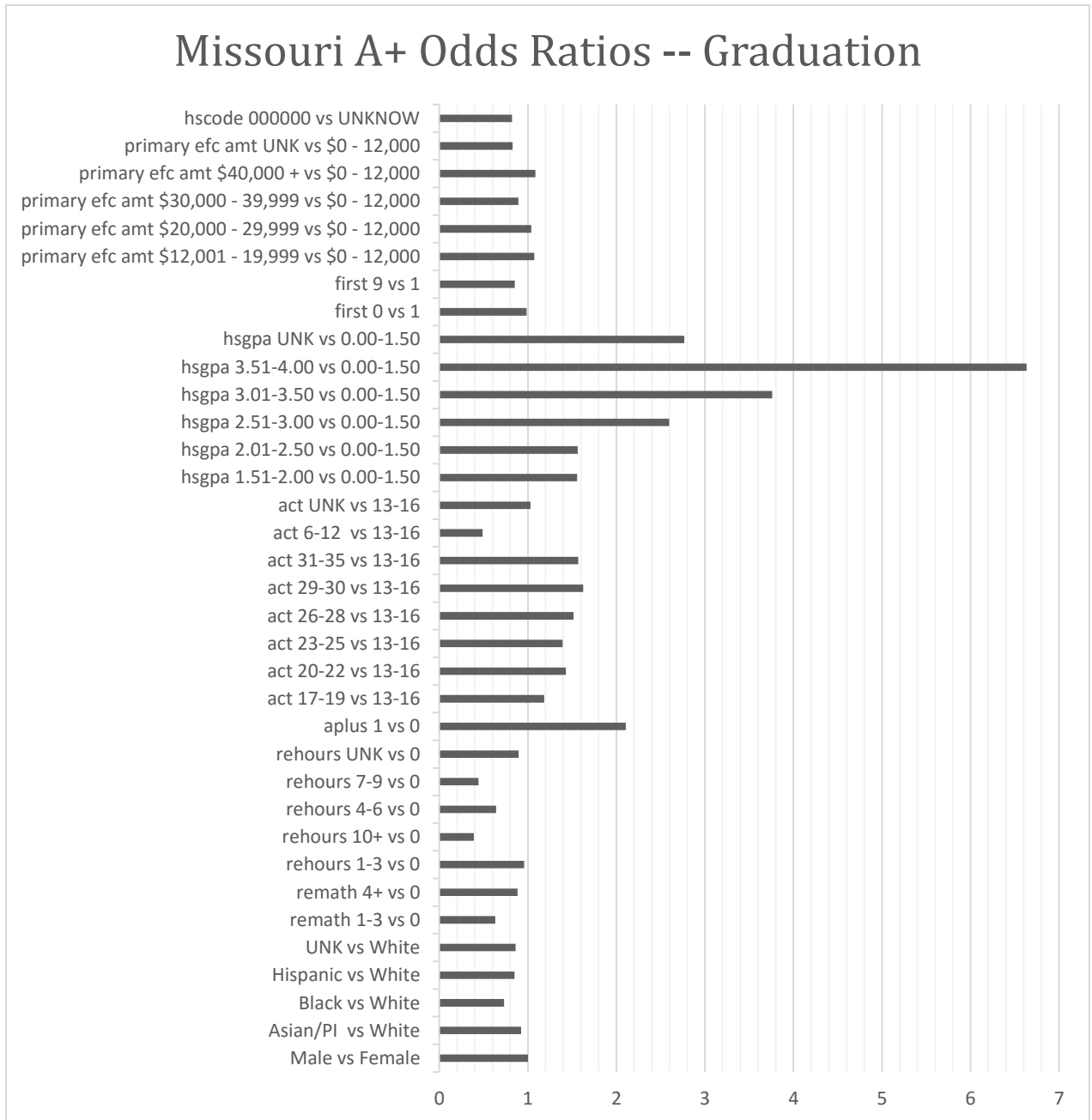
Disaggregating by race/ethnicity revealed similar results (see Figure 19). On average the gap between completers who received A+ reimbursements and those who did not was 16.2 percent, again suggesting that program elements designed to improve both schools and students yield substantial results and particularly so for those who may not believe they are capable of attaining a college education (Perna & Titus, 2005).

A+ Graduation: Logistic Regression Modeling

To explore the impact of A+ on graduation, logistic regression modeling was employed to provide knowledge of the relationships and strengths among the variables. Using data provided by Missouri Department of Higher Education, Missouri public high school students who graduated during the period between 2008 and 2013, and who enrolled in the fall immediately following graduation as first time full time degree seeking (FTFTDS) students in Missouri public two-year institutions, were examined (N = 42,441). These students were selected so graduation

Figure 20

Missouri A+ Odds Ratios – Graduation



NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 42,441. See Appendix J, Table J2 for a comprehensive demographic description of the data.

performance wouldn't be complicated by gaps in enrollment or time spent pursuing other post high school interests.

Figure 20 shows that, among all variables, high school achievement as measured by high school grade point average (hsgpa) most influenced whether students graduated in a three-year period of time while controlling for important conditions (e.g., socio-economic status (i.e., primary efc amount), hours of remediation (i.e., rehours, remath) student achievement (i.e., act, hsgpa), high school attended (i.e., hscore)). The log-odds ratios in Appendix G Table G1 indicate that students with the highest high school grade point averages (i.e., 3.51-4.0) log-odds of persistence were 6.6 times those of the lowest achieving students (i.e., 0.00-1.50). Furthermore, the highest achieving students' log-odds of graduation were about three times those of the next highest achieving group (i.e., hsgpa's between 3.01 and 3.50). That result reinforced the notion that even when compared to students who achieve at reasonably high levels, achieving at the highest levels does indeed return substantial postsecondary benefits.

While high school grade point average more strongly impacted graduation than any other variable -- being an A+ student was nearly as influential. Figure 20 indicates no other single variable (e.g., ACT scores, economic status, number of hours in remediation) was as powerful in predicting graduation. Appendix G Table G1 suggests that while controlling for the effects of a host of important variables, A+ students' log-odds of graduation within three years were about twice those of students who did not receive A+ reimbursements. Once again, the results of the logistic regression suggest that the design features (e.g., educational supports, exposure to community resources and relationships, and improved schools with strengthened curriculums) of the Missouri A+ Schools Program improves students and schools to the extent that the log-odds of graduation for those who participate are significantly improved.

Logistic Regression Modeling -- Transfer to Four-Year Institutions

Student transfer from two-year (2Y) to four-year (4Y) institutions was not a central question for this inquiry. However, because many A+ students begin their careers at community colleges with the intention of transferring to 4Y institutions to earn bachelor's degrees, the impact of A+ on transfer was briefly examined. Again the logistic regression routine was utilized so that insights regarding the relationships and strengths among the variables could be explored.

Using data provided by MDHE, Missouri public high school students who graduated during the period between 2008 and 2013, and who enrolled in the fall immediately following graduation as first-time, full-time, degree seeking (FTFTDS) students in

Missouri public two-year institutions were examined (N = 31,307). Students with these characteristics were selected for analysis so gaps in enrollment or time spent pursuing other post high school interests wouldn't confound choices to transfer to four-year colleges or universities.

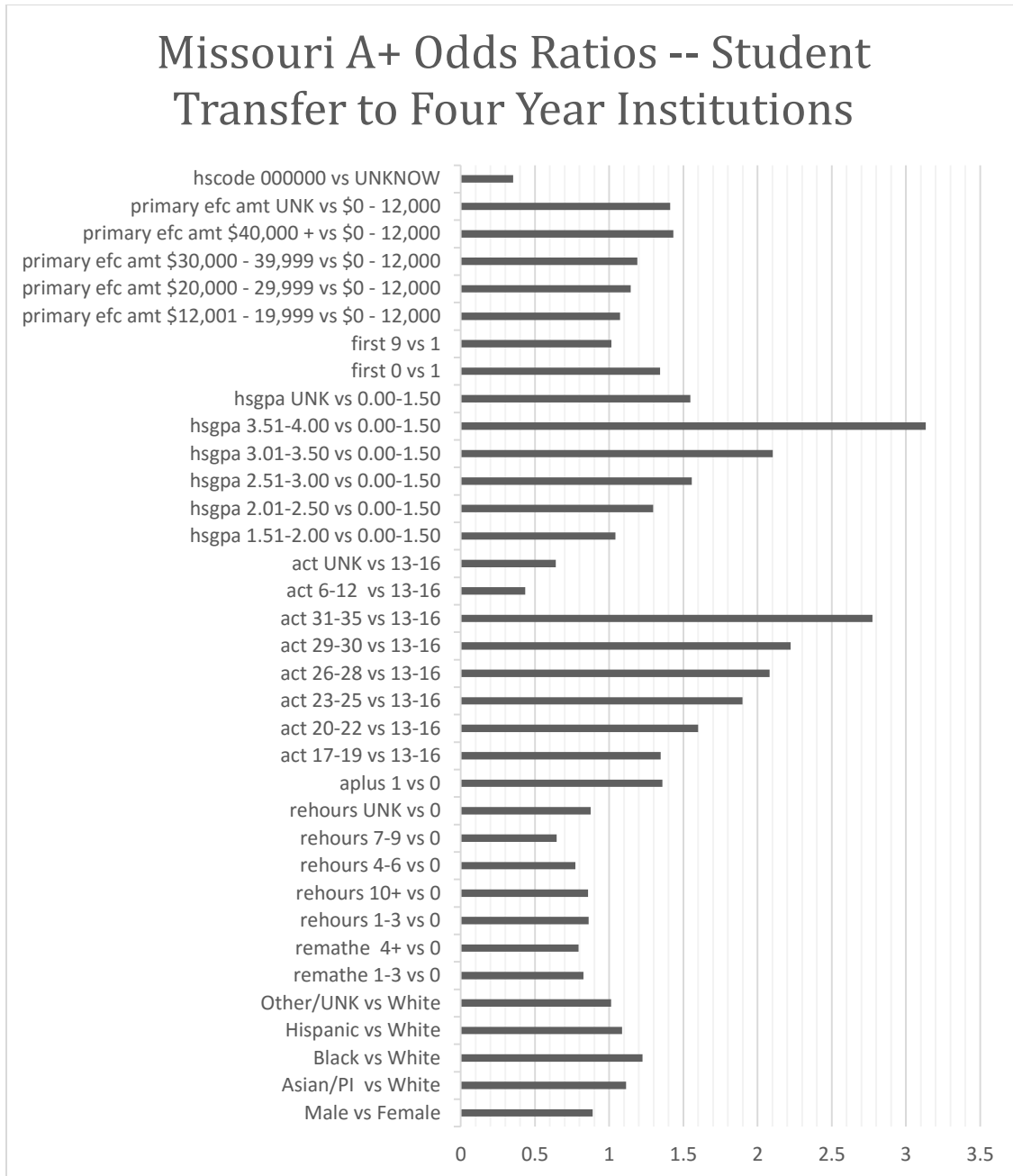
Of the 31,307 records examined, 30 percent or 9,477 students transferred to four-year (4Y) Missouri institutions of higher learning during the time period examined (see Appendix J, Table J2 a more complete demographic breakdown of the data). 4,578 of those students received A+ awards (see Appendix J, table J5). The results of the logistic regression analysis solidified high school achievement as measured by high school grade point average (hsgpa) as a reliable predictor of favorable postsecondary outcomes. As it did in every previous logistic regression analysis, hsgpa most influenced whether students would transfer to a four-year (4Y) institution while controlling for important variables and conditions (socio-economic status (i.e., primary efc amount), hours of remediation (i.e., rehours, remath) student achievement (i.e., act, hsgpa), high school attended (i.e., hscore)).

Once again, the results reinforced the importance of achievement. Appendix H Table H1 indicates that students with the highest high school grade point averages (i.e., hsgpa 3.51-4.0) had log-odds of transferring to 4Y institutions that were more than 3 times those of the lowest achieving students (i.e., hsgpa 0.00-1.50). The importance of student achievement on 4Y transfer was buttressed by achievement as measured by ACT score as well. Students with ACT scores that ranged from 31-35 had log-odds of 4Y transfer that were more than 2.78 times greater than those who scored in the 13 to 16 range. Remedial course work also impacted student log-odds of 4Y transfer. Generally -- and as might be expected -- as the number of remedial hours increased, log-odds of 4Y transfer decreased. It also came as no surprise that as a student's expected family contribution (efc) increased, so did the log-odds of transfer to a 4Y institution. Logically, this may be so because higher levels of family financial support should afford students increased opportunities to transfer 4Y institutions.

As was the case when persistence and graduation were examined -- being an A+ student positively impacted the log-odds of transfer to 4Y institutions. Figure 21 indicates that A+ students log-odds of transfer were about 1.4 times (see Appendix H Table H1) of those who did not receive the award. Once again, the results of the logistic regression analysis suggested that the Missouri A+ Schools Program enriches students and schools to the extent that the log-odds of 4Y transfer are improved.

Figure 21

Missouri A+ Odds Ratios – Transfer



NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 31,307. See Appendix J, Tables J2 and J5 for comprehensive demographic data descriptions.

Conclusions:

The Missouri A + Schools Program was, from the outset, designed to be much more than the typical one-dimensional financial aid program offered to alleviate financial barriers to college access. In fact, theory suggests that multiple A+ elements significantly impact all three of Hossler and Gallagher's (1987) stages of college choice. Moreover, and in accordance with Tierney and Hagedorn (2002), A+ features elements that emphasize academics and parental involvement, strong connections with postsecondary institutions, stable financial support, preparation for multiple postsecondary options, and early intervention. These measures were designed to enhance the likelihood that students who may believe they are not well suited for postsecondary academic experiences can graduate high school with the *academic and personal* skills needed to succeed in a variety of postsecondary settings (Department of Elementary & Secondary Education, 2009). This approach is likely what has made, and continues to make, the Missouri A+ Schools Program popular and successful.

A+ is unlike any other Missouri postsecondary scholarship/financial aid program because it creates support networks of mentors and advisors – especially for students who may have little or no such support. Support networks facilitate wiser postsecondary choices and importantly, A+ accomplishes this in part by enriching the cultural capital of *parents* as well. This key design element positively impacts students' awareness of possible institutions, financial aid sources, and the benefits of postsecondary education (Cabrera & La Nasa, 2001). More in depth examination of the program's cultural capital enrichment elements is certainly an area that deserves additional research efforts. This is so because identifying specific program features that most benefit traditionally low achieving student groups may have potential for narrowing stubborn achievement gaps – an area of intense interest.

The findings of this examination suggest that A+ is effective in that it positively influences postsecondary participation by making students more likely to enroll, actually enroll (Muñoz et al., under review), persist, and graduate. The program was found to increase access – at least in the sense that rigorous empirical research efforts have found that it increases overall college going rates (Muñoz, Harrington, Curs, & Ehlert, under review). Moreover, the tremendous growth of the program provides anecdotal evidence that A+ has increased student access to postsecondary educational opportunities.

A+ recipients persist at much higher percentages than they fail to persist. Roughly 70 percent of FTFTDS A+ recipients were reenrolled in two-year institutions after

their initial year. When the data was disaggregated by race/ethnicity, the findings suggested A+ recipients persist at greater rates – no matter the group. African American students who received A+ payments persisted at rates nearly 25 percent higher than African American students who did not receive awards.

While many variables positively impacted the odds of persistence (e.g., higher grade point average, higher ACT scores, being from a more affluent family), logistic regression analysis suggested the impact of participating in the A+ program was second only to the effect of having an excellent high school grade point average. While controlling for a host of important conditions, A+ students' odds of persistence were found to be one and a half times those of students who did not receive awards.

Very similar results were observed when examining graduation. In concurrence with the literature, high school grade point average more strongly impacted the log-odds of graduation than any other variable. However, being an A+ student was nearly as influential. In fact, no other single variable (e.g., ACT scores, economic status, number of hours in remediation) was as powerful in predicting graduation. The log-odds that A+ students would graduate within three years were about twice the log-odds of those who did not receive the award.

A+ was also found to positively impact student transfer from 2Y to 4Y postsecondary institutions. While student achievement as measured by high school grade point average and ACT score best predicted student transfer -- A+ plus participation impacted the log-odds of transfer nearly as much. Again controlling for a host of important conditions, A+ students' log-odds of transfer were about 1.4 times those who did not receive the award.

The Missouri A+ Scholarship's multiple design elements provide a comprehensive system for improving Missouri's high schools and students. By emphasizing intervention, school improvement, cultural capital amplification, and providing a substantial financial award – a design feature that has been found to encourage postsecondary participation (Kim, 2004) -- A+ takes an all-encompassing approach to increasing postsecondary participation while enhancing persistence and graduation statistics. These findings are similar to those found by St. John et al. (2004) and Mendoza, Mendez, and Malcolm (2009) when examining programs with similar design elements (i.e., Indiana Twenty First Century Scholars Program, Oklahoma Promise Grant).

There are nearly no new A+ schools being designated at this point in time. This is not because school leaders are discouraged with the program, rather it is because virtually every school in Missouri is now implementing the program. Nonetheless, MDHE projects program expansion over the next few years because students in

lately certified schools are yet to graduate and therefore yet to claim awards. While the total appropriation for FY16 is \$35,113,326, an amount that is \$2,000,000 greater than FY15, MDHE indicates it is too early to determine whether the program will be fully funded for FY16. Additionally, the Department suggests expected growth will require additional resources to fully fund the program in the future (Missouri Coordinating Board for Higher Education, 2015).

Recommendations:

This inquiry has concluded that the Missouri A+ Scholarship is a very well designed program that has positively influenced access, persistence, graduation, and two-year (2Y) to four-year (4Y) transfer statistics. Generally, A+ appears to be increasing the state's collective educational attainment statistics through increased enrollment rates. In addition, increased 2Y enrollment rates may be reducing individual levels of debt. On the other hand, the findings indicated that A+ may be contributing to diminished levels of individual educational attainment because students who begin at community colleges earn bachelor's degrees less often than those who begin at 4Y schools.

While the success of the program is compelling, many believe that the elements that may most contribute to that success (i.e., cultural capital enrichment aspects) are being implemented with less fidelity and urgency than when the program was young. This is a troubling possibility because requirements that motivate regular school attendance, prompt participation in custom tailored tutoring and/or mentoring activities, and encourage abstinence from deleterious behaviors (e.g., crime, drug use) may be benefitting the students who need it most -- those who come from backgrounds of low or no postsecondary education knowledge/tradition.

The A+ program's required parent/school partnerships are believed to increase parental potential to provide their children with input and advice about postsecondary possibilities. In this way, it may be fair to believe that the program inspires the type of parental support that is found in homes where higher education is a tradition and moreover -- an expectation. This is an extremely important program feature because as Cabrera and La Nasa (2001) observed, parents who are postsecondary savvy often have students who are also postsecondary savvy. It is therefore recommended that the possible "rubber stamping" of requirements that enrich student cultural capital be discouraged and discontinued. Stopping the practice of simply signing off on these important program elements may require additional regulation/oversight to ensure that the program is instituted accurately and implemented faithfully.

Research cited in this study suggested that A+ increases overall postsecondary enrollment in Missouri's institutions of higher learning. However that research also indicated that the increase has been realized in two-year (2Y) schools at the expense of four-year (4Y) institutions -- evidence of an A+ diversion effect (Muñoz, Harrington, Curs, and Ehlert, under review). This may be problematic because students who begin at 2Y institutions have been found to face challenges if they later decide to transfer to 4Y colleges and universities (Long and Kurlaender, 2009).

At this time, the Missouri A+ Scholarship can only be used at 2Y public institutions however, many have suggested that students should be allowed to use the scholarship at public and private 4Y institutions as well. This suggestion may be beneficial for students who would prefer to begin at 4Y schools for three reasons. First, the academic and personal preparation required for A+ eligibility would in theory benefit students who begin at 4Y institutions as it does those who begin at 2Y schools. Second, in light of the A+ diversionary effect discussed previously, it is logical to believe that some students would attain higher levels of education if they were allowed to use their award at 4Y institutions. This is so because research has found that when students begin at four-year institutions the likelihood of them completing a bachelor's degree is 14.5 percent higher when compared to students who started at two-year institutions (Long and Kurlaender, 2009). This may be so because beginning and graduating from the same institution requires acclimating to one institutional setting and culture and eliminates credit transfer and program compatibility issues. Third, allowing recipients to attend both 2Y and 4Y institutions would align A+ with the Access Missouri and Missouri Bright Flight Scholarships.

There is much speculation about whether the Missouri Department of Higher Education will have the financial ability to fully fund A+ going forward. While the program has been appropriated an additional \$2,000,000 for FY16, MDHE indicates it is too early to determine whether that level of funding will be sufficient to fully fund the program. Further, MDHE forecasts program growth will require greater levels financial resources going forward (Missouri Coordinating Board for Higher Education, 2015). This tenuous financial forecast has caused some to suggest that A+ awards be reserved for more needy students, thereby reducing overall expenditures by reducing the number of eligible students. At present, Missouri's A+ program is purely merit based. In the cohorts of A+ students examined in this study, more than 45 percent had EFC's above the \$12,000 cutoff established for Access Missouri. During FY09, the average A+ student's EFC was approximately \$16,000 which corresponds to an adjusted gross income of between \$90,000 and \$100,000. Those statistics support the assertion that A+ scholarships may indeed be going to students from families that have the financial strength to pay for college.

Need based eligibility requirements are not uncommon in programs similar to A+. Because of its multiple eligibility requirements, A+ is similar to hybrid programs like the Indiana 21st Century Scholars Program or the Oklahoma Promise Grant both of which have household income limits. The Indiana 21st Century Scholars Program income guidelines conform to the federal free and reduced lunch program (Indiana Commission for Higher Education, 2009) and the Oklahoma Promise Grant requires that family income be less than \$50,000 per year, (Oklahoma State Regents for Higher Education, 2015).

On the other hand, opponents of modifying A+ to include need-based criteria argue that students from more affluent families are no more responsible for their families' financial condition than students from poorer backgrounds. In addition, they assert A+ incentives were designed specifically to be powerful in motivating students from all walks of life to learn the value of achievement and merit. Therefore, opponents of including need-based criteria say it is important to send the message that if a student earns the award, s/he should be able to claim it -- no matter his or her financial circumstance.

Very rough estimates indicate that if the Missouri A+ Program were modified to include similar need-based criteria – the number of recipients in the 2008 through 2013 would have been reduced by nearly 25 percent. However, a determination to include need based criteria should be informed by additional research and rigorous actuarial analysis.

**The Missouri Higher Education
Academic Scholarship**

THE MISSOURI HIGHER EDUCATION ACADEMIC SCHOLARSHIP (aka THE MISSOURI BRIGHT FLIGHT SCHOLARSHIP)

The Higher Education Academic Scholarship is better known as the Bright Flight Scholarship or simply Bright Flight (BF). Bright Flight is Missouri's only financial aid program based solely on academic merit. Generally, academic merit programs are instituted to incent top achieving high school students to pursue in-state postsecondary education opportunities. Bright Flight is no different. It was established to encourage Missouri's best and brightest to attend Missouri postsecondary institutions and to remain in Missouri thereafter to live and work. Policy makers believe that substantial returns can be realized by investing in programs that help train -- and hopefully retain -- high ability students with advanced skill sets. That belief is supported by research. Moretti (2004) found that states with highly educated workforces have higher economic growth rates.

House Bill 1356 created BF in 1986 for students with ACT/ SAT scores that ranked in the top three percent of all Missouri test takers. Later, Senate Bill 389 (2007) expanded eligibility to those in the top fourth and fifth percentiles and increased the maximum award level. Implementation of the 2007 expansion became effective during the 2010-2011 academic year; however, state appropriations have been insufficient to fund those scholarships. Senate Bill 733 further modified BF to require the top three percent receive the full \$3,000 annual award before students in the top fourth and fifth percentiles can realize any benefit.

State merit aid programs are on the increase, particularly in the southeastern United States (Doyle 2006) and eligibility criteria as well as award amounts vary greatly between programs. One of the best known and most studied merit aid programs, the Georgia HOPE scholarship, uses high school grade point average (i.e., minimum 3.0) to determine eligibility. The University of Alaska Scholars' Award utilizes high school class ranking. At the high end of the award continuum, both the Georgia HOPE and the New Mexico Lottery Success Scholarship cover full tuition to in-state public institutions. In comparison, the Missouri Bright Flight Program -- one of the oldest merit based aid programs -- requires that students score in the top three percent of all Missouri ACT/SAT test takers, a relatively stringent standard, while offering one of the lowest annual awards (i.e., \$3,000).

Research has been conducted to determine whether merit aid programs actually serve their intended purposes. In other words, scholars have examined these programs to determine if they actually ameliorate "brain drain" by reducing the number of very high achieving students who attend out-of-state colleges and

universities. Dynarski (2004) found that the Georgia HOPE scholarship positively affected the likelihood residents would enroll in an in-state college or university. Cornwell, Mustard and Sridhar (2006) found that Georgia public university first-year enrollment rates increased by about six percent after HOPE was introduced. While, program specifics and the amount of financial aid awarded appeared to make a difference because effects varied widely by state, on average, states with merit programs increased first-year enrollment at four-year (4Y) institutions by about 10 percent (Zhang & Ness, 2010). Further, when compared to states without merit programs -- merit aid states experienced a nine percent average reduction in the number of students who attended college out-of-state.

From the point of view of states, the important merit aid program benefit is that students are encouraged to remain in state after college to apply their skills in the workforce. Generally research has supported that idea as well. When students attend in-state colleges and universities, the probability is greater that they will become residents when compared to those who attend out-of-state institutions (Adelman, 2004). Moreover, research has found that when students attend public colleges in their home states they are 15 percent more likely to live in their home states after graduating (Groen, 2004). Keeping in mind that the characteristics of a particular state are very important in influencing students to remain or leave – on average, strong merit aid programs have been found to increase the probability of remaining by 2.8 percentage points (Sjoquist & Winters, 2014).

In theory then, BF should work on two levels. First, by providing a financial award that can only be redeemed at a Missouri institution, BF guarantees that *recipients* attend college in Missouri. Then because recipients study in-state, the program should improve the chances that they will then live in-state after graduation, thereby improving the chances that the skills they acquire will be used to improve Missouri's economy.

The FY16 Bright Flight (BF) appropriation was reduced by four-million dollars. However, in May of 2015 the Governor released \$4 million that was held under a spending restriction. Due to the timing of the release, the funds will be available for awards in FY16 which would balance the reduction. In other words, funding levels for FY16 will remain at FY15 levels. The Missouri Department of Higher Education (MDHE) projects that this level of funding will allow the top three percent of Missouri's ACT test takers to be awarded the statutory maximum of \$3,000. At this point, MDHE is predicting that the program will have insufficient resources to fund students in the top fourth and fifth percentiles (Missouri Coordinating Board for Higher Education, 2015).

At present, the BF scholarship only covers approximately 28 percent of the tuition cost charged at the state's flagship university, the University of Missouri at Columbia. Purchasing power is even lower at private institutions. For example, tuition at Washington University in St. Louis was approximately \$47,300 in FY15. Bright Flight only covered 6 percent of that cost. The relatively low and diminishing purchasing power of the BF scholarship has inspired one of this inquiry's central questions: Does Bright Flight accomplish its central objective -- retaining the state's most capable citizens?

THE MISSOURI BRIGHT FLIGHT SCHOLARSHIP: Hossler and Gallagher's Model of Student Choice

Hossler and Gallagher's (1987) model of student choice suggests that students' decisions to pursue a postsecondary education consists of three distinct stages: predisposition, search, and choice. Table 1, page 12 classifies the Missouri Bright Flight Scholarship on Hossler and Gallagher's (1987) model of student college choice.

At the outset, it is well to remember that Bright Flight (BF) students are indeed Missouri's highest achieving students. These students often come from homes, cultures, and traditions that place tremendous emphasis on educational attainment and academic achievement, therefore BF students are often rich in the cultural capital that programs like Missouri A+ attempts to augment. Due to high levels of postsecondary awareness, BF students may become predisposed to attend college at very early ages, begin the search process in grade school, and choose the institutions they will attend well before they graduate high school. By providing incentive for students to attend Missouri colleges and universities – as it was designed to do -- BF primarily impacts the selection and choice stages. However, because BF students and their families are often very aware of postsecondary opportunities -- including the availability of financial aid and scholarships – the BF award may influence students during the predisposition stage as well.

Predisposition

A central element of enrollment programs is the amelioration of financial need -- the most prominent barrier to attaining a postsecondary education. Bright Flight awards are offered to assuage the financial needs of top students – that is if they choose to attend Missouri institutions. In this way, BF may impact student predisposition to attend college because knowledge of the financial award would tend to support a decision to attend rather than a decision not to attend college. However, that is where the overt influence on predisposition ends. Apart from the financial incentive,

BF has no other *explicit* elements to influence student predisposition -- much like the Access Missouri award.

Unlike the Missouri A+ Schools Program, BF has no school quality/academic rigor conditions and contains no mechanisms to increase student postsecondary awareness/readiness, savvy, or cultural capital. So, while students who aspire to earn a BF award may be motivated to go to extraordinary lengths to prepare *themselves* to score in the top three percent of Missouri ACT test takers – the program itself has no elements that *require* specific concrete activities or actions to augment, promote, or support postsecondary predisposition.

Search

Because BF awards are designed to motivate students to attend Missouri institutions, BF limits which colleges and universities students *can* choose to examine when creating a list of institutions from which to choose. More specifically, if students intend to take advantage of BF awards, they must list only Missouri institutions. However, and again like the Access Missouri program, besides the financial award, BF contains no other explicit program requirements that impact the search stage. In contrast, A+ requires schools to offer rigorous academic programs for postsecondary preparation, generates awareness of the need for academic success early in a student's high school career, and augments the cultural capital resources students need to build relationships with colleges and universities. These types of elements and activities have been shown to influence which postsecondary institutions a student considers (Engberg & Wolniak, 2010; Perna & Titus, 2005).

Choice

Choice involves two stages: the creation of a roster of eligible postsecondary institutions and the subsequent selection of a winner from that list (Hossler & Gallagher, 1987). As was the case for the predisposition and selection stages, Bright Flight utilizes the financial award and the fact that the award must be used at a Missouri institution as the only explicit motivators for both choice stages. Because the BF scholarship was specifically created to impact the choices of Missouri's most capable students, and because those students likely have a considerable number of both in- and out-of-state institutions from which to choose, examining the actual choices of those students is essential for understanding program effectiveness.

Using Missouri Department of Elementary and Secondary Education (DESE) and National Student Clearinghouse data, MDHE calculated out-of-state student migration frequencies for students who graduated high school during the period between 2011 and 2014. Descriptive statistics for in- and out-of-state enrollments for BF eligible (those who scored 31 or above on ACT, N = 6,568) and Near Bright

Flight (NBF) eligible (those who scored a 29 or 30 on the ACT, N = 5781) were calculated and compared (see Table 4).

Interestingly, Table 4 suggests that the percentage of BF students who choose to pursue out-of-state postsecondary opportunities have remained fairly steady at an average of about 26 percent over the last four years. An out-of-state enrollment

Table 4

In-State and Out-of-State Enrollment of Bright Flight and Near-Bright Flight Eligible Graduates Public High Schools 2011-2014

HS Grad Year	Bright Flight Enrollment			Total	HS Grad Year	"Near Bright Flight" * Enrollment			
	MO	OUT				MO	OUT	Total	
2011	N	1,231	407	1,638	2011	N	1,179	218	1,397
	Pct.	75.2%	24.8%			Pct.	84.4%	15.6%	
2012	N	1,195	317	1,512	2012	N	1,246	197	1,443
	Pct.	79.0%	21.0%			Pct.	86.3%	13.7%	
2013	N	1,079	498	1,577	2013	N	1,105	352	1,457
	Pct.	68.4%	31.6%			Pct.	75.8%	24.2%	
2014	N	1,340	501	1,841	2014	N	1,125	359	1,484
	Pct.	72.8%	27.2%			Pct.	75.8%	24.2%	
Total	N	4,845	1,723	6,568	Total	N	4,655	1,126	5,781
	Pct.	73.8%	26.2%			Pct.	80.5%	19.5%	

* "Near Bright Flight" eligible students are those who scored a 29-30 on the ACT
 Sources: DESE Student Core and National Student Clearinghouse, DHE ACT data

spike did occur for BF eligible students in 2013 (more than 31 percent) but dropped back to just over 27 percent in 2014.

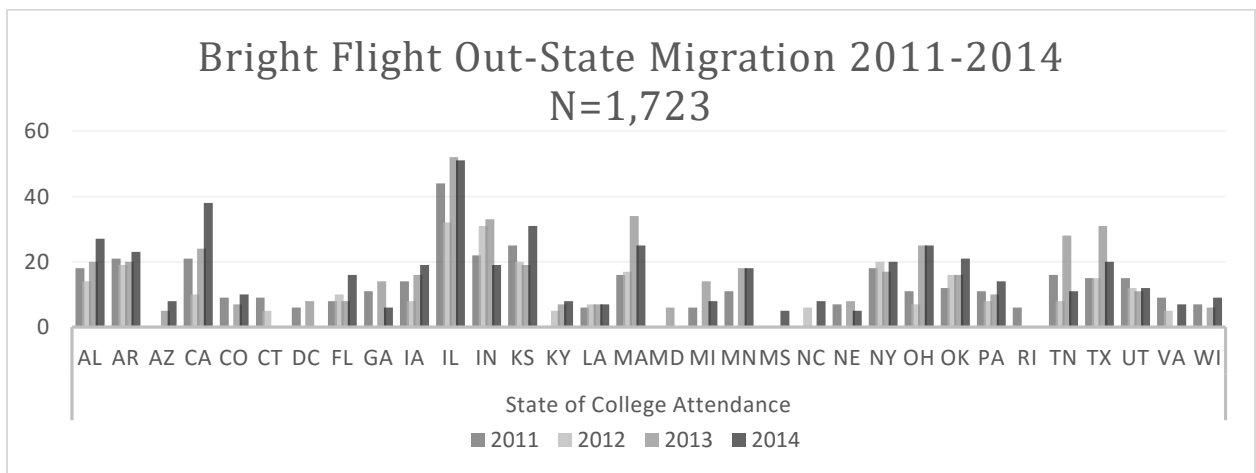
Near Bright Flight (NBF) students -- or students who achieved at similarly high levels but did not receive BF awards -- were nearly ten percent less likely to attend out-of-state institutions. Roughly 16 percent of NBF students attended out-of-state institutions in 2011 and about 14 percent did the same in 2012. Considering that NBF students are very similar to BF students in terms of academic achievement, the significantly lower rate at which students in the NBF group elected to attend, and/or had the financial ability to attend, out-of-state colleges and universities may be

indicative of NBF students’ somewhat more limited postsecondary options when compared to BF students.

Interesting, NBF out-migration percentages increased dramatically to over 24 percent in 2013 and 2014. This large out-migration increase among NBF students may have been an anomaly -- as was the case in the 2013 out-of-state enrollment spike noted for BF eligible students in 2013. On the other hand, the NBF out-migration may be indicative of concerted efforts on the part of some states/institutions to identify and attract highly capable students who may be less motivated to remain in Missouri. Examining this emerging trend is certainly worthy of additional research considering the potential economic benefit these students can add to the communities they choose to join.

Figure 22

Bright Flight Out-Migration



Sources: DESE Student Core and National Student Clearinghouse, DHE ACT data. N = 1,723

Figure 22 depicts where Missouri Bright Flight eligible students went when they decided to attend out-of-state institutions between 2011 and 2014. The state of Illinois (IL) attracts more BF and near NBF students (i.e., 258) than any other state. Kansas (KS) was the second most popular destination attracting 208. Other states that attracted a significant number of BF and NBF eligible students were Alabama (107), Arkansas (161), California (116), Indiana (184), Massachusetts (100), Ohio (109), Oklahoma (100), and Texas (133).

Interestingly, Florida and Ohio have both doubled their take of BF Eligible students since 2011. That fact may signal possible recruitment efforts aimed specifically at high ability students in Missouri -- a trend worthy of continued attention/examination. Future inquiries should specifically examine the reasons why Bright Flight eligible students themselves give for choosing to attend particular institutions in particular

states to understand how BF might be improved to accomplish its purpose -- retaining a larger number of Missouri's highest achieving residents.

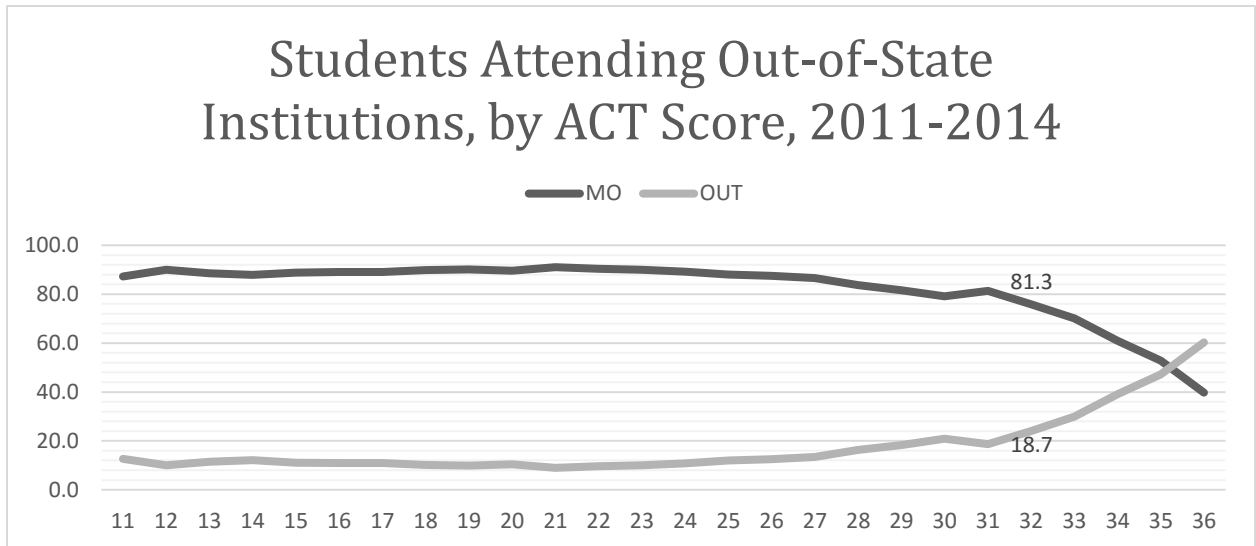
Table 4 makes clear that a large percentage (more than a quarter of BF eligible students) choose to attend college at out-of-state institutions. That statistic strongly suggests that the BF financial incentive may be insufficient to convince many of Missouri's best students to remain in Missouri. This may be so for at least two reasons. First, cost may not be a significant obstacle for many BF students because many may have several attractive scholarship opportunities from which to choose. Second, in comparison to more generous out-of-state scholarships offered by prestigious colleges and universities, the BF award may be woefully inadequate.

Figure 23 plots the percentages of Missouri first-time, full-time, degree seeking students (FTFTDS) who enrolled in Missouri institutions and those who attended out-of-state colleges and universities versus ACT score for the period between and including 2011 to 2014. The trend appears to support the possibility that, as student ability levels increase, BF becomes decreasingly effective at keeping them in-state.

The graph indicates, on average, about ten percent of Missouri students attended out-of-state institutions during the time period examined. That was until ACT scores reached 24 -- then the percentage of students who chose to attend out-of-state colleges and universities began to increase rapidly. That trend continued with a slight plateau occurring between ACT scores of 30 and 31, the cutoff scores for Bright Flight eligibility. The decrease in the rate of out-migration increase (i.e., plateau) may be visual evidence of the BF incentive at work. However, immediately after a score of 31, out-migration resumed at an accelerating rate. The percentage of students who remained in state equaled the percentage of those who left when ACT scores reached 35 and more than 60 percent of Missouri students who had ACT scores of 36 elected to attend out-of-state institutions. In sum then, Figure 22 indicates that Missouri is losing a large percentage of its ultra-high achieving students – even while the Bright Flight program is in place to prevent it.

Figure 23

Student Out-Migration by ACT Score



Sources: DESE Student Core and National Student Clearinghouse, DHE ACT data

Much like Access Missouri (AM), Table 1, page 12 indicates that the Missouri Higher Education Academic Scholarship can influence (however minimally) all three of Hossler and Gallagher’s (1987) college choice categories through its financial incentive. Unfortunately, and again like AM, weaknesses emerge when the program is more closely examined through the lens suggested by Tierney and Hagedorn’s (2002) effective and efficient program measures.

Unlike the Missouri A+ Schools Program, Bright Flight (BF) does not include requirements that obligate schools to offer rigorous academic programs to prepare students for a range of higher educational settings, mechanisms that encourage early student commitment to the program, or provisions that obligate students to establish meaningful relationships with postsecondary institutions. Omissions of this sort make BF less than ideal in terms of effectiveness and efficiency (Tierney & Hagedorn, 2002). However, the type of program features just mentioned may not be as important to the success of BF students as they are to typical A+ or AM recipients. This may be so because many BF students are prepared for postsecondary settings by culturally rich familial backgrounds. On the other hand, some BF students may have lower levels of family support. While BF students from lower socioeconomic circumstances undoubtedly achieve at high levels, it is fair to imagine that they, like the students A+ was designed to help, could benefit from a scholarship program that *explicitly* requires elements like the effective and efficient program measures suggested by Tierney and Hagedorn (2002). At present, Bright Flight features only the financial dependability aspect (see Table 1, page 12).

Because students from lower socioeconomic backgrounds have been found to be less college savvy (Terenzini, Cabrera, & Bernal, 2001; Tierney & Venegas, 2009), BF students from lower socioeconomic backgrounds may be confronting some of the same sorts of problems faced Access Missouri (AM) recipients (i.e., students with FAFSA EFCs of \$12,000 or less). Like AM students, needy BF students may make institutional choices based more on cost and less on best fit for interest, talent, and career goals. So while it is logical to believe that the Bright Flight scholarship may be more successful in persuading high ability students from lower socioeconomic backgrounds to remain in Missouri -- it may also encouraged those students to “settle” on an institution based on price as opposed to choosing the college or university that can maximize their potential. This situation may be reducing Missouri’s return on investment because if these students fail to realize their full educational potential, their subsequent economic contribution will logically be less impactful. To examine that possibility, future inquiries should specifically examine the reasons lower income BF students (i.e., students who are likely more motivated by BF awards than their more affluent counterparts) offer for their institutional choices.

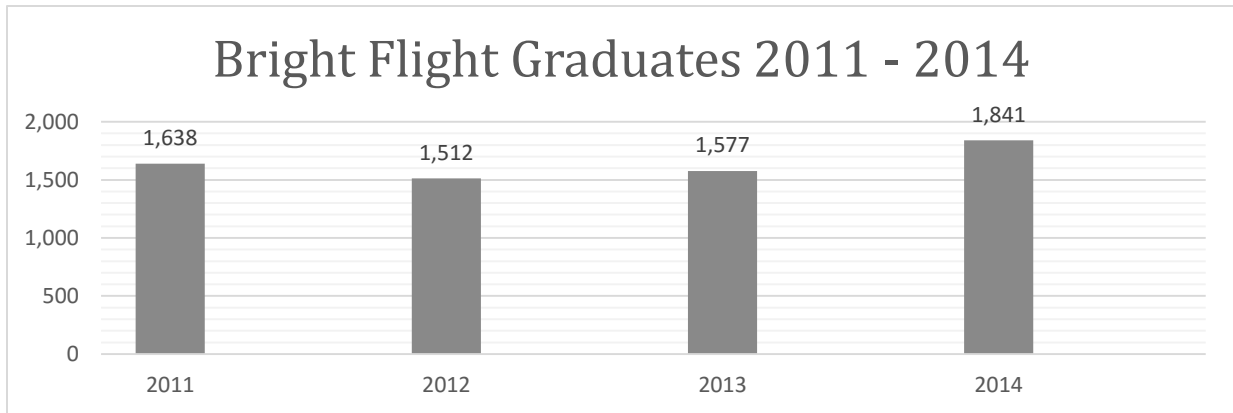
Access

Postsecondary access refers to how financial aid scholarship programs try to ensure that students have equal and equitable opportunities to take advantage of postsecondary education. Bright Flight (BF) was created for a very specific purpose - - to retain the state’s best and brightest citizens and not to alleviate issues of access. Therefore, access is an inappropriate indicator of Bright Flight’s performance. Nonetheless, for sake of comparison with Access and A+, BF participation levels are presented.

Bright Flight participation fluctuates based on two variables. The established minimum ACT/SAT eligibility score for the graduating cohort of Missouri high school students and on the size of that cohort. In comparison to Access and A+, Bright Flight participation is miniscule, accounting for roughly two-percent of Missouri’s higher education budget (Missouri Coordinating Board for Higher Education, 2015). Figure 24 indicates that only 6,586 students have become BF eligible since 2011, an average of about 1,650 per year. If Missouri loses 25 percent of those students on average to other states, as Table 4 suggests, then an average of only about 1,240 remain to enroll in Missouri colleges and universities each year.

Figure 24

Bright Flight Graduates 2011 - 2014

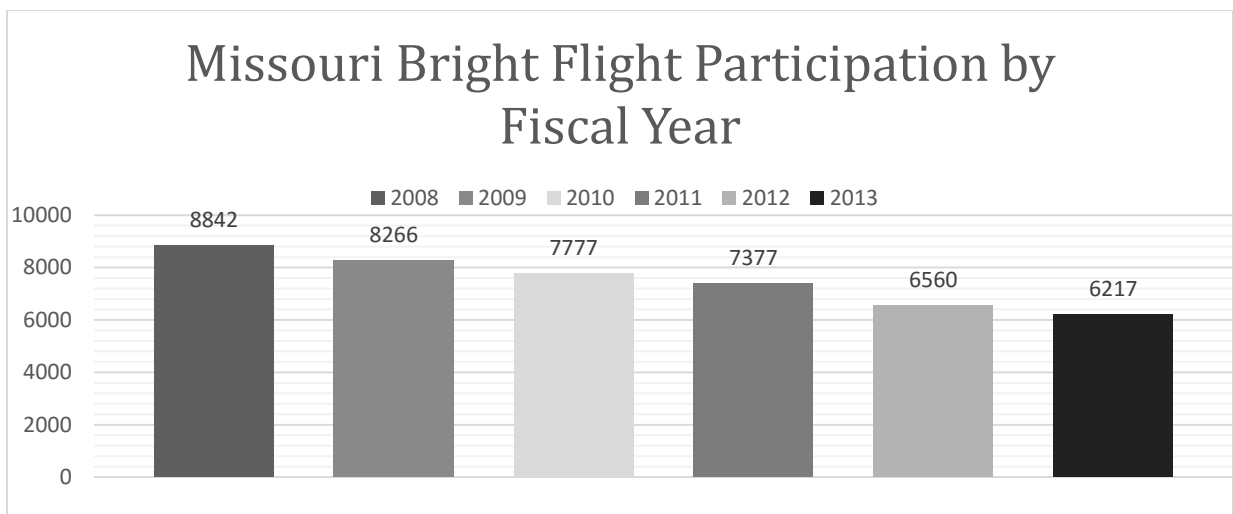


Source: Missouri Department of Higher Education

Bright Flight recipients can continue to receive awards for up to 10 semesters if they remain continuously enrolled, maintain a cumulative grade point average of 2.5 or better, and stay in good institutional standing. Consequently, the number of BF participants is higher than the number of yearly BF eligible graduates. Figure 25 shows a steady decline in the number of students who have received Bright Flight payments since 2008. According to MDHE the diminishing number of participants is explained by smaller populations of high school students, and thus BF eligible students, during the time period.

Figure 25

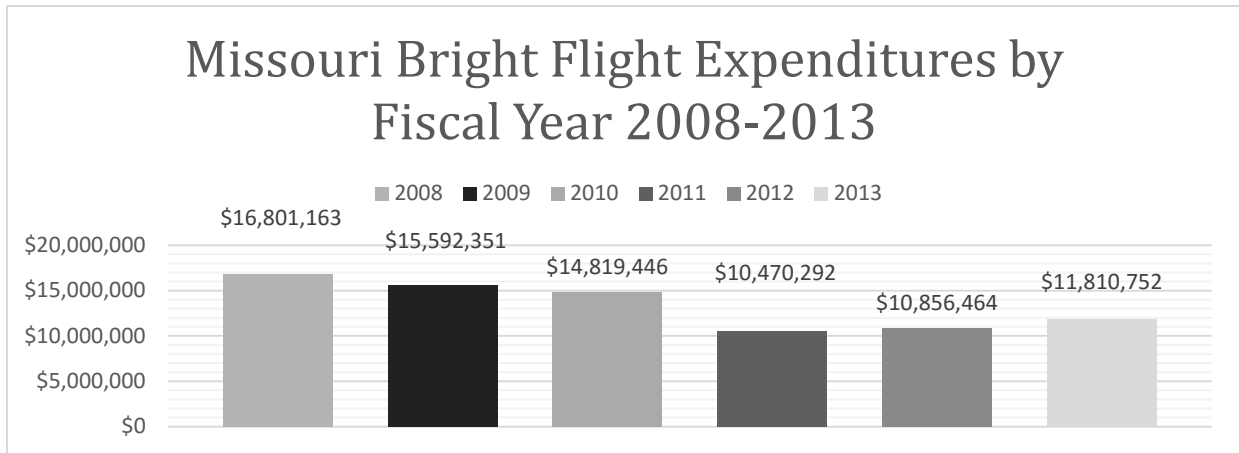
Bright Flight Participation 2008 – 2013



Source: Missouri Department of Higher Education

Figure 26

Bright Flight Expenditures 2008-2013



Source: Missouri Department of Higher Education

Figure 26 illustrates Missouri Bright Flight expenditures. Corresponding to the decreasing student participation rate observed over the same period, BF expenditures reached a high of nearly \$17 million in FY08, then decreased to a low of about \$10.5 million in 2011. Expenditures have since risen to about \$12 million. Between 2011 and 2013 averages expenditures reported by MDHE are just over \$11 million.

According to MDHE, roughly 76 percent of the total Bright Flight expenditures and 76 percent of BF recipients attend public 4 year institutions in Missouri. Two percent of BF recipients choose to attend Missouri community colleges. Private four year institutions in Missouri capture 22 percent of BF expenditures and students.

Persistence

Because the Missouri Bright Flight Scholarship was designed to keep Missouri's best and brightest students in state -- the research emphasis of this inquiry was to explore the programs ability to accomplish that task. For that reason, and the fact that BF graduation and persistence rates are very high -- logistic regression models were not used to analyze BF persistence and graduation rates. Nonetheless, for sake of completeness and comparison, short persistence and graduation sections are provided.

A 2012 MDHE report produced for the Governor found that, on average, since 1996 nearly 95 percent of Bright Flight (BF) recipients have persisted to their sophomore year of college. Compared to Access Missouri persistence rates of 83 and 66 percent for the four-year (4Y) and two-year (2Y) sectors respectively, and the 70

percent persistence rate of FTFTDS A+ recipients, the persistence rate of BF recipients is more than 10 percent higher than the best persistence rate associated with the other major state financial aid programs. According to the MDHE, BF persistence rates have been relatively constant over the past decade (Missouri Department of Higher Education, 2012).

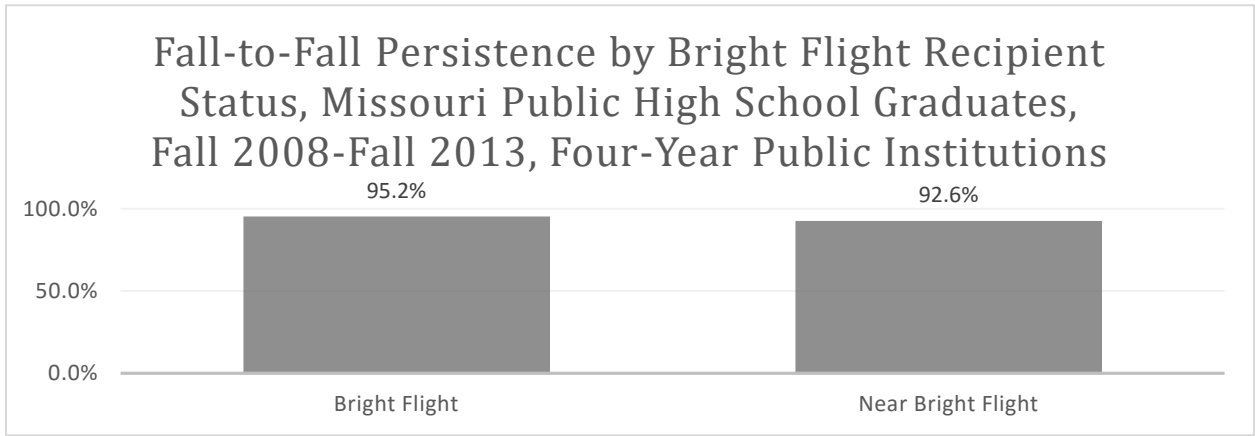
Bright Flight students achieve at the highest levels (i.e., selected from the top three percent of ACT test takers) and often come from more culturally and financially affluent families. In contrast, Access Missouri students generally achieve at mediocre levels and often come from very needy backgrounds. Because the literature has time and again shown socioeconomic status to be a strong predictor of many measures of academic success -- comparing high ability students to those who are substantially less fortunate creates a poor comparison scenario. Therefore, more similar students groups were created and compared to create a clearer picture of BF impact.

Using data provided by the Missouri Department of Higher Education (MDHE) – 2008 through 2013 Missouri public high school graduates were examined. Data for that period of time includes the most consistent/complete Free Application for Federal Student Aid (FAFSA) information available to MDHE. To be included in the analysis, the students must have enrolled in a Missouri public college or university in the fall immediately following graduation. These FTFTDS students were selected so that gaps in enrollment or time spent pursuing other postsecondary interests wouldn't complicate persistence performance. Six iterations of persistence data were examined for both two and four year institutions (e.g., 2008 graduates into fall 2009 enrollments and 2010 reenrollments etc.).

Figure 27 represents the comparison groups. Students who received Bright Flight awards had ACT composite scores of 31 or above (N = 3,434). To create a comparison group of sufficient size and ability, the Near Bright Flight (NBF) student group included students who achieved ACT composite scores of 29 and 30 (N = 3,549) and who also attended Missouri public institutions. Bright Flight recipients who attended four- year (4Y) institutions (N = 3,326) persisted at a slightly higher percentage (95.2%) than those who had similar ACT scores (i.e., NBF, N = 3,237) but did not receive the scholarship (92.6%) – a difference of 2.6 percent. Bright Flight students who initially enrolled in 2Y institutions (N = 108) had much lower persistence rates than those observed in the 4Y sector (see Figure 28). Nearly 82 percent of students who received the scholarship persisted compared to 77 percent of students who had similar ACT scores (i.e., NBF, N = 312) but did not receive a BF award – a difference of about five percent.

Figure 27

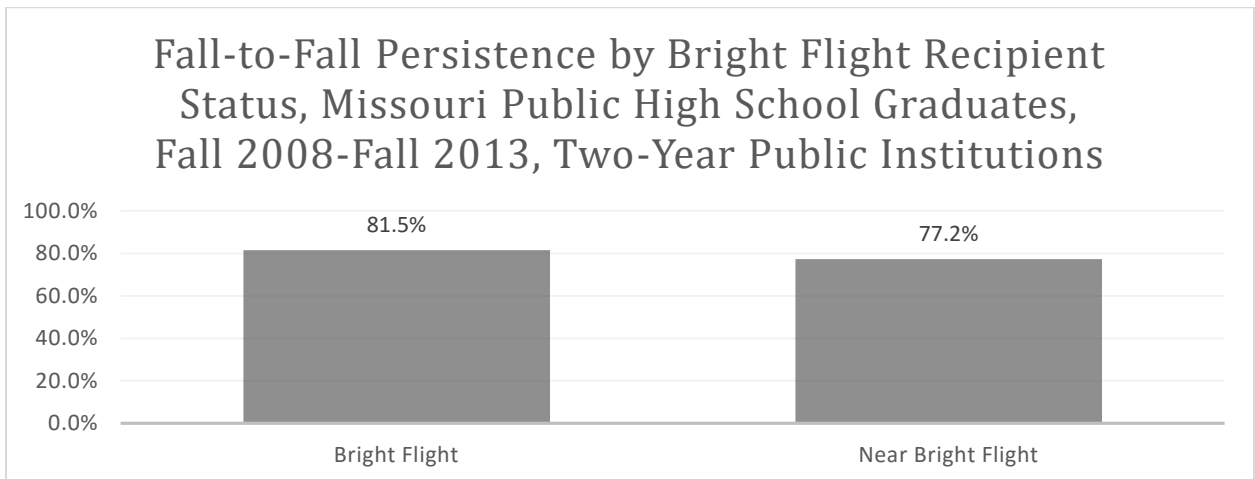
Four Year Institution Persistence by Bright Flight Recipient Status



Source: Missouri Department of Higher Education. Bright Flight N= 3,326, Near Bright Flight N = 3,237

Figure 28

Two Year Institution Persistence by Bright Flight Recipient Status



Source: Missouri Department of Higher Education, Bright Flight N= 108, Near Bright Flight N = 312

The significantly lower persistence percentages observed in the 2Y sector (see Figure 28) compared to the 4Y sector may be symptomatic of the fact that many students (especially very high achieving students) initially attend 2Y institutions with plans to transfer to pursue bachelor’s degrees at 4Y institutions. Additionally, the relatively small gaps in persistence rates between BF recipients and high achieving non-recipients in both sectors may be due to the impact of BF. However, the difference might just as easily be explained by the fact that higher ability students

(ACT composite of 31 and higher) were compared to students with slightly less ability (ACT composite of 29 and 30). Both the 2Y transfer and persistence gap phenomena require further investigation.

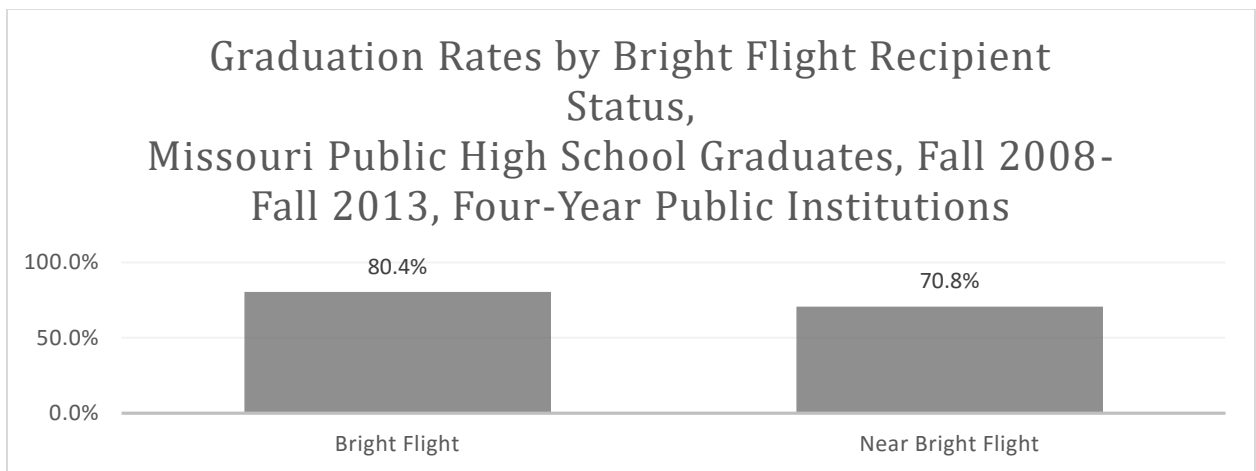
Graduation

A 2012 report prepared for the Governor by MDHE found that since 1996, 58 percent of all students, 69 percent of NBF students, and 71 percent of Bright Flight recipients completed bachelor’s degrees at public colleges and universities within six years. In addition, the study found that while graduation rates increased for all three groups since 1996 – rates for Bright Flight and “Near Bright Flight” students increased more than 12 percentage points (Missouri Department of Higher Education, 2012).

To refresh these statistics for this inquiry, data for Missouri public high school graduates who made up the 2008 through 2013 cohorts were examined. To be included in the analysis, the students must have enrolled in a Missouri public college or university in the fall immediately following graduation. FTFTDS students were examined so time spent pursuing other post high school interests and/or enrollment gaps would not complicate the degree completion analysis. The available data allowed a single six-year graduation cohort (i.e., 2008) and four three-year graduation cohorts (i.e., 2008, 2009, 2010, and 2011) to be examined (N = 6,983, see Appendix J Table J6 for selected demographics of Bright Flight (BF) and Near Bright Flight (NBF) students who were public high school graduates attending Missouri public colleges and universities between 2008 and 2013).

Figure 29

Bright Flight Six-Year Graduation Rate – 2008 Cohort



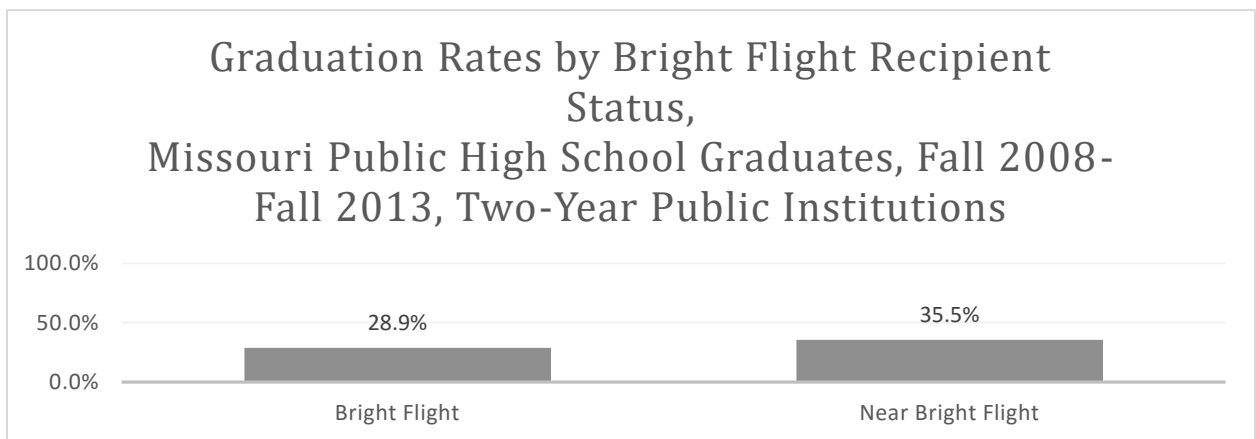
Source: Missouri Department of Higher Education.

According to Figure 29, slightly more than 80 percent of the 2008 Bright Flight 4Y sector cohort graduated within 6 years. The Near Bright Flight percentage was nearly 10 percent lower. While the findings were for a single cohort only, they closely paralleled the results of the 2012 MDHE report which found the BF and NBF FY04 cohorts six-year graduation rates to be 79 and 69 percent respectively -- lending validity to the current finding.

Bright Flight (BF) recipients' graduation rates were much lower at two-year public institutions. About 29 percent of BF students (N = 108) graduated within three years while nearly 35 percent of NBF students (N = 312) did the same. The very low 2Y graduation rate is most likely explained by imagining that many BF students who begin their postsecondary careers at 2Y institutions intend to transfer to 4Y institutions to attain bachelor's degrees. Thus, many never receive associate degrees from the sending institutions – a situation that would depress 2Y graduation rates. Instead, because BF students achieve at very high levels, those who begin at 2Y institutions likely graduate from the 4Y institutions they transfer to.

Figure 30

Bright Flight Three-Year Graduation Rate – 2008, 2009, 2010, and 2011 Cohorts



Source: Missouri Department of Higher Education, Bright Flight N= 108, Near Bright Flight N = 312

The greater percentage of high achieving students who graduated from 2Y institutions without the financial assistance of a Bright Flight scholarship (i.e., NBF students) as compared to students who were able to rely on a Bright Flight award was, at first glance, counterintuitive (see Figure 29). However, the finding may imply two logical and important phenomena. First, without the financial subsidy provided by the BF scholarship, NBF students may be less financially able than BF students. Second, because NBF students have less financial capacity to transfer to 4Y institutions -- they will logically be more likely to remain in their 2Y colleges. This would be one explanation for why NBF students graduate from 2Y institutions at

higher percentages than Bright Flight recipients. That possibility is supported by research conducted by Long and Kurlaender (2009) that found when students begin their postsecondary careers at two-year institutions, the likelihood of them completing a bachelor's degree is decreased by 14.5 percent when compared to students who started at 4Y institutions.

The relatively small gaps in graduation rates between BF recipients and high achieving non-recipients in both sectors may, like the gaps observed in persistence rates, be partially due to the impact of Bright Flight. On the other hand, the difference may be explained by the fact that higher ability students (ACT composite of 31 and higher) were compared to students with relatively lower ability levels (ACT composite of 29 and 30). In all likelihood the graduation gaps, and for that matter, gaps in persistence found between BF and NBF students are a function of a host of factors -- including but not limited to the financial impact of the Bright Flight Scholarship, student socioeconomic status, and/or differing student ability levels. Only more focused research efforts can provide more detailed insights.

Retention of Missouri Most Capable Citizens: A Regression Discontinuity Approach. Harrington, Muñoz, Curs, and Ehlert

The purpose and intent of the Missouri Bright Flight Scholarship is to discourage Missouri's highest performing students from attending out-of-state institutions in an effort to increase the probability they will ultimately choose to live and work in Missouri. However, we have seen that BF is only partially effective in accomplishing that mission. Descriptive statistics (see Figure 23) presented previously suggested that BF became less effective as students' ACT scores increased. That phenomena is better understood when placed in the context of human capital and brain drain theory.

Two important pillars of human capital theory suggest economic growth is largely dependent on nonphysical resources (e.g., workforce skills) and that individuals, being fully aware that worthwhile long-term benefits can be realized, invest in themselves by acquiring economically valuable abilities (Becker, 1962; Schultz, 1961). Brain drain theory, developed by Beine, Docquier, and Rapoport (2001), focuses on the reasons why people leave situations to accept other opportunities. It suggests that individuals will take advantage of all legitimate opportunities to substantially improve their knowledge and skills. These "improved" individuals will then take their human capital assets elsewhere if they perceive a lack of usefulness/reward in their current circumstances (Beine et al., 2001).

Bright Flight attempts to enhance human capital production in Missouri by reducing the cost of an in-state postsecondary education as compared to out-of-state opportunities. In theory then, BF students should be able to spend less to acquire economically valuable skills in Missouri. In turn, Missouri realizes a return on its investment by increasing the probability that it will produce, retain, and amass citizens that can contribute advanced skills to the state’s workforce. Conversely, if the BF award is not large enough to convince many of the state’s highest achieving students to attend college in Missouri – it is more likely they will chose to live and work outside the state as well (Groen, 2004; Zhang & Ness, 2010).

Harrington, Muñoz, Curs, and Ehlert (under review) used administrative datasets from ACT, MDHE, and the Missouri Department of Labor and Industrial Relations (DOLIR) to test BF’s most important purpose – its ability to positively influence the in-state labor market participation of the state’s highest achieving students. The sample population (N = 154,888) included all Missouri ACT test-takers who reported they would graduate high school in 1999, 2000, 2001, or 2002. An eight-year time frame was selected because it allowed sufficient time for students to earn bachelor’s degrees within six years and to subsequently secure employment. Students were then linked to their first quarter earnings for the following year, 2007, 2008, 2009, and 2010. This design permitted the researchers to fully explore the graduates’ labor force participation.

As was noted previously, in 2014 BF eligibility rules were modified to create a two-tier award structure. Missouri now provides an award of \$3,000 for Missouri high school graduates with an ACT score of 31 or higher, and while appropriations have been insufficient to fund it, an award of \$1,000 for an ACT score of 30. These changes were outside of the period of analysis so they did not impact the inquiry.

To estimate the effect of BF on Missouri workforce participation, Harrington et al. utilized an “intent to treat” model. In other words, the researchers simulated whether being *eligible* for the Bright Flight Scholarship led to changes in whether the subjects would decide to join the Missouri labor pool. To properly understand the outcomes of the analysis, it is important to remember that the “intent to treat” model is dependent on the effect of being eligible to receive BF -- not the effect of actually receiving the award. Intent-to- treat models reduce bias due to subject self-selection because the choice of whether to attend an institution in Missouri is eliminated. Thus, the actual impact of BF could be measured because the “treatment” is being BF eligible.

Harrington et al. also took advantage of a BF design element that allows eligibility, or the treatment effect, to be estimated by using regression discontinuity design.

Regression discontinuity takes advantage of discontinuities in the probability of treatment due to a small change in the variable of interest slightly above and below the treatment cut-off point. In this case, BF eligibility for the time period examined was determined by an ACT score equal to or above 30.

In congruence with the descriptive statistics presented previously, Harrington et al. discovered that Missouri employment probability is highest at slightly more than 60 percent for ACT scores of 18. In addition, the researchers noted a negative relationship between ACT score and the probability of employment in Missouri. That finding suggested that the students became more likely to leave Missouri as their ability levels increased. Both of these results concurred with statistics presented previously which indicated that students with lower ACT scores are far more likely to attend college in Missouri when compared to those with higher scores (see Figure 23). The findings strongly suggest that Missouri does indeed have a brain drain problem -- especially among those who achieve at the highest levels.

A slight plateau was exposed between ACT scores of 30 and 31, the current cutoff for Bright Flight eligibility. The researchers explained this decrease in the rate of student out-migration as possible evidence of the BF incentive at work. Harrington et al. also noted “a jump” in the percentage of students employed in Missouri at a score of 30, the eligibility requirement for the time period. The average probability of in-state employment for participants with ACT scores of 30 was found to be 47.7 percent. The counterfactual group, or those without BF eligibility, had a probability of Missouri employment of 43.4 percent. The researchers therefore concluded that Bright Flight eligibility increased the probability of in-state employment eight years after high school graduation by 4.3 percentage points. Overall, Harrington et al. asserted that being BF eligible translated into a nine percent increased probability of being employed in Missouri. These findings suggested that the BF program does indeed work to keep some of Missouri’s best and brightest studying -- and more importantly from the point of view of the state -- working in Missouri.

In conclusion, Harrington, Muñoz, Curs, and Ehlert (under review) found that the Bright Flight program is indeed associated with an increased likelihood of Missouri labor force participation -- however, they noted that the effect sizes were small. During the period of the investigation, the \$2,000 (\$3,000 currently) Bright Flight scholarship covered only a fraction of the total annual costs of attending many of Missouri’s best public institutions and even less of the costs at more expensive and exclusive private colleges and universities. This led the researchers to speculate that if the BF award had been greater, the estimates for the probability of in-state employment may have been greater as well. In the end, Harrington et al. asserted

that BF awards may not be great enough to convince many to stay in-state. That assertion is supported by Zhang and Ness (2010) who found that the size of merit aid awards are essential to program success.

CONCLUSIONS:

The Missouri Bright Flight Scholarship is the state's only financial aid program based solely on academic merit. It was established to encourage Missouri's best and brightest to attend Missouri postsecondary institutions and to remain in Missouri thereafter to live and work. Viewed through the lens suggested by brain drain theory, Bright Flight attempts to increase the creation of valuable human capital in Missouri by reducing the cost of an in-state postsecondary education relative to the cost of out-of-state alternatives. In this way, BF enhances the opportunity for eligible students to advance and improve their personal levels of human capital in Missouri - - as opposed to doing so out-of-state (Beine, Docquier, & Rapoport, 2001).

Bright Flight participation is miniscule in comparison to the other major state funded scholarship/financial aid programs (i.e., Access Missouri, Missouri A+ Schools Program) accounting for about two-percent of Missouri's higher education budget (Missouri Coordinating Board for Higher Education, 2015). 6,586 students have become BF eligible since 2011, an average of about 1,650 per year. However, on average Missouri loses 25 percent of those students to out-of-state colleges and universities -- leaving about 1,240 to enroll in Missouri institutions each year. According to MDHE, roughly 76 percent of BF recipients attend public four-year institutions, two percent choose to attend community colleges, and private four-year colleges and universities capture 22 percent.

Bright Flight students are indeed Missouri's highest achieving students and they often come from homes, cultures, and traditions that place tremendous emphasis on educational attainment, achievement, and success. These students are often rich in the cultural capital that the Missouri A+ Schools program attempts to foster and grow. Due to high levels of postsecondary savvy, it is fair to imagine that BF students often become predisposed to attend college at early ages, begin the college search process in grade school, and choose postsecondary institutions well before high school graduation. By providing incentive for students to attend Missouri colleges and universities – as it was designed to do -- BF primarily influences students during the selection and choice stages of a student's college search.

Much like Access Missouri, BF has no other *explicit* design elements to influence Hossler and Gallagher's (1987) stages of college choice other than the financial

incentive to attend a Missouri postsecondary institution. BF has no high school quality or academic rigor requirements and contains no explicit mechanisms to increase postsecondary awareness and readiness. Bright Flight does not include requirements designed to prepare students for higher educational expectations, mechanisms that encourage early program commitment, or provisions that obligate high school students to establish relationships with mentors or with postsecondary institutions that they may one day attend. These omissions make BF less than ideal when examined in relation to effective and efficient program design (Tierney & Hagedorn, 2002). So while students may be motivated to go to great lengths to prepare themselves to score in the top three percent of Missouri ACT test takers – the Bright Flight scholarship itself has no elements that *require* specific activities or actions to prepare them to do so. BF awards are designed to do one thing -- persuade the state's best and brightest citizens to study and work in Missouri. It does so by conditioning the acceptance of a BF award on attendance at a Missouri institution.

Bright Flight students persist at very high rates. Recipients who attended four- year (4Y) institutions persisted at a slightly higher percentage (95.2%) than those who had similar ACT scores but did not receive the scholarship (92.6%). Bright Flight students who initially enrolled in two-year (2Y) institutions had much lower persistence rates than those observed in the 4Y sector. That fact was partially attributed to transfer from 2Y to 4Y schools which almost certainly depresses 2Y persistence statistics. Nearly 82 percent of 2Y students who received the BF scholarship persisted compared to 77 percent of students who had similar ACT scores but did not receive an award – a difference of about five percent.

Slightly more than 80 percent of the 4Y students in the 2008-2013 cohort graduated within 6 years. The Near Bright Flight (NBF) percentage was nearly 10 percent lower. Bright Flight recipients' graduation rates were much lower at two-year public institutions. About 29 percent of BF students graduated within three years while nearly 35 percent of NBF students did the same. The very low BF graduation rates observed in the 2Y sector is likely explained by imagining that a high percentage of BF students who begin their careers at 2Y institutions transfer to 4Y schools to pursue bachelor's degrees. Thus, many may never receive degrees from their 2Y schools – a situation that would depress 2Y sector graduation rates.

Harrington et al. discovered that Missouri employment probability is highest (slightly more than 60 percent) for ACT scores of 18. In addition, the researchers noted a negative relationship between ACT score and the probability of employment in Missouri. This finding suggested that students became more likely to leave Missouri

as their ability levels increased. Both of those results concurred with the 2008-2013 descriptive statistics which indicated that students with lower ACT scores are far more likely to attend college in Missouri than those with increasingly high scores. Results of that sort suggested that Missouri may have a brain drain problem even while the Bright Flight Scholarship is in place to prevent it.

A slight dip in the percent of students leaving the state to attend college was noted between ACT scores 30 and 31, the current cutoff for Bright Flight Eligibility. That decrease in the rate of out-migration was explained as possible evidence of the BF incentive at work. Harrington et al. also noted “a jump” in the percentage of students employed in the state at an ACT score of 30, the eligibility requirement for the time period examined. These findings provided evidence that the BF program serves to keep some of Missouri’s best and brightest studying and working in Missouri.

Regression discontinuity analysis found that BF eligibility increased the probability of being employed in Missouri by about 9 percent (Harrington et al., under review). These findings aligned with the literature on merit aid and in-state postsecondary enrollment rates. Dynarski (2004) found that the Georgia HOPE scholarship positively affected the likelihood residents would enroll in an in-state college or university. Cornwell, Mustard and Sridhar (2006) found that Georgia public university first-year enrollment rates increased by about six percent after HOPE was introduced. On average, Zhang and Ness (2010) found that states with merit programs increased first-year enrollment at four-year institutions by about 10 percent.

RECOMMENDATIONS:

While Bright Flight has impressive postsecondary graduation rates – those rates may not be as high as they can or should be. Missouri Department of Higher Education (MDHE) statistics indicate that 75 percent of Bright Flight students with reported expected family contributions (EFC) of \$12,000 or less graduate college in six years or less as compared to 85 percent of those with EFCs between \$20,000 and \$29,000 and an overall BF graduation rate of 80 percent. Given the high achievement potential of all BF students, it is highly likely that upon graduation they will become high wage earners which has positive implications for Missouri’s economy. Therefore, efforts should be made to maximize the postsecondary program completion rates of all BF students. Doing so will increase the likelihood that more high ability students will eventually join the state’s labor force (Harrington et al., under review; Zhang & Ness, 2010), maximizing the state’s return on investment.

While less financially fortunate BF students clearly achieve at very high levels, these talented students somehow fail to complete their programs of study more often than their more affluent counterparts. This is obviously a problem for students and families, but it is also bad for Missouri because the state is deprived of the potential economic benefits these students would contribute as college graduates. These problems might be alleviated through program modification.

Unlike the Missouri A+ Schools Program, Bright Flight does not include requirements that are designed to improve the state's schools or the achievement capacity of the students who attend them. From the point of view of program design, the omission of these kinds of elements makes BF less than ideal -- especially from the standpoint of improving measurements of student success. Because many BF students are well prepared for postsecondary achievement by culturally rich familial circumstances and traditions – student capital increasing program elements may not be as needed by BF students as they are, for example, by typical A+ students. On the other hand, the relatively low graduation rates of more needy BF students suggest that they may benefit from requirements that would enrich their ability to succeed in postsecondary settings. So in an effort to increase success metrics for all BF students, it is recommended that the program be modified to include the types of cultural enrichment elements suggested by Tierney and Hagedorn (2002) (e.g., parental involvement, strong postsecondary institutional relationships, predictable financial support, student preparation for multiple postsecondary options, and early intervention).

Merit scholarships in other states already feature requirements to enhance student success metrics. For example, the West Virginia Promise Scholarship includes fairly ubiquitous academic requirements (i.e., high school graduation, a grade point average of at least 3.0, ACT composite score of 22 or a SAT combined score of 1020) (College Foundation of West Virginia, 2015). However, unlike Bright Flight, West Virginia Promise recipients must complete a minimum core class requirement, thereby helping to prepare them for multiple postsecondary options. West Virginia Promise recipients are also required to complete 30 postsecondary credit hours each year (College Foundation of West Virginia, 2015). This is believed to enhance measures of success including high school grade point averages, on-time graduations, and ACT scores.

Research suggests that when students attend colleges and universities in their home states, they more often remain in their states than those who do not (Adelman, 2004). Sjoquist and Winters (2014) found that while the individual characteristics of a state are very important in influencing students' decisions – on average, strong merit

aid programs increase the probability of students remaining in their home states by 2.8 percentage points. Groen (2004) found that students who attend public colleges in their home states are 15 percent more likely to live in their home states after finishing college. In examining the Missouri Bright Flight program, Harrington, Muñoz, Curs, and Ehlert (under review) found that it is associated with an increased probability (roughly 9 percent) of in-state labor force participation.

Harrington, et al. (under review) noted that BF covered only a fraction of the FY15 costs of attendance at most of Missouri's public institutions (e.g., approximately 28 percent of the tuition cost at the University of Missouri-Columbia) and even less at the states more expensive and exclusive private colleges and universities (e.g., six percent of the tuition cost at Washington University). This poor purchasing power may be a significant problem for program's power to achieve its purpose. We have seen that a quarter of BF students choose to attend out-of-state institutions and that Missouri loses an increasingly greater percentage of students as ability levels increase. It is fair to suspect this is so because ultra-high ability students may have several opportunities to attend prestigious out-of-state institutions at little or no cost.

The Georgia HOPE scholarship pays for most or all undergraduate tuition charges for full and part-time students (GAcollege411, 2015). The Florida Bright Futures Program provides a two-tiered award that covers either full or 75 percent of tuition charges at in-state public institutions. The New Mexico Lottery Success Scholarship covers full tuition at in-state public colleges and universities. Those eligible for the West Virginia Promise Scholarship receive annual awards valued at the lesser of tuition and mandatory fees or \$4,750 (College Foundation of West Virginia, 2015). In comparison, Bright Flight, which has relatively high eligibility criteria, offers a financial incentive that, because it has failed to keep pace with inflation, has actually declined in purchasing power. The relatively low and diminishing purchasing power of the BF scholarship may be at the heart of why the state is losing many of its best and brightest citizens. In fact, Harrington et al., (under review) asserted that if the BF awards had been greater the estimates for the probability of Missouri employment might have been larger. Such a statement is supported by research. Zhang and Ness (2010) found that the size of merit aid awards are essential to program effectiveness.

This inquiry has shown that Missouri loses increasingly large percentages of its students as their ability levels rise and has determined that merit program award amounts are extremely relevant to student retention. It is therefore recommended that the Higher Education Academic Scholarship be modified to increase its awards. Late legislative efforts have attempted to do just that by modifying the program to

include requirements to enhance measures of postsecondary success (e.g., completing a minimum number of yearly credits) and to improve the percentage of talented students who choose to remain in Missouri (e.g., increase the BF award by establishing a forgivable loan component). While it is essential that future inquiries specifically examine the reasons Bright Flight students themselves give for choosing out-of-state institutions to better understand how the program might be modified to improve the retention of Missouri's highest achieving students -- research indicates that implementing this inquiry's recommendations can improve the Missouri Higher Education Academic Scholarship's ability to accomplish its sole purpose -- to encourage the states most talented citizens to remain in Missouri.

Appendix A – References

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Appendix B – Logistic Regression

A reason for transforming from probability to log-odds is the difficulty of modeling probability which has a restricted range. Transforming to log-odds addresses the restricted range problem (i.e., maps probability ranging between 0 and 1 to log-odds ranging from negative infinity to positive infinity). Additionally, the logit transformation is one of the easiest to understand and interpret.

Logistic regression allows the establishment of a relationship between a binary outcome variable and a group of predictor variables.

let y be the binary outcome variable indicating failure/success with 0/1 and p be the probability of y to be 1, $p = \text{prob}(y=1)$.

Let x_1, \dots, x_k be a set of predictor variables. Then the logistic regression of y on x_1, \dots, x_k estimates parameter values for $\beta_0, \beta_1, \dots, \beta_k$ via maximum likelihood method of the following equation.

$$\text{logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1 * x_1 + \dots + \beta_k * x_k$$

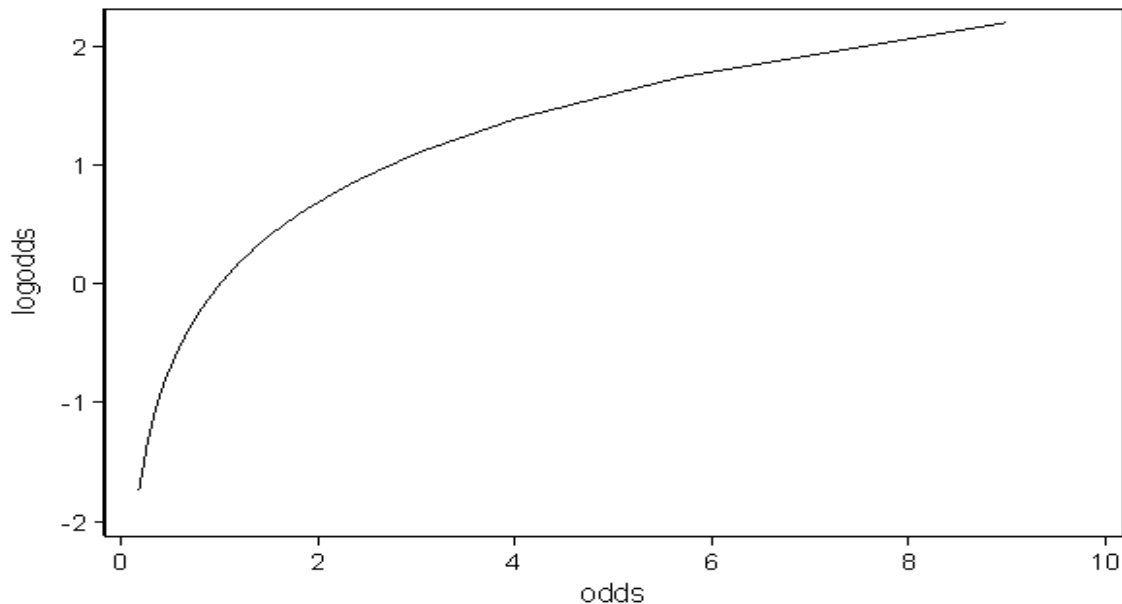
In terms of probabilities, the equation above is translated into

$$p = \exp(\beta_0 + \beta_1 * x_1 + \dots + \beta_k * x_k) / (1 + \exp(\beta_0 + \beta_1 * x_1 + \dots + \beta_k * x_k)).$$

Appendix C – Probability to Odds to Log-odds Conversions

The monotonic transformation from odds to log of odds is the log transformation. The greater the odds, the greater the log of odds and vice versa. The table below shows the relationship among the probability, odds and log of odds. The plot of log-odds against odds is also shown.

<u>p</u>	<u>odds</u>	<u>logodds</u>
.001	.001001	-6.906755
.01	.010101	-4.59512
.15	.1764706	-1.734601
.2	.25	-1.386294
.25	.3333333	-1.098612
.3	.4285714	-.8472978
.35	.5384616	-.6190392
.4	.6666667	-.4054651
.45	.8181818	-.2006707
.5	1	0
.55	1.222222	.2006707
.6	1.5	.4054651
.65	1.857143	.6190392
.7	2.333333	.8472978
.75	3	1.098612
.8	4	1.386294
.85	5.666667	1.734601
.9	9	2.197225
.999	999	6.906755
.9999	9999	9.21024



Appendix D – Access Missouri Odds Ratio Estimates -- Persistence

Table D1

Access Missouri Log-Odds Ratio Estimates -- Two-Year Student Persistence

Effect	Point Estimate	95% Wald Confidence Limits	
Male vs Female	0.890	0.860	0.922
Asian Pacific Islander vs White	1.379	1.202	1.583
African American vs White	0.919	0.860	0.981
Hispanic vs White	1.126	1.001	1.267
OTHER/UNK vs White	0.920	0.869	0.973
remath 1-3 vs 0	1.016	0.953	1.084
remath 4+ vs 0	1.108	0.978	1.255
rehours 1-3 vs 0	0.928	0.868	0.993
rehours 10+ vs 0	0.674	0.575	0.790
rehours 4-6 vs 0	0.838	0.773	0.908
rehours 7-9 vs 0	0.758	0.690	0.833
rehours UNK vs 0	1.049	0.747	1.473
Access recip. vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	1.507	1.433	1.585
EFC \$12,001 - \$15,000 vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	1.229	1.130	1.336
EFC<=\$12,000, FAFSA post-April vs EFC<=\$12,000, FAFSA pre- April 1, non-recip.	0.917	0.871	0.965
act 17-19 vs 13-16	1.008	0.949	1.071
act 20-22 vs 13-16	0.964	0.901	1.031
act 23-25 vs 13-16	1.009	0.931	1.093
act 26-28 vs 13-16	1.145	1.034	1.269
act 29-30 vs 13-16	1.334	1.127	1.578
act 31-35 vs 13-16	1.889	1.525	2.340
act 6-12 vs 13-16	0.703	0.590	0.838

Table D1

Access Missouri Log-Odds Ratio Estimates -- Two-Year Student Persistence

Effect	Point Estimate	95% Wald Confidence Limits	
act UNK vs 13-16	0.643	0.595	0.695
hsgpa 1.51-2.00 vs 0.00-1.50	0.945	0.724	1.233
hsgpa 2.01-2.50 vs 0.00-1.50	1.190	0.923	1.533
hsgpa 2.51-3.00 vs 0.00-1.50	1.587	1.235	2.041
hsgpa 3.01-3.50 vs 0.00-1.50	2.154	1.675	2.771
hsgpa 3.51-4.00 vs 0.00-1.50	3.693	2.864	4.761
hsgpa UNK vs 0.00-1.50	1.637	1.270	2.110
first 0 vs 1	1.176	1.134	1.219
first 9 vs 1	1.012	0.955	1.073
hocode U vs UNKNOW	0.658	0.408	1.062
Dependent vs Independent	1.519	1.419	1.626
aplus 0 vs 1	0.754	0.709	0.802
Sector 2Y vs 4Y	0.651	0.621	0.683
Pell Eligibility No vs Yes	1.328	1.271	1.388

NOTE: See Appendix J, Table J1 for full data demographic description. Access recip. = Access Missouri award recipient (N = 14,921), act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander (N = 782), EFC = Expected Family Contribution, first = first generation student (N = 18,989), hocode = high school identification code, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown, 2Y = Two year institution, 4Y = Four year institution

Appendix E – Access Missouri Odds Ratio Estimates – Graduation

Table E1

Access Missouri Odds Ratio Estimates – Two -Year Student Graduation

Effect	Point Estimate	95% Wald Confidence Limits	
Male vs Female	1.173	1.094	1.257
Asian Pacific Islander vs White	0.987	0.770	1.265
African American vs White	0.604	0.490	0.744
Hispanic vs White	0.870	0.675	1.120
OTHER/UNK vs White	0.849	0.740	0.973
remath 1-3 vs 0	1.029	0.904	1.171
remath 4+ vs 0	1.672	1.231	2.27
rehours 1-3 vs 0	0.638	0.561	0.725
rehours 10+ vs 0	0.13	0.066	0.256
rehours 4-6 vs 0	0.353	0.299	0.418
rehours 7-9 vs 0	0.219	0.175	0.273
rehours UNK vs 0	0.569	0.206	1.571
Access recip. vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	1.116	1.018	1.224
EFC \$12,0001 - \$15,000 vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	0.946	0.826	1.083
EFC<=\$12,000, FAFSA post-April vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	0.634	0.576	0.698
act 17-19 vs 13-16	1.100	0.966	1.252
act 20-22 vs 13-16	1.082	0.942	1.242
act 23-25 vs 13-16	0.930	0.790	1.096

Table E1 -- Continued

Access Missouri Odds Ratio Estimates – Two -Year Student Graduation

Effect	Point Estimate	95% Wald Confidence Limits
act 26-28 vs 13-16	0.886	0.709 1.107
act 29-30 vs 13-16	1.303	0.814 2.085
act 31-35 vs 13-16	0.637	0.291 1.394
act 6-12 vs 13-16	0.426	0.212 0.855
act UNK vs 13-16	0.955	0.809 1.127
hsgpa 1.51-2.00 vs 0.00-1.50	1.832	0.550 6.096
hsgpa 2.01-2.50 vs 0.00-1.50	2.063	0.638 6.672
hsgpa 2.51-3.00 vs 0.00-1.50	3.644	1.135 11.703
hsgpa 3.01-3.50 vs 0.00-1.50	5.608	1.747 18.001
hsgpa 3.51-4.00 vs 0.00-1.50	9.553	2.972 30.704
hsgpa UNK vs 0.00-1.50	3.835	1.192 12.346
first 0 vs 1	1.041	0.969 1.118
first 9 vs 1	0.854	0.747 0.977
hscode U vs UNK	1.293	0.362 4.620
Dependent vs Independent	1.565	1.309 1.871
aplus 0 vs 1	0.655	0.592 0.725
Pell Eligibility No vs Yes	1.455	1.339 1.581

NOTE: See Appendix J, Table J1 for full data demographic description. Access recip. = Access Missouri award recipient, act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, DPNDNC_CD D = Dependent, EFC = Expected Family Contribution, first = first generation student, hscode = high school identification code, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, I = Independent, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours UNK = Unknown

Table E2

Access Missouri Odds Ratio Estimates – Four-Year Student Graduation

Effect	Point Estimate	95% Wald Confidence Limits	
Male vs Female	0.835	0.703	0.993
Asian/Pacific Islander vs White	1.019	0.544	1.909
Black vs White	0.735	0.549	0.984
Hispanic vs White	0.582	0.332	1.020
OTHER/UNK vs White	1.010	0.685	1.488
remath 1-3 vs 0	0.974	0.683	1.388
remath 4+ vs 0	4.428	0.427	45.888
rehours 1-3 vs 0	0.807	0.587	1.111
rehours 4-6 vs 0	0.824	0.501	1.356
Access recip. vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	1.317	0.880	1.971
EFC \$12,0001 - \$15,000 vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	1.281	0.741	2.215
EFC<=\$12,000, FAFSA post-April vs EFC<=\$12,000, FAFSA pre-April 1, non-recip.	0.595	0.379	0.934
act 6-12 vs 13-16	0.952	0.233	3.879
act 17-19 vs 13-16	1.342	0.936	1.923
act 20-22 vs 13-16	1.403	0.952	2.070
act 23-25 vs 13-16	0.797	0.519	1.225
act 26-28 vs 13-16	1.001	0.620	1.616
act 29-30 vs 13-16	1.640	0.866	3.108
act 31-35 vs 13-16	1.515	0.736	3.120
act UNK vs 13-16	0.485	0.237	0.991
hsgpa 1.51-2.00 vs 0.00-1.50	1.310	0.134	12.776
hsgpa 2.01-2.50 vs 0.00-1.50	4.562	0.552	37.683
hsgpa 2.51-3.00 vs 0.00-1.50	6.366	0.780	51.955
hsgpa 3.01-3.50 vs 0.00-1.50	10.886	1.335	88.767
hsgpa 3.51-4.00 vs 0.00-1.50	26.354	3.214	216.068
hsgpa UNK vs 0.00-1.50	8.168	1.000	66.748

Table E2

Access Missouri Odds Ratio Estimates – Four-Year Student Graduation

Effect	Point Estimate	95% Wald Confidence Limits	
first 0 vs 1	1.261	1.051	1.513
first 9 vs 1	1.139	0.854	1.521
Dependent vs Independent	1.157	0.742	1.804
Pell Eligibility No vs Yes	1.308	1.093	1.566

NOTE: See Appendix J, Table J1 for full data demographic description Access recip. = Access Missouri award recipient, act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, EFC = Expected Family Contribution, first = first generation student, hscore = high school identification code, hsgpa = high school grade point average, FAFSA = Free Application for Federal Student Aid, I = Independent, non-recip. = Access Missouri award non-recipient, rehours = remediation hours, remath = remedial mathematics hours UNK = Unknown

Appendix F – A+ Schools Odds Ratio Estimates – Persistence

Table F1

Missouri A+ Odds Ratio Estimates -- Student Persistence

	Point Estimate	95% Wald Confidence Limits	
Male vs Female	0.862	0.833	0.892
Asian/PI vs White	1.402	1.221	1.610
Black vs White	0.848	0.785	0.916
Hispanic vs White	1.278	1.137	1.437
UNK vs WHITE	0.965	0.912	1.021
remath 1-3 vs 0	0.969	0.922	1.017
remath 4+ vs 0	1.050	0.944	1.169
rehours 1-3 vs 0	1.055	0.990	1.124
rehours 10+ vs 0	0.847	0.729	0.984
rehours 4-6 vs 0	0.911	0.845	0.982
rehours 7-9 vs 0	0.829	0.761	0.903
rehours UNK vs 0	1.061	1.008	1.117
aplus 1 vs 0	1.548	1.484	1.615
act 17-19 vs 13-16	1.026	0.966	1.089
act 20-22 vs 13-16	1.052	0.985	1.123
act 23-25 vs 13-16	1.026	0.949	1.110
act 26-28 vs 13-16	1.127	1.010	1.257
act 29-30 vs 13-16	0.994	0.794	1.244
act 31-35 vs 13-16	0.997	0.703	1.413
act 6-12 vs 13-16	0.830	0.690	0.997
act UNK vs 13-16	0.726	0.674	0.783
hsgpa 1.51-2.00 vs 0.00-1.50	0.953	0.721	1.260
hsgpa 2.01-2.50 vs 0.00-1.50	1.122	0.859	1.467
hsgpa 2.51-3.00 vs 0.00-1.50	1.426	1.093	1.859
hsgpa 3.01-3.50 vs 0.00-1.50	1.792	1.374	2.338

Table F1

Missouri A+ Odds Ratio Estimates -- Student Persistence

	Point Estimate	95% Wald Confidence Limits	
hsgpa 3.51-4.00 vs 0.00-1.50	2.499	1.911	3.268
hsgpa UNK vs 0.00-1.50	1.343	1.028	1.754
first 0 vs 1	1.081	1.041	1.123
first 9 vs 1	0.955	0.895	1.019
primary efc amt \$12,001 - 19,999 vs \$0 - 12,000	1.013	0.954	1.075
primary efc amt \$20,000 - 29,999 vs \$0 - 12,000	1.082	1.002	1.167
primary efc amt \$30,000 - 39,999 vs \$0 - 12,000	1.055	0.939	1.186
primary efc amt \$40,000 + vs \$0 - 12,000	1.029	0.926	1.143
primary efc amt UNK vs \$0 - 12,000	1.190	1.094	1.294
hocode 000000 vs UNKNOW	0.242	0.089	0.659

NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hocode = high school identification code, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 62,743. See Appendix J, Tables J2 and J3 for a comprehensive demographic description of the data.

Appendix G – A+ Schools Odds Ratio Estimates -- Graduation

Table G1

Missouri A+ Odds Ratio Estimates -- Graduation

	Point Estimate	95% Wald Confidence Limits	
Male vs Female	1.002	0.951	1.057
Asian/PI vs White	0.923	0.756	1.128
Black vs White	0.731	0.62	0.862
Hispanic vs White	0.851	0.698	1.037
UNK vs White	0.862	0.777	0.956
remath 1-3 vs 0	0.633	0.59	0.68
remath 4+ vs 0	0.884	0.706	1.109
rehours 1-3 vs 0	0.958	0.869	1.055
rehours 10+ vs 0	0.391	0.211	0.722
rehours 4-6 vs 0	0.643	0.561	0.738
rehours 7-9 vs 0	0.444	0.364	0.542
rehours UNK vs 0	0.897	0.84	0.958
aplus 1 vs 0	2.105	1.979	2.239
act 17-19 vs 13-16	1.186	1.067	1.319
act 20-22 vs 13-16	1.43	1.283	1.594
act 23-25 vs 13-16	1.394	1.236	1.572
act 26-28 vs 13-16	1.517	1.304	1.765
act 29-30 vs 13-16	1.625	1.21	2.183
act 31-35 vs 13-16	1.569	0.986	2.497
act 6-12 vs 13-16	0.491	0.289	0.835
act UNK vs 13-16	1.029	0.904	1.171
hsgpa 1.51-2.00 vs 0.00-1.50	1.557	0.659	3.682
hsgpa 2.01-2.50 vs 0.00-1.50	1.563	0.677	3.608
hsgpa 2.51-3.00 vs 0.00-1.50	2.597	1.132	5.958
hsgpa 3.01-3.50 vs 0.00-1.50	3.76	1.639	8.622
hsgpa 3.51-4.00 vs 0.00-1.50	6.634	2.891	15.225
hsgpa UNK vs 0.00-1.50	2.768	1.205	6.359
first 0 vs 1	0.985	0.931	1.042
first 9 vs 1	0.854	0.765	0.953
primary efc amt \$12,001 - 19,999 vs \$0 - 12,000	1.073	0.99	1.164

Table G1 -- Continued

Missouri A+ Odds Ratio Estimates -- Graduation

	Point Estimate	95% Wald Confidence Limits	
primary efc amt \$20,000 - 29,999 vs \$0 - 12,000	1.038	0.939	1.148
primary efc amt \$30,000 - 39,999 vs \$0 - 12,000	0.894	0.765	1.045
primary efc amt \$40,000 + vs \$0 - 12,000	1.086	0.942	1.253
primary efc amt UNK vs \$0 - 12,000	0.829	0.711	0.965
hocode 000000 vs UNKNOW	0.821	0.217	3.102

NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hocode = high school identification code, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 42,441. See Appendix J, Tables J2 and J4 for a comprehensive demographic description of the data.

Appendix H – A+ Schools Odds Ratio Estimates -- Transfer

Table H1

Missouri A+ Odds Ratio Estimates -- Transfer

	Point Estimate	95% Wald Confidence Limits	
Male vs Female	0.888	0.841	0.938
Asian/PI vs White	1.114	0.921	1.348
Black vs White	1.225	1.078	1.392
Hispanic vs White	1.087	0.910	1.298
UNK vs White	1.013	0.916	1.121
remath 1-3 vs 0	0.827	0.774	0.884
remath 4+ vs 0	0.794	0.596	1.058
rehours 1-3 vs 0	0.861	0.767	0.967
rehours 10+ vs 0	0.857	0.531	1.385
rehours 4-6 vs 0	0.772	0.667	0.893
rehours 7-9 vs 0	0.647	0.539	0.776
rehours UNK vs 0	0.875	0.809	0.946
aplus 1 vs 0	1.359	1.262	1.464
act 17-19 vs 13-16	1.348	1.225	1.483
act 20-22 vs 13-16	1.600	1.446	1.770
act 23-25 vs 13-16	1.898	1.690	2.131
act 26-28 vs 13-16	2.081	1.782	2.431
act 29-30 vs 13-16	2.223	1.610	3.069
act 31-35 vs 13-16	2.775	1.684	4.573
act 6-12 vs 13-16	0.434	0.282	0.667
act UNK vs 13-16	0.640	0.567	0.722
hsgpa 1.51-2.00 vs 0.00-1.50	1.042	0.608	1.787
hsgpa 2.01-2.50 vs 0.00-1.50	1.296	0.773	2.174
hsgpa 2.51-3.00 vs 0.00-1.50	1.556	0.932	2.599
hsgpa 3.01-3.50 vs 0.00-1.50	2.102	1.258	3.510
hsgpa 3.51-4.00 vs 0.00-1.50	3.133	1.872	5.242

Table H1 -- Continued

Missouri A+ Odds Ratio Estimates -- Transfer

	Point Estimate	95% Wald Confidence Limits	
hsgpa UNK vs 0.00-1.50	1.548	0.925	2.589
first 0 vs 1	1.344	1.266	1.427
first 9 vs 1	1.015	0.909	1.133
primary efc amt \$12,001 - 19,999 vs \$0 - 12,000	1.074	0.978	1.180
primary efc amt \$20,000 - 29,999 vs \$0 - 12,000	1.146	1.026	1.280
primary efc amt \$30,000 - 39,999 vs \$0 - 12,000	1.190	1.010	1.401
primary efc amt \$40,000 + vs \$0 - 12,000	1.432	1.228	1.670
primary efc amt UNK vs \$0 - 12,000	1.411	1.144	1.739
hocode 000000 vs UNKNOW	0.352	0.108	1.148

NOTE: act = ACT score, aplus = Missouri A+ scholarship eligible, ASIAN/PI = Asian Pacific Islander, efc = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, first = first generation student, hocode = high school identification code, hsgpa = high school grade point average, rehours = remediation hours, remath = remedial mathematics hours, UNK = Unknown. N = 31,307. See Appendix J, Tables J2 and J5 for comprehensive demographic data descriptions.

Appendix J – Data Demographic Breakdown

Table J1

Access Recipients and Non-Recipient Comparison Groups -- Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Access Recipient.	EFC \$12,001 - \$15,000	EFC<=\$12,000, FAFSA post-April	EFC<=\$12,000, FAFSA pre-April 1, non-recipient.	Grand Total
Year					
2008	1,627	354	2,130	1,120	5,231
2009	2,302	417	2,335	1,537	6,591
2010	2,222	425	2,491	2,334	7,472
2011	3,156	536	2,466	2,498	8,656
2012	2,895	491	2,358	2,244	7,988
2013	2,719	479	2,592	2,131	7,921
2Y Total	14,921	2,702	14,372	11,864	43,859
2008	2,601	149	622	171	3,543
2009	2,946	315	572	211	4,044
2010	3,356	340	553	334	4,583
2011	5,787	685	576	473	7,521
2012	5,671	603	589	387	7,250
2013	5,062	529	551	349	6,491
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Year	40,344	5,323	17,835	13,789	77,291
Gender					
Female	8,891	1,338	7,746	6,542	24,517
Male	6,030	1,364	6,626	5,322	19,342
2Y Total	14,921	2,702	14,372	11,864	43,859
Female	15,016	1,446	1,846	1,118	19,426
Male	10,407	1,175	1,617	807	14,006
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Gender	40,344	5,323	17,835	13,789	77,291

Table J1 -- Continued

Access Recipients and Non-Recipient Comparison Groups -- Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Access Recipient.	EFC \$12,001 - \$15,000	EFC<=\$12,000, FAFSA post-April	EFC<=\$12,000, FAFSA pre-April 1, non-recip.	Grand Total
First Generation					
No	6,092	1,646	6,746	5,904	20,388
Yes	7,067	938	6,043	4,941	18,989
Unknown	1,762	118	1,583	1,019	4,482
2Y Total	14,921	2,702	14,372	11,864	43,859
No	13,818	1,978	1,797	988	18,581
Yes	9,271	555	1,299	735	11,860
Unknown	2,334	88	367	202	2,991
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- First Generation	40,344	5,323	17,835	13,789	77,291
Pell Eligible					
No	1,640	2,702	3,648	5,828	13,818
Yes	13,281		10,724	6,036	30,041
2Y Total	14,921	2,702	14,372	11,864	43,859
No	8,055	2,621	1,027	550	12,253
Yes	17,368		2,436	1,375	21,179
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Pell Eligibility	40,344	5,323	17,835	13,789	77,291
Dependent/Independent					
Dependent	13,704	2,701	13,137	11,370	40,912
Independent	1,217	1	1,235	494	2,947
2Y Total	14,921	2,702	14,372	11,864	43,859
Dependent	24,360	2,621	3,226	1,799	32,006
Independent	1,063		237	126	1,426
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Dependent/Independent	40,344	5,323	17,835	13,789	77,291

Table J1 -- Continued

Access Recipients and Non-Recipient Comparison Groups -- Missouri Students Same-Year High

School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Access Recipient.	EFC \$12,001 - \$15,000	EFC<=\$12,000, FAFSA post-April	EFC<=\$12,000, FAFSA pre-April 1, non-recv.	Grand Total
Race					
Asian/Pacific Islander	308	26	238	210	782
Black	1,504	81	1,960	1,323	4,868
Hispanic	359	49	379	224	1,011
Other/Unknown	1,567	265	1,757	1,410	4,999
White	11,183	2,281	10,038	8,697	32,199
2Y Total	14,921	2,702	14,372	11,864	43,859
Asian/Pacific Islander	522	31	86	42	681
Black	4,862	148	954	496	6,460
Hispanic	443	44	73	50	610
Other/Unknown	2,587	289	328	185	3,389
White	17,009	2,109	2,022	1,152	22,292
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Race	40,344	5,323	17,835	13,789	77,291
Remedial Hours - Math					
0	7,310	1,506	6,242	6,091	21,149
1-3	7,018	1,060	7,450	5,291	20,819
4+	593	136	679	482	1,890
UNK			1		1
2Y Total	14,921	2,702	14,372	11,864	43,859
0	20,301	2,249	2,379	1,422	26,351
1-3	5,096	370	1,077	501	7,044
4+	26	2	7	2	37
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Remedial Hours - Math	40,344	5,323	17,835	13,789	77,291
Total Remedial Hours					
0	5,920	1,275	4,869	5,144	17,208

Table J1 -- Continued

Access Recipients and Non-Recipient Comparison Groups -- Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Access Recipient.	EFC \$12,001 - \$15,000	EFC<=\$12,000, FAFSA post-April	EFC<=\$12,000, FAFSA pre-April 1, non-recip.	Grand Total
1-3	4,262	768	4,046	3,191	12,267
4-6	2,623	428	2,773	1,905	7,729
7-9	1,774	205	2,251	1,389	5,619
10+	322	26	420	228	996
UNK	20		13	7	40
2Y Total	14,921	2,702	14,372	11,864	43,859
0	19,023	2,169	2,045	1,246	24,483
1-3	4,499	336	824	396	6,055
4-6	1,224	87	393	189	1,893
7-9	538	21	179	88	826
10+	11		2		13
UNK	128	8	20	6	162
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Total Remedial Hours	40,344	5,323	17,835	13,789	77,291
Composite ACT					
6-12	165	14	176	113	468
13-16	2,579	300	2,202	1,916	6,997
17-19	3,739	651	2,737	2,952	10,079
20-22	2,966	662	2,030	2,607	8,265
23-25	1,376	379	955	1,248	3,958
26-28	426	137	280	444	1,287
29-30	80	22	55	66	223
31-35	34	12	18	24	88
Unknown	3,556	525	5,919	2,494	12,494
2Y Total	14,921	2,702	14,372	11,864	43,859
6-12	73	1	51	10	135
13-16	1,562	67	484	243	2,356
17-19	4,871	353	825	449	6,498
20-22	6,628	617	820	474	8,539
23-25	5,582	661	561	323	7,127
26-28	3,670	490	271	176	4,607
29-30	1,274	179	78	67	1,598

Table J1 -- Continued

Access Recipients and Non-Recipient Comparison Groups -- Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Access Recipient.	EFC \$12,001 - \$15,000	EFC<=\$12,000, FAFSA post-April	EFC<=\$12,000, FAFSA pre-April 1, non-recv.	Grand Total
31-35	1,119	216	60	75	1,470
UNK	644	37	313	108	1,102
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- Composite ACT	40,344	5,323	17,835	13,789	77,291
High School GPA					
0.00-1.50	65	3	68	45	181
1.51-2.00	481	48	437	282	1,248
2.01-2.50	1,275	203	1,163	937	3,578
2.51-3.00	2,648	508	2,069	2,094	7,319
3.01-3.50	2,920	613	2,024	2,565	8,122
3.51-4.00	2,569	506	1,362	2,332	6,769
Unknown	4,963	821	7,249	3,609	16,642
2Y Total	14,921	2,702	14,372	11,864	43,859
0.00-1.50	51	2	32	7	92
1.51-2.00	309	16	121	43	489
2.01-2.50	1,329	83	340	166	1,918
2.51-3.00	3,570	310	644	325	4,849
3.01-3.50	6,200	591	756	443	7,990
3.51-4.00	10,970	1,344	792	647	13,753
UNK	2,994	275	778	294	4,341
4Y Total	25,423	2,621	3,463	1,925	33,432
Grand Total -- High School GPA	40,344	5,323	17,835	13,789	77,291

Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013. Source: Missouri Department of Higher Education. NOTE: EFC = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, 2Y = Two year institution, 4Y = Four year institution

Table J2

*A+ Recipients and Non-Recipients -- All Missouri Students Same-Year High School
Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013*

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Year				
2008	9,538	15.20	9,538	15.20
2009	10,528	16.78	20,066	31.98
2010	11,241	17.92	31,307	49.90
2011	11,134	17.75	42,441	67.64
2012	9,828	15.66	52,269	83.31
2013	10,474	16.69	62,743	100.00
Gender				
Female	33,677	53.67	33,677	53.67
Male	29,058	46.31	62,735	99.99
Unreported	8	0.01	62,743	100.00
First Generation				
No = 0	29,325	46.74	29,325	46.74
Yes = 1	23,039	36.72	52,364	83.46
Unknown = 9	10,379	16.54	62,743	100.00
A+ Recipient				
No=0	38,150	60.80	38,150	60.80
Yes=1	24,593	39.20	62,743	100.00
Pell Eligibility				
No = 0	26,305	41.92	26,305	41.92
Unknown = 9	5,294	8.44	31,599	50.36
Yes = 1	31,144	49.64	62,743	100.00
Dependent/ Independent				
Dependent	54,476	86.82	54,476	86.82
Independent	2,973	4.74	57,449	91.56
Unknown	5,294	8.44	62,743	100.00
Race				
Asian/Pacific Islander	1,063	1.69	1,063	1.69
Black	5,437	8.67	6,500	10.36
Hispanic	1,416	2.26	7,916	12.62

Table J2

A+ Recipients and Non-Recipients -- All Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Other/Unknown	6,996	11.15	14,912	23.77
White	47,831	76.23	62,743	100.00
Remedial Hours - Math				
0	32,583	51.93	32,583	51.93
1-3	27,660	44.08	60,243	96.02
4+	2,500	3.98	62,743	100.00
Total Remedial Hours				
0	18,970	30.23	18,970	30.23
1-3	11,023	17.57	29,993	47.80
10+	1,011	1.61	31,004	49.41
4-6	6,971	11.11	37,975	60.52
7-9	4,702	7.49	42,677	68.02
Unknown	20,066	31.98	62,743	100.00
ACT Score				
13-16	8,755	13.95	8,755	13.95
17-19	13,765	21.94	22,520	35.89
20-22	13,005	20.73	35,525	56.62
23-25	7,260	11.57	42,785	68.19
26-28	2,548	4.06	45,333	72.25
29-30	422	0.67	45,755	72.92
31-35	165	0.26	45,920	73.19
6-12	528	0.84	46,448	74.03
Unknown	16,295	25.97	62,743	100.00
High School GPA				
0.00-1.50	238	0.38	238	0.38
1.51-2.00	1,646	2.62	1,884	3.00
2.01-2.50	4,831	7.70	6,715	10.70
2.51-3.00	10,141	16.16	16,856	26.87

Table J2

A+ Recipients and Non-Recipients -- All Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3.01-3.50	11,884	18.94	28,740	45.81
3.51-4.00	11,285	17.99	40,025	63.79
Unknown	22,718	36.21	62,743	100.00
Expected Family Contribution (EFC)				
\$0 - 12,000	43,345	69.08	43,345	69.08
\$12,001 - 19,999	6,718	10.71	50,063	79.79
\$20,000 - 29,999	3,972	6.33	54,035	86.12
\$30,000 - 39,999	1,529	2.44	55,564	88.56
\$40,000 +	1,885	3.00	57,449	91.56
Unknown	5,294	8.44	62,743	100.00

Missouri Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013. Source: Missouri Department of Higher Education. EFC = Expected Family Contribution, FAFSA = Free Application for Federal Student Aid, 2Y = Two year institution, 4Y = Four year institution

Table J3

Persistence -- A+ Recipients, Same-Year High School Graduating Classes Enrolled in Missouri Public Institutions of Higher Education, Fall 2008-2013 (as available)

	Year						Total
	2008	2009	2010	2011	2012	2013	
Not Persist							
Frequency	1,086	1,141	1,308	1,276	1,363	1,334	7,508
Percent	4.42	4.64	5.32	5.19	5.54	5.42	30.53
Row Percent	14.46	15.20	17.42	17.00	18.15	17.77	
Col Percent	30.70	29.55	31.65	29.50	31.49	30.26	
Persist							
Frequency	2,451	2,720	2,825	3,050	2,965	3,074	17,085
Percent	9.97	11.06	11.49	12.40	12.06	12.50	69.47
Row Percent	14.35	15.92	16.53	17.85	17.35	17.99	
Col Percent	69.30	70.45	68.35	70.50	68.51	69.74	
Total							
	3,537	3,861	4,133	4,326	4,328	4,408	24,593
	14.38	15.70	16.81	17.59	17.60	17.92	100.00

Missouri A+ recipients in classes of 2008-2013, N = 24,593 who enrolled in public colleges and universities as FTFTDS students during the fall following high school matriculation.

Table J4

Graduation -- A+ Recipients, Same-Year High School Graduating Classes Enrolled in Missouri Public Institutions of Higher Education, Fall 2008-2013 (as available)

	Year						Total
	2008	2009	2010	2011	2012	2013	
Frequency	0	0	0	0	4,328	4,408	8,736
Percent	0.00	0.00	0.00	0.00	17.60	17.92	35.52
Row Percent	0.00	0.00	0.00	0.00	49.54	50.46	
Col Percent.	0.00	0.00	0.00	0.00	100.00	100.00	
Did not Graduate Within Three Years							
Frequency	2,396	2,602	2,784	2,825	0	0	10,607
Percent	9.74	10.58	11.32	11.49	0.00	0.00	43.13
Row Percent	22.59	24.53	26.25	26.63	0.00	0.00	
Col Percent	67.74	67.39	67.36	65.30	0.00	0.00	
Graduated Within Three Years							
Frequency							
Percent	1,141	1,259	1,349	1,501	0	0	5,250
Row Percent	4.64	5.12	5.49	6.10	0.00	0.00	21.35
Col Percent	21.73	23.98	25.70	28.59	0.00	0.00	
	32.26	32.61	32.64	34.70	0.00	0.00	
Total	3,537	3,861	4,133	4,326	4,328	4,408	24,593
	14.38	15.70	16.81	17.59	17.60	17.92	100.00

Missouri A+ recipients in classes of 2008-2013, N = 24,593 who enrolled in public colleges and universities as FTFTDS students during the fall following high school matriculation.

Table J5

4Y Transfer -- A+ Recipients, Same-Year High School Graduating Classes Enrolled in Public Institutions of Higher Education, Fall 2008-2013 (as available)

	Year						Total
	2008	2009	2010	2011	2012	2013	
Frequency	0	0	0	4,326	4,328	4,408	13,062
Percent	0.00	0.00	0.00	17.59	17.60	17.92	53.11
Row Percent	0.00	0.00	0.00	33.12	33.13	33.75	
Col Percent.	0.00	0.00	0.00	100.00	100.00	100.00	
Did not Transfer							
Frequency							
Percent	2,164	2,314	2,475	0	0	0	6,953
Row Percent	8.80	9.41	10.06	0.00	0.00	0.00	28.27
Col Percent	31.12	33.28	35.60	0.00	0.00	0.00	
	61.18	59.93	59.88	0.00	0.00	0.00	
4Y Transfer							
Frequency	1,373	1,547	1,658	0	0	0	4,578
Percent	5.58	6.29	6.74	0.00	0.00	0.00	18.62
Row Percent	29.99	33.79	36.22	0.00	0.00	0.00	
Col Percent	38.82	40.07	40.12	0.00	0.00	0.00	
Total	3,537	3,861	4,133	4,326	4,328	4,408	24,593
	14.38	15.70	16.81	17.59	17.60	17.92	100.00

Missouri A+ recipients in classes of 2008-2013, N = 24,593 who enrolled as in public colleges and universities as FTFTDS students during the fall following high school matriculation.

Table J6

Selected Demographics of Bright Flight and Near Bright Flight Students, Public High School Graduates Attending Public MO Colleges and Universities, 2008-2013

Race	NBF	BF	Row Total
Asian/Pacific Islander	98	97	195
Black	45	10	55
Hispanic	38	19	57
Other/Unknown	422	465	887
White	2,946	2,843	5,789
Grand Total	3,549	3,434	6,983
Gender	NBF	BF	Row Total
Female	1,750	1,368	3,118
Male	1,799	2,066	3,865
Grand Total	3,549	3,434	6,983
Institutional Sector	NBF	BF	Row Total
2Y	312	108	420
4Y	3,237	3,326	6,563
Grand Total	3,549	3,434	6,983
Pell Eligibility	NBF	BF	Row Total
N	2,635	2,740	5,375
Y	914	694	1,608
Grand Total	3,549	3,434	6,983
ACT Score	NBF	BF	Row Total
29-30	3,549		3,549
31-32		2,565	2,565
33-35		869	869
Grand Total	3,549	3,434	6,983
HS GPA (via ACT)	NBF	BF	Row Total
0.00-3.00	180	100	280
3.01-3.50	463	285	748
3.51-4.00	2,617	2,809	5,426
Grand Total	3,260	3,194	6,454

Bright Flight and Near Bright Flight Students Same-Year High School Graduating Classes Enrolled in Public Higher Education Institutions, Fall 2008-2013. N = 6,983. Source: Missouri Department of Higher Education. NOTE: Not all students reported High School Grade Point Average. HS GPA = High School Grade Point Average, NBF = Near Bright Flight non-recipient, BF = Bright Flight Scholarship recipient, 2Y = Two year institution, 4Y = Four year institution