



ADMISSIONS
SELECTIVITY FOR

MISSOURI'S PUBLIC
UNIVERSITIES

**AUTUMN BOYD &
EMELIA DUNSTON**

ED.D. CAPSTONE PROJECT
PEABODY COLLEGE OF
EDUCATION & HUMAN
DEVELOPMENT
VANDERBILT UNIVERSITY



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ABOUT THE AUTHORS

Autumn Boyd currently serves as a Senior Manager in the Houston Independent School District's College Readiness Department. She previously worked as a College Counselor at YES Prep Public Schools and in Admissions at The University of Texas at Austin and Our Lady of the Lake University. She received her Bachelor's degree from The University of Georgia and her Master's degree from Our Lady of the Lake University.

Emelia Dunston has worked in student affairs since 2011. Her portfolio of experience includes campus activities and programming, student media, fraternity and sorority life, and student organizations. She has been fortunate to support student leaders at a number of institutions including the University of Tennessee at Chattanooga, Bellarmine University, and the University of Kentucky. Emelia received a Bachelor of Arts degree in Communication from Meredith College and a Master of Education degree focused on College Student Affairs Administration from the University of Georgia.

EXECUTIVE SUMMARY

This report discusses a recent study commissioned by the Office of Postsecondary Policy, located within the Missouri Department of Higher Education and Workforce Development, to evaluate the relevance and efficacy of the department's admissions selectivity policy. Concerns were raised as to whether the admissions criteria outlined in the policy are the most appropriate measures for universities to use for admissions decisions. A mixed methods research design was employed to assess the policy's functionality, determine which pre-college characteristics are the strongest indicators of student success, and evaluate how the administration of state-sponsored aid factors into the equation.

Admissions officials from the state's 13 public four-year universities were surveyed to gather baseline information on current institutional practices. Individual interviews were conducted with a segment of the original group to expand upon the survey responses recorded and evaluate perceptions of the policy. Existing student-level and financial aid funding data from members of the Fall 2014 cohorts at those respective institutions was used to determine 1) the extent to which HSGPA and ACT Composite scores predict college outcomes and 2) the influence of financial aid on student success.

A review of the data determined that earlier deviations from the policy were caused by differential interpretations of the selectivity guidelines, but more recent changes were made in response to the COVID-19 pandemic. In practice, the primary performance metrics being used to gauge a student's academic potential are high school grades and SAT/ACT scores. Based on the Fall 2014 cohort's performance data, high school GPA as a single indicator was found to offer a greater predictive value than ACT Composite Scores, with respect to graduation rates. But, adding ACT scores to the equation does offer a modest improvement to the prediction. Additionally, the receipt of first-year state aid demonstrated some predictive value, suggesting that state aid plays a role in students' ability to persist and graduate.

While graduates who received this aid in their first year graduated at lower rates than their peers who did not receive aid, Pell-eligible students who received this aid graduated at higher rates than their Pell-eligible peers who did not receive this aid. Furthermore, aid amounts received have also been seen to account for a percentage of the likelihood in persistence and graduation.

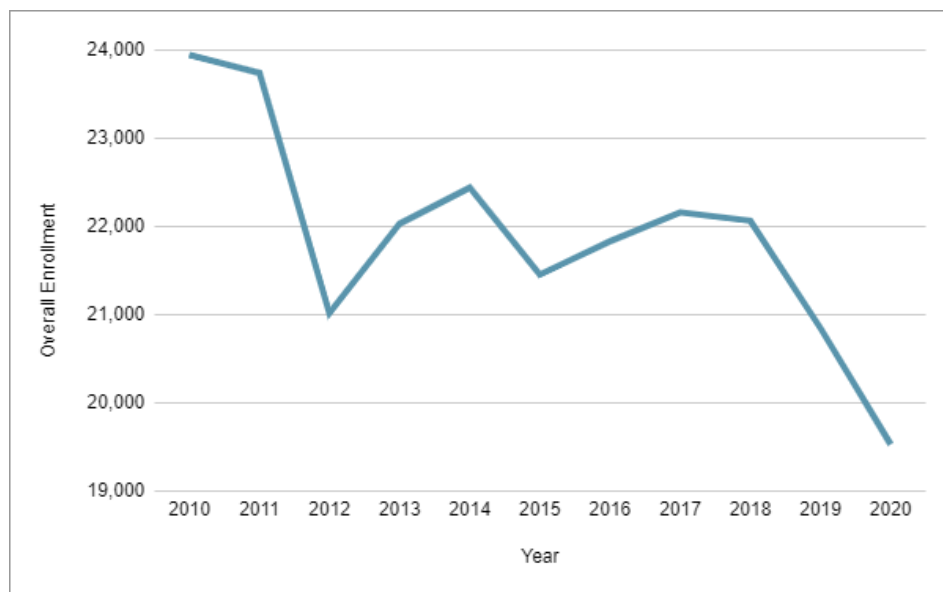
The findings of this study are inconclusive as to whether a statewide policy is the most effective means for achieving the department's larger vision. Though some institutions have deviated from the criteria outlined, there is not a desire to eliminate the policy altogether. Instead, officials would like to see revisions made that reflect institutional perspectives and greater uniformity in application. The department is encouraged to work with the institutions that fall within the purview of this policy to explore how the current guidelines have helped or hindered institutional enrollment efforts. This evidence can then be used to identify the most appropriate revisions needed to meet department and institutional goals. Once revisions are made, the department should initiate policy conversations early and often with key institutional stakeholders to allow for continual feedback and ensure consistency in administration. Finally, since the effects of the pandemic prompted institutions to forego test scores and rely more on high school grades, the department should encourage institutions to continue this trend by prioritizing high school grades over standardized test scores.

INTRODUCTION

The Missouri Department of Higher Education & Workforce Development (MDHEWD) works to ensure the state’s 27 institutions of higher education provide a quality education to students while helping the state work towards its goal for 60% of adults to hold a certificate or degree by 2025 (Department of Higher Education and Workforce Development, n.d.). However, despite having a robust number of postsecondary institutions, the state has experienced a decline in the number and percentage of high school graduates pursuing higher education in the state. In 2019, 20,847 Missouri high school graduates enrolled at one of the state’s public institutions (two-year and four-year). By 2020, there were 19,528 graduates enrolled - a 6.3% decrease in one year (Missouri Coordinating Board for Higher Education, 2021). While some of the decrease in 2020 was attributed to the COVID-19 pandemic, the state has experienced decreases prior to this time. The Missouri Coordinating Board for Higher Education cites an 18.5% decrease over the last 10 years (Missouri Coordinating Board for Higher Education, 2021).

FIGURE 1

Recent Public Missouri High School Graduate Enrollment from 2010-2020

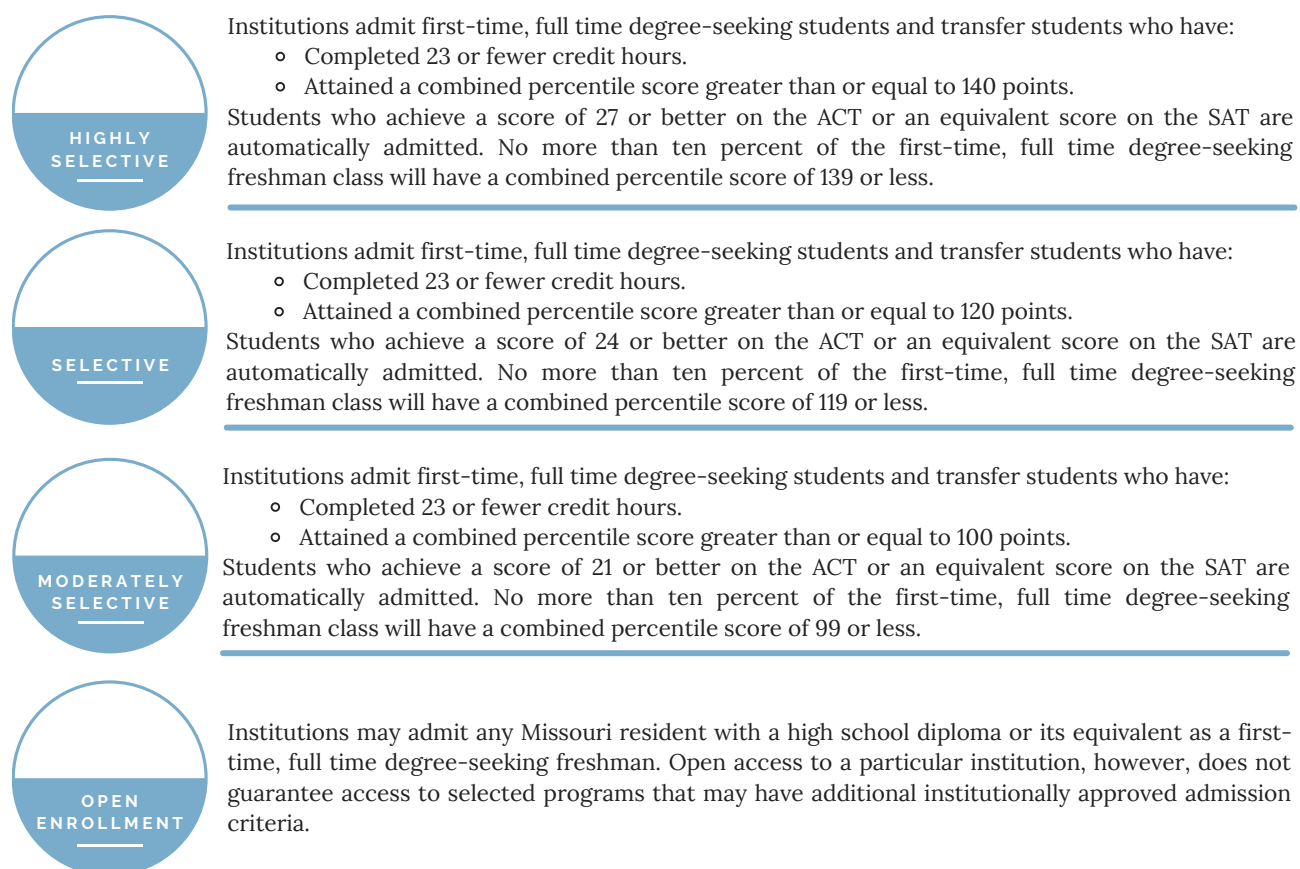


Note: Data from Enhanced Missouri Student Achievement Study (EMSAS). Retrieved from <https://dhewd.mo.gov/cbhe/boardbook/documents/Tab100321.pdf>

Figure 1 illustrates the enrollment totals for Missouri’s public high school graduates at the state’s public two-year and four-year institutions over a ten-year span.

Situated within the MDHEWD, the Office of Postsecondary Policy crafts state admissions policies that seek to promote a collaborative spirit between institutions of higher education and equitable access for all students in the state. Ten years ago, the MDHEWD developed an admissions selectivity policy that specified admissions criteria for four selectivity categories (highly selective, selective, moderately selective, and open enrollment) based on a combination of percentile class rank and standardized test score or solely based on ACT score (Department of Higher Education and Workforce Development). The policy also assigns a recommended percentage of first-time freshmen that may fall below the assigned percentile score for each category (Department of Higher Education and Workforce Development). Figure 2 outlines the criteria for each category.

FIGURE 2
MDHEWD Guidelines for the Admissions Selectivity Categories



Note: Percentile score is calculated from adding their high school percentile rank and the percentile rank attained on the ACT or SAT.

Due to the aforementioned parameters, the challenge that the MDHEWD faces is institutional investment in this selectivity policy. To date, some of Missouri's state public institutions have begun to engage in test-optional admissions practices. Eliminating the test score requirement strays from the policy, placing these institutions in a position of noncompliance. For example, University of Central Missouri, University of Missouri - Kansas City, Missouri Western State University, and the Southeast Missouri State University engage in a test-optional policy for prospective students (National Center for Fair & Open Testing, 2020; Southeast Missouri State University, 2019; University of Central Missouri, 2020; University of Missouri - Kansas City, 2020). While the rationale for this decision was not communicated to the department, their deviation provided a window of opportunity that the Office of Postsecondary Policy sought to explore.

RESEARCH PURPOSE & QUESTIONS

This study will provide the Office of Postsecondary Policy with an overview of the admissions policies implemented by its public institutions, rationale for said approach, and a list of indicators shown to be the strongest predictors of student success and completion within the state. The following research questions are explored to achieve this goal:

01 **Is the MDHEWD admissions selectivity policy being implemented as designed?**

- **Is there any variance in implementation across institutions and to what degree?**
- **Why have some institutions chosen to deviate from the policy and go test optional?**

02 **What performance metrics, beyond those identified in the policy, are the universities using to gauge a student's academic potential for admissions purposes?**

- **How do these align with the metrics identified in the current policy?**

03 **Based on student data, which pre-college characteristics should Missouri's public four-year universities consider when determining a student's aptitude for college success?**

04 **To what extent does the administration of financial aid, particularly state grants and scholarships, correlate with student success given selectivity and pre-college characteristics?**

By addressing these areas, the state of Missouri will be better positioned to determine if the continued quest for a statewide policy is the best approach or if it should reconsider its role in this initiative. Further, the state will gain additional insight regarding the role of financial aid funding and student success measures to further inform their practice.

LITERATURE REVIEW

An exploration of current scholarship was conducted to help us understand the current landscape surrounding undergraduate admissions in higher education. We reviewed the various means by which institutions evaluate applicants, attributes deemed pertinent for determining a student's propensity for educational attainment, and additional factors found to influence student success. This search led us to narrow our focus towards four primary topics: admissions policy, holistic review, predictors of academic success, and financial aid.

ADMISSIONS POLICY

The state of Missouri has specified admissions selectivity categories that allow its public institutions to self-select a category for which it is best fit (MDHEWD, n.d.). This tiered approach to categorization is structured such that representation from multiple institutions within the state is encouraged for each category. Currently, four-year institutions have somewhat of an equal distribution amongst the three most selective categories with 2-3 institutions allocated to each (MDHEWD, n.d.). In theory, this assists in increasing equitable access to a college education and decreases the likelihood of institutional shifts toward the most selective selectivity categories. Similar to Missouri, Texas has also implemented statewide policies that seek to provide equitable access to its students. Hence, Texas will be used as a proxy for description within this study as the state has exhibited a longevity and a wealth of empirical research regarding the progression and effects of statewide admissions policies.

Recounting legislation that altered the ways in which institutions admitted first time freshman gives context for statewide policies Texas implemented. A critical legislative period that modified admissions review nationally stemmed from the period in which affirmative action was utilized. While affirmative action granted institutions the ability to utilize race as a determining factor in college admissions decisions, the ruling and application of the 1996 Hopwood v. Texas case challenged this practice and eliminated the use of affirmative action in the admissions process (Barr, 2002; Bowen, Kurzweil, & Tobin, 2005; Harris & Tienda, 2010; Long & Tienda, 2008).

The year following this ruling, both of Texas' flagship institutions (The University of Texas at Austin and Texas A&M University) experienced stark declines in the number of African American and Hispanic/Latino first-time freshmen (Barr, 2002).

Texas' response to a decline in minority enrollment was the creation of HB 588. Established in 1998, HB 588, also known as the "Top 10% Law," sought to provide equitable access to college for academically talented students - specifically those from underrepresented populations - to attend the state's flagship institutions (Harris & Tienda, 2010; Holley & Spencer, 1999; Long & Tienda, 2008; Montejano, 2001). This bill certifies that students who graduate within the top 10% of their high school graduating class are guaranteed admission into all public institutions within the state (Harris & Tienda, 2010; Long & Tienda, 2008). In sum, HB 588 sought to be a race neutral alternative that granted access based on academic merit while expanding the scope of reach for minority communities (Tienda & Sullivan, 2009).

“Supporters of HB 588 anticipated increases in minority enrollment due to rank-based admission, but research indicates that vision has yet to be achieved (Alon & Tienda, 2007).”

Studies focused primarily on The University of Texas at Austin and Texas A&M University found that, as a result of HB 588, minority enrollment did increase; however, this increase did not peak to the levels that were seen during the period in which affirmative action was enacted (Andrews, 2009; Andrews, Ranchhod, & Sathy, 2010; Bucks, 2004; Harris & Tienda, 2010; Koffman & Tienda, 2008; Long 2007; Long & Tienda, 2008). Additional research indicates that even these increases were not considered notable in increasing diversity at institutions in Texas, particularly at the state's flagship institutions (Fletcher & Mayer, 2014).

HOLISTIC REVIEW

The origins of holistic review are found in the discriminatory practices once used by elite/selective institutions prior to World War II to disqualify Jewish students from admissions consideration, called the "whole man" standard (Bastedo, Bowman, Glasener, & Kelly, 2018). Admissions officers used subjective, nonacademic criteria

(such as character or leadership) that favored affluent, white males to inform admissions decisions (Bastedo et al., 2018). Researchers believe the re-emergence of the concept, as a positive tool, was stimulated by legal action that eliminated affirmative action in college admissions (e.g. Regents of the University of California v. Bakke, 1978 & Grutter v. Bollinger, 2003) and growing criticism against higher education’s reliance on standardized test scores to gauge merit (Bastedo, Howard, & Flaster, 2016; Bastedo et al., 2018). Richard Atkinson, president emeritus of the University of California, is credited for his advocacy efforts with the current iteration of this process. He “proposed a more comprehensive evaluation process that included high school quality and home environment as admissions criteria” (Bastedo et al., 2018, p. 785). In practice, admissions officers are expected to look beyond the quantitative measures of academic performance (high school grade point average and standardized test scores) and consider other factors when making admissions decisions (Bastedo et al., 2018; Gebre-Medhin, Giebel, Alvero, Domingue, & Stevens, 2020; Rosinger, Sarita Ford, & Choi, 2020). These factors can include the availability of advanced academic opportunities, life experiences, family background, school and neighborhood demographics, and other extenuating circumstances (Bastedo et al., 2018; Hossler, Chung, Kwon, Lucido, Bowman, & Bastedo, 2019; Rosinger et al., 2020; Talkad Sukumar, Metoyer, & He, 2018). It is considered an individualized, more socially just review of an applicant’s potential for postsecondary academic success (Bowen, Kurzweil, Tobin, & Pichler, 2005; Gebre-Medhin et al., 2020; Talkad Sukumar et al., 2018).

In the often cited mixed-methods study conducted by Bastedo, Bowman, Glasener, and Kelly (2018) examining how admissions officers define and use holistic review in selective college admissions, the authors determined three primary variations were being utilized within the field:



Whole File refers to reading all parts of the application submitted as opposed to reliance on one specific component as the determining factor when rendering admissions decisions. This type was found to be most common with less selective institutions. Researchers observed that the institutions using this variation assigned a value to each component, but those values were not equally distributed. Admissions decisions made using the Whole Person review “sought to evaluate academic achievements in light of the applicant’s character, personality, or ability to contribute to the community in a unique way” (Bastedo et al., 2018, p. 791). However, it lacks consideration for an applicant’s context or environment. Institutions that placed heavy emphasis on fit were more likely to utilize a whole person review. Whole Context review combines aspects from the previous types (full file review plus treating the applicant as a unique individual) and considers those items within the context of the applicant’s family and school environments. Admissions officers with this view of holistic review demonstrated an understanding of how these external factors could influence the traditional pre-college attributes used for evaluative purposes and the quality of the applicant’s application materials (Bastedo et al., 2018). This form of review was observed to be more common at the most selective institutions in the study’s sample. Though the consideration of non-academic factors has become an integral part of the admissions process, much of the available research has primarily focused on their use at highly selective undergraduate institutions since those institutions are known to use holistic review (Bastedo et al., 2018; Hossler et al., 2019; Rosinger et al., 2020). The study by Hossler et al (2019) is one of a few that has attempted to investigate if and how public universities and less selective institutions (public and private) are utilizing holistic review at the undergraduate level.

Advocates for holistic review have described the practice as humane, less mechanical and a way to prevent those with more resources from taking advantage of the system (Bowen et al., 2005). This type of review has the potential to minimize some of the barriers individuals from underrepresented and marginalized communities encounter in their pursuit of postsecondary education. Those in favor of the practice have suggested that greater consideration of non-academic factors could help diversify applicant pools and reduce inequalities in college access (Bastedo et al., 2018; Hossler et al., 2019). However, limited evidence supports those claims (Bastedo et al., 2016). Long (2015; as cited in Hossler et al., 2019) criticized the use of holistic review and found that institutions using the method did not produce the results expected; instead, it yielded an entering class of individuals less likely to graduate and more

likely to earn lower GPAs than predicted. Another critique cited is the lack of consensus on how it should be implemented in practice (Bastedo et al., 2018; Hossler et al., 2019; Talkad Sukumar et al., 2018). Since it is a subjective process, Talkad Sukumar et al (2018) concluded that there is no way to conduct a genuine holistic review. “Since every application presents a unique case” they wrote, “the downside to holistic reviews is the lack of a definite solution path and hence a systematic and uniform review method” (Talkad Sukumar et al., 2018, p. 169). They argued that most institutions have already identified specific attributes they will consider with each applicant but the conclusions drawn about an applicant’s potential are at the discretion of each reviewer, making it nearly impossible for the process to stay objective (Talkad Sukumar et al., 2018). Hossler et al (2019) called attention to the impact of institutional factors on an institution’s ability to complete a full holistic review of every applicant. Examples include the number of staff members in an admissions office, the size of their applicant pool, institutional control and size, and funding sources (Hossler et al., 2019). Though they often referenced the impact in relation to public institutions, similar challenges are possible in the private sector.

As colleges and universities seek more effective means to achieve high levels of racial and ethnic diversity on their campuses, the utilization of holistic review in collegiate admissions will likely to expand. While general agreement exists across the profession on the positive value this approach adds, the lack of best practices for implementation will continue to limit its utility. Additional research on how aspects of holistic review are being used more broadly, if at all, across institutions and the results produced could help fill this gap for practitioners.

PREDICTORS OF ACADEMIC SUCCESS

Studies examining the traditional pre-college attributes used by post-secondary institutions to evaluate candidates for admission, high school grade point average (HSGPA) and standardized test scores (SAT or ACT) have identified positive correlations between each attribute and the first-year cumulative GPA - a common marker for academic success (Bowen, Chingos, & McPherson, 2009; Bridgeman, McCamley-Jenkins, & Ervin, 2000; Camara & Echternacht, 2000; Kobrin, Patterson, Barbuti, Mattern, & Shaw, 2008; Mattson, 2007; Noble & Sawyer, 2004; Ramist, Lewis, & McCamley-Jenkins, 1993; Sackett, Kuncel, Beatty, Rigdon, Shen, & Kiger, 2012; Saunders-Scott, Braley, & Stennes-Spidahl, 2018). Bowen et al (2009), Mattson (2007), Ramist et al (1993), and Saunders-Scott et al (2018) found HSGPA to have a slight edge

over standardized test scores in terms of its predictive value. Kobrin et al (2008) and Sackett et al (2012) alternatively found standardized test scores, specifically the SAT, to be slightly more effective. Noble and Sawyer (2004) deviated from the others and found each to be effective predictors for different levels of academic achievement. They concluded ACT Composite scores were an effective predictor of high academic achievement, while HSGPA was a better predictor of moderate academic achievement (between a 2.5 and 3.0 GPA) during the first year of college (Noble & Sawyer, 2004). Despite these findings, most researchers agreed that pairing HSGPA with standardized test scores provides institutions more accurate predictions of success than those produced when using a single attribute (Bridgeman et al., 2000; Kobrin et al., 2008; Noble & Sawyer, 2004; Ramist et al., 1993; Sackett et al., 2012).

A growing amount of empirical research has come forward questioning the validity of standardized test scores as a predictor of college success. Validity studies have been criticized for misrepresenting the strength of association between pre-college attributes and failing to consider other factors that can predict academic success in college (Akos & Kretchmar, 2017; Noble & Sawyer, 2004; Rothstein, 2004). Jesse Rothstein's research asserts that the addition of demographic variables (i.e. race/ethnicity, gender, high school attended) reduces the predictive value of SAT scores on collegiate outcomes (Rothstein, 2004). One demographic variable Rothstein did not control for in his research was socioeconomic status. Other researchers did and found that the inclusion of socioeconomic status also alters the predictive validity of SAT scores (Geiser & Studley, 2002; Sackett et al., 2012). Geiser and Studley (2002) examined these effects at the University of California and found the relationship between test score and first-year academic performance "virtually disappears" once these are entered into the equation (p. 14). Furthermore, it has been suggested that test scores are more of an indicator of class or privilege and this social advantage or disadvantage must be considered when examining collegiate success (Akos & Kretchmar, 2017; Grodsky, Warren, & Felts, 2008).

In response, an increasing number of researchers and administrators have called for institutions to reduce their reliance on standardized tests and consider using other non-cognitive variables as predictors of academic success for admissions decisions. New variables being evaluated include locus of control and pre-college leadership experience (Gifford, Briceño-Perriott, & Mianzo, 2006; Mattson, 2007). Though the results of his study on academically at-risk students admitted through a special

admission program confirmed HSGPA as a significant predictor, Mattson (2007) also found pre-college leadership experience (defined as holding a position associated with leadership experience) to be a positive predictor of first-semester GPA and first-year GPA. Gifford, Briceño-Perriott, and Mianzo (2006) conducted a larger study with more than 3,000 first year students examining locus of control (defined as a person's belief about control over life events) and ACT scores as predictors of first year academic success. Students with a more internal locus of control were found to have earned a higher cumulative GPA by the end of the year than those with a more external locus of control (Gifford et al., 2006). These findings were consistent with those reported in previous studies that analyzed smaller subgroups of students. Both sets of researchers concluded their studies with a recommendation for college and universities to supplement the traditional admission criteria used for evaluation with non-cognitive factors (Gifford et al., 2006; Mattson, 2007).

Uncertainty surrounding the usefulness of standardized test scores and HSGPA continues to grow as more scholars question their importance in predicting who will complete college. While many in higher education are pushing for the consideration of other criteria, it is unclear which variables should be given greater value. More research is needed to determine if there are any new or additional pre-college variables not being utilized that could lead to more accurate predictions of college success, particularly long-term outcomes of success like graduation.

FINANCIAL AID

Several studies have examined financial aid's relationship to student success, specifically collegiate grade point average. However, some of the most recent studies have examined this through the lens of need-based and merit-based aid. Extant literature observed a relationship between merit aid and grade point average, discovering a significant correlation between the two (Curs & Harper, 2012; Stater, 2009). Curs and Harper (2012) provided additional rationale for this finding, acknowledging that students who receive recurring aid based on merit are encouraged to excel academically so that aid will be reinstated the following year. In addition to an analysis of merit-based aid on grade point average, Stater (2009) examined its relationship to need-based aid and found a positive correlation between these variables as well. This study further compares average grade point average of students who received need-based and merit-based aid and finds that the "effect of merit aid is consistently larger" (Stater, 2009). In sum, these studies find that students

who received need- and merit-based aid exhibited a stronger academic performance. They also found that those who received merit-based aid exhibited the strongest performance as compared to their peers who received solely need-based aid (Curs & Harper, 2012; Stater, 2009).

Studies that have examined financial aid's relationship to persistence have produced mixed results. When examined through the lens of class, Paulsen and St. John (2002) found that grants and loan amounts for low-income students were negatively associated with persistence (Paulsen & St. John, 2002). Their examination illuminated the challenge with adequate aid amounts being provided for this population to encourage persistence as well as their hesitancy to take out additional aid to cover these expenses (Paulsen & St. John, 2002). However, other studies have found positive relationships relative to persistence when financial aid was examined, indicating an increase in aid increases the persistence rate (Cofer & Somers, 2000; Bettinger, 2004; Hossler, Ziskin, Kim, Cekic & Gross, 2008). Bettinger (2004) and Hossler et al. (2008) take a deeper look into this relationship and examine this based on tiers of aid amounts that were disbursed. These studies found that "increases in aid decrease the likelihood that students will withdraw" and assert that increases in aid will increase persistence (Bettinger, 2004; Hossler et al., 2008). It can be inferred that mixed results here are also byproduct of varying methodologies within each of these studies.

Exploration regarding the strength of grant and aid on persistence has also been conducted. Those who have engaged in research regarding need-based aid have found that grants exhibit positive correlations and reduce the likelihood of dropout (Bettinger, 2004; Cofer & Somers, 2000). Other studies have specified that correlations exist, but are challenged to specify direct correlations between grants and student success (Paulsen & St. John, 2002; Hossler et al., 2008).

Financial aid's relationship to graduation is also important to examine. Several researchers have studied this milestone and found positive relationships between financial aid and graduation (Alon, 2005; Cabrera, Nora & Castañeda, 1992). Alon (2005) specifically indicated that work-study exhibited positive correlations to graduation. Cabrera, Nora, and Castaneda (1992) examined this from Tinto's social integration lens, asserting that the receipt of financial aid eases student social acclimation to college - thereby increasing the student's level of commitment to complete their educational endeavors.

Although some studies show that funding positively contributes to student success, researchers caution the extent to which these parties message aid as the salient factor in student success. Bettinger (2004) specifies that Pell grant recipients are lower income populations and are traditionally at risk to drop out at higher rates as compared to their more affluent peers. Some researchers implore those researching this area to consider unobserved and observed characteristics such as academic preparation, collegiate choice, and family background (Alon, 2005; Bettinger, 2004; Dynarski, 2004). Therefore, while results are promising in this area, these are factors that should also be considered when making judgements on relationships between aid and student success.

Extant literature exploring the relationship between financial aid and graduation has demonstrated more positive relationships than not. It is seen that both merit aid and need based aid draw positive correlations, with merit aid and graduation having the strongest relationship (Stater, 2009). However, studies that have explored the relationship between financial aid and persistence produced mixed results – identifying positive correlations in some studies and negative correlations in others. Studies that established a negative relationship found that the type of aid (i.e. loans) contributed to this trend, specifying that increases in loan amounts increased the likelihood of drop out for lower income populations (Paulsen & St. John, 2002). Studies on grant aid also produced mixed results due to differing methodologies on studies conducted. Additional sources highlighted the importance of considering contextual factors when assessing persistence and graduation. These researchers challenged the notion that financial aid be viewed as a single indicator for student success in this area and stress the importance of including other variables in this assessment (Alon, 2005; Bettinger, 2004; Dynarski, 2004).

Inconsistencies exist in articulating contextual factors that influence persistence for aid recipients. Viewing aid as an individual or primary variable in persistence is likely to lead to misunderstandings in practice. Furthermore, studies in this area have used various methodologies. The variance in methodologies utilized may have been a factor in disparate results. Therefore, the extent to which one should take research in this area and utilize it for practice must be better explored prior to practical application.

The literature reviewed explores the results of a statewide admissions policy, examines the predictive value of quantitative items on student success, acknowledges

a more inclusive process for decision making within admissions review, and highlights the relationship between financial aid and student outcomes. Similar to Texas, the state of Missouri has issued statewide admissions selectivity criteria for its public institutions. Prior research on the effectiveness of such policies have shown them to be somewhat effective but lacking a clear or significant impact on equity, one of the key issues Missouri attempts to address with its selectivity guidelines (Alon & Tienda, 2007). It has been shown that these policies place heavy reliance on quantitative factors such as high school GPA and SAT/ACT scores. While positive correlations exist between these items and first-year performance and graduation, these associations are overemphasized and discount the influence of other factors such as race/ethnicity, gender, high school attended, and socioeconomic status (Geiser & Studley, 2002; Rothstein, 2004; Sackett et al., 2012). Research supports expanding the scope in this area to include such items and engage in a holistic review process (Bastedo et al., 2018; Gebre-Medhin, Giebel, Alvero, Domingue, & Stevens, 2020; Rosinger, Sarita Ford, & Choi, 2020). Finally, as institutions seek to make connections between their policies and student success, the relationship between state, federal, and institutional aid should be considered. Although mixed results exist, research has shown more positive correlations between aid and student success than not. The findings of this study will contribute to established evidence in these areas.

DATA & METHODS

A mixed methods research design was employed for this study using a survey, interviews, and student-level and financial aid data. Studies that follow this framework seek to provide a comprehensive narrative of outcomes and processes (Greene, Caracelli, & Graham, 1989). Our analysis focused on 13 of Missouri's public four-year universities:



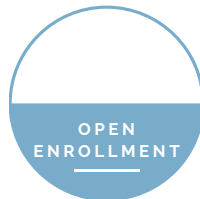
Missouri University of Science & Technology*
Truman State University



Missouri State University
University of Missouri – Columbia
University of Missouri – Kansas City
University of Missouri – St. Louis



Northwest Missouri State University
Southeast Missouri State University
Missouri Southern State University
University of Central Missouri



Harris-Stowe State University
Lincoln University
Missouri Western State University

SURVEY

The survey was crafted using questions from instruments developed by a number of educational agencies that have previously explored aspects of our topic (see Appendix A). It includes a mix of quantitative and qualitative questions drawn from the National Survey of Undergraduate Admissions Policies, Practices, and Procedures (administered in 1979, 1985, and 1992 by AACRAO, American College Testing, The College Board, Educational Testing Service, and NACAC) and The Common Data Set (CDS) initiative. The questions selected addressed our first two research questions on policy implementation and institutional practices. Respondents were asked to describe how admissions decisions were made, what factors (academic and non-academic) were considered, and whether their institutions adhered to the admissions

requirements under their respective selectivity category. It was distributed to a convenience sample of admissions/enrollment officials from the universities identified, using a list of contacts provided by the Office of Postsecondary Policy. The announcement, sent by email, described the purpose of the study and invited these professionals to complete an online survey. Though respondents were asked to provide the name of their respective institution, no additional identifiable information was requested. 11 of the 13 universities in our sample completed the online survey. Responses were received from universities under each selectivity category. However, the Open Enrollment selectivity category was sparsely represented in the survey; only one of the three four-year universities under that category completed the survey.

INTERVIEWS

Based on the information gathered from survey responses, five universities were invited to participate in follow-up interviews. The interviews allowed us to delve deeper into institutional practices, addressing the sub-questions under research questions 1 and 2. Using a semi-structured interview protocol, participants were asked to describe their perceptions of the policy, successes and challenges with implementation, outcomes produced, and adaptations made (see Appendix B). A coding and thematic analysis was used to examine the information collected from the institutional survey and the individual interviews with university officials.

Four categories of inquiry were explored within the interview: Admissions Practices, COVID-19, Success Factors, and the institution's relationship with the MDHEWD. Questions surrounding admissions practices offered clarity on the process by which decisions are rendered. Additional inquiry in this area provided an indication of the academic and nonacademic factors that play into student success as well as the role standardized test scores play within their institutional admissions policy. The COVID-19 lines of questioning uncovered the role COVID-19 has played within admissions review as well as a detailed explanation of modifications made to their policies and procedures in direct response to the pandemic. The exploration of success factors yielded institutional definitions of student success along with institutional predictors of student success. A final sequence of questioning explored each institution's relationship with the MDHEWD and historical knowledge on the institution's role in the development of the statewide policy. Institutional survey responses were reviewed to determine if additional detail would benefit this study. The driving force for an interview request was the lack of elaboration on survey questions that requested

additional detail. Institutions that showed promise for providing greater context to at least one of the factors mentioned were invited to interview.

Due to the COVID-19 pandemic, the Centers for Disease Control and Prevention and Vanderbilt University imposed travel and in-person restrictions that limited in-person interactions. Therefore, interviews were conducted via Zoom and interviewees were allowed to register for an interview time that best fit with their schedule between the hours of 8 am and 5 pm. Three institutions confirmed interviews, representing different selectivity categories: Highly Selective, Selective, and Moderately Selective. Although outreach was done to solidify an interview with an Open Enrollment institution, no one responded to our requests. The stakeholders interviewed either oversaw the execution of admissions review and admission decisions (i.e. Director of Admissions) or held an executive level position at the institution and had knowledge of more global conversations impacting institutional enrollment (i.e. Vice Provost). Each of the interviewees held a range of experience at the institution represented, from less than a year to over 20 years with the institution. While conducting the initial interviews, two respondents indicated that their limited amount of time at the institution made it challenging to provide historical knowledge on the institution's relationship with the MDHEWD. Therefore, a second round of follow-up interviews were scheduled with more senior members of those institutions to gain a more complete picture of this area. All interviews were recorded with typed notes as a secondary reference. Recordings were kept in an electronic password protected location.

STATE-LEVEL DATA

The data used was drawn from the Enhanced Missouri Student Achievement Study (EMSAS) and the Free Application for Federal Student Aid (FAFSA) for students that enrolled as freshmen for the first time at the universities of focus for our study during the Fall 2014 semester. The datasets included Race/Ethnicity, Gender, ACT Composite scores, SAT Verbal and Math scores, Class Rank, Total Term Hours Enrolled, Pell Eligibility, Parent Income Levels, First Generation Status, Dual Credit Courses, Graduation Year, and State Grants and Scholarships received. High school data including HSGPA, High School Classification/Type, Class Rank for each student in the data set was provided by the Missouri Department of Elementary and Secondary Education. We focused our analysis on the following variables: ACT Composite Score, HSGPA, Pell Eligibility, First Generation Status, Race/Ethnicity, State Aid Received

and the amount of State Aid Received during the 2014-15 academic year. If a student was missing data for one or more of these variables, they were eliminated from our sample. Our primary indicator for collegiate success was graduation so we included non-graduates and any student that graduated with a bachelor's degree by the end of the 2019-20 academic year. The descriptive statistics for our final sample (n=15,015) are summarized in Table 1 (Appendix C). To address our third research question, a regression analysis was conducted to determine the extent to which HSGPA and ACT Composite scores predict or indicate collegiate success, controlling for student background factors. The influence of financial aid on student success, the focus of our fourth research question, was explored using a chi square and a regression analysis.

By following a tiered approach for data collection and analysis, the results generated from this study should provide the MDHEWD clarity on the variables institutions prioritize within admissions review, context for why those items were chosen, and an appraisal of the relationship between these success indicators, financial aid and graduation. This examination should better position the department and institutions alike to make objective and informed choices about the future of this policy.

KEY FINDINGS

INSTITUTIONAL USE & UNDERSTANDING OF THE POLICY

Under each category in the department's policy, except Open Enrollment, it stipulates that universities should automatically admit students who achieve the ACT score identified (or an equivalent SAT score) for their assigned category. During our initial conversations with department officials, anecdotal evidence of non-compliance from the universities was referenced but nothing concrete was available to confirm whether this was occurring. Our first research question (RQ #1) explored whether the department's admissions selectivity policy is being implemented as designed. The questions selected for the institutional survey asked respondents to describe the general admissions practices for their campus prior to COVID to help us ascertain if they were adhering to the stipulations under their respective categories. 9 out of 11 schools indicated the majority of individuals admitted met the level of academic achievement expected. The remaining two indicated that any high school graduate (or person with equivalent credentials) was admitted. While this answer was expected from the university under Open Enrollment, it was not expected from an institution categorized as Moderately Selective. Variations in implementation of the policy were reported by 10 of the survey respondents, addressing the first sub-question under RQ #1, but these changes were driven by the ongoing COVID 19 pandemic. Eight of those ten universities have gone test-optional, one institution went test-flexible, and the other institution did not provide any details on how their process was altered. The interview responses offered further detail on how and why these alternative practices were chosen, addressing the second sub-question under RQ #1.

Those interviewed explained that the alterations were made primarily to accommodate the limited number of ACT and SAT exams administered. One university official said, "[Counselors] begged us to come up with a different way because they weren't sure when those students were going to be able to take this test" (Selective Institution). Due to this challenge, two institutions formally implemented test-optional policies that removed standardized test scores as a required item, but allowed students to submit scores if they chose to do so. One

institution implemented a test flexible policy that required students to submit scores from some form of a standardized exam (i.e. SAT, ACT, subject test, etc.) but allowed students a wider array of options for submission. While this has been labeled a “pilot” year for these policies, there’s already a desire to have further conversations about the test score requirement post-COVID. However, the officials highlighted the relatively short window they have to collect the data needed to guide those discussions. One university official posits,



At least one institution remains committed to requiring the ACT post-COVID and states, “We do feel that the requirement of the ACT is extremely important to us and so based on conversations in the future when COVID isn’t - you know, a part of the equation - we will go back to making it a requirement” (Moderately Selective Institution). Alternatively, the Selective Institution intends to “extend the pilot for one more year” and engage in executive level conversations within the institution to determine if this is a permanent solution.

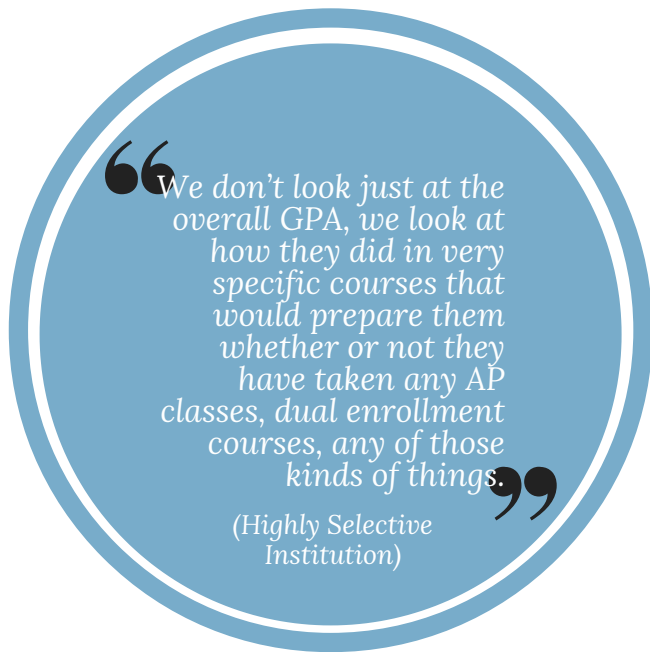
In discussing their familiarity with the policy, at least one stakeholder described their institution as “very, very familiar” with the specifics of the guidelines while another

indicated “it’s something that we look at frequently to ensure that we are following all the policies and guidelines” (Moderately Selective Institution). However, our initial interview with a different official from the same institution provided a contradictory account of institutional adherence to the selectivity policy. This stakeholder professed a less intimate level of familiarity and admitted “a lack of full compliance with the guidelines” (Moderately Selective Institution). When asked for specifics on how each aspect of the selectivity guidelines was being implemented, each stakeholder made reference to the test score requirement. Some mentioned a consideration of percentile rank as part of the admissions review, but no stakeholder made reference to the section that requires students to attain a specified percentile score that exceeds a specified point value. Additionally, no officials referenced the need to ensure that no more than 10% of first-time, full-time, degree-seeking freshmen have a combined percentile score at or below the specified point value set by the MDHEWD.

FACTORS CONSIDERED DURING THE ADMISSIONS PROCESS

To better understand how admissions decisions were being made, survey respondents were asked to review a list of academic and nonacademic factors and indicate the relative importance of each in admissions decisions for first-time, first-year, degree-seeking (freshman) applicants, prior to the COVID-19 pandemic (see Table 2 in Appendix D for the full list of factors and level of importance reported). In order to answer Research Question 2 (RQ #2), we sought to identify which performance measures universities used to evaluate candidates for admission. **Academic GPA** received the highest rating, with 10 of the 11 universities rating it as “very important” (1 marked it as important).





The ratings for **Standardized Test Scores** were mixed (3 institutions - very important, 5 institutions - important, 3 institutions - limited importance). This was a notable result since 10 of the 11 universities said they made use of at least one standardized test (SAT, ACT, or SAT Subject Tests) in admission decisions for first-time, first-year, degree-seeking applicants. The next highest factors in terms of importance were: **Rigor of Secondary School Record** (1 institution - very important, 4 institutions - important, 2 institutions - limited importance, 3 institutions - no importance, 1 institution - not applicable) and **Class Rank** (2 institutions - very important, 2 institutions - important, 6 institutions - limited importance, 1 - no importance). Interviewees expressed confidence in the predictive value of a student's high school GPA, ACT scores, and high school coursework within the admissions process to gauge a student's propensity for success on their campus.

Alternatively, the non-academic factors listed on the survey (commonly considered in a holistic review) were rated low in importance or identified as not applicable by most of the responding institutions. Only one university ranked more than one non-academic factor as important (essay, interview, extracurricular activities, character/personality qualities). Later in the survey, four institutions admitted to including non-academic factors in their evaluation process prior to the pandemic, but the use of this holistic approach was limited to applicants that needed an exception to the formal academic requirements for admission.

PREDICTORS OF ACADEMIC SUCCESS FROM THE FALL 2014 COHORT

The literature referenced previously points to high school GPA (HSGPA) and standardized test scores as the best predictors of academic performance during the first year but a limited number of studies have explored whether their predictive value extends to longer term outcomes like graduation. Our third research question seeks to determine if Missouri’s public four-year universities should utilize either of those variables when determining a student’s aptitude for college success. We used a linear probability model to estimate the relationship between student characteristics, HSGPA and ACT Composite Scores, and the probability of graduation. Graduation was coded as a binary variable where 1=graduated and 0=did not graduate. Table 3 provides a summary of the regression coefficients.

TABLE 3
Estimated Effects of Selected Pre-College Characteristics on Graduation Rates

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6
HSGPA	.0386*** (.0027)		.0246*** (.0027)	.0430*** (.0029)		.0296*** (.0028)
ACT		.0324*** (.0009)	.0312*** (.0009)		.0276*** (.0009)	.0260*** (.0009)
FIRST GEN				-.0922 (.0105)	-.0593 (.0103)	-.0648*** (.0103)
PELL ELIGIBLE				-.2031 (.0088)	-.1432 (.0090)	-.1446 (.0090)
Intercept	.5223*** (.0083)	-.1590*** (.0200)	.5223*** (.0083)	.6000 (.0095)	.0187 (.0235)	-.0176* (.0236)
R2	.0131	.0888	.0939	.0705	.1147	.1217
N	14,786	14,786	14,786	13,310	13,310	13,310

Note: Robust standard errors reported in parentheses. * $p < 0.05$, *** $p < 0.001$

As a student’s high school GPA increases by one unit, for example from 2.0 to 3.0, the predicted probability of graduation increases by approximately 3.9 percentage points (Model 1). This indicates that high school GPA has a substantive association with the probability of graduation. The probability of graduation ranges from 57% for students with a GPA below 2.15 to almost 83% for students with a 3.6 GPA or higher. ACT also has a substantive association with the probability of graduation. The predicted

probability of graduation increases by 3.2 percentage points as a student’s ACT score increases by one unit (Model 2). The probability of graduation ranges from 43% for students with an ACT Composite score below 21 to almost 79% for students with an ACT Composite score of 27 or higher. When both were entered simultaneously, ACT remained a significant predictor while the strength of the relationship between HSGPA and graduation rates decreased by 1.4 percentage points (Model 3). Because the p-value is so low ($p < 0.001$), we can reject the null hypothesis and conclude that HSGPA and ACT scores have a statistically significant effect on a student’s probability for graduation.

Knowing the critiques often lobbed at using standardized tests as a predictor and the push to consider non-cognitive factors, another linear probability model was used to determine the extent to which graduation rates increase as a function of HSGPA and ACT after controlling for first-generation (first-gen) status and pell-eligibility, two non-academic pre-college factors. We observe a slight increase in the coefficient for HSGPA, from .0246 in Model 3 to .0296 in Model 6, while the coefficient for ACT experiences a considerable drop to 0.0260 (Model 6) from .0312 (Model 3). This finding aligns with Rothstein’s (2004) contention that the predictive value of standardized tests is reduced when demographic variables are included.

TABLE 4
Estimated Effects of Selected Pre-College Characteristics on Graduation Rates for Black, White & Hispanic Students

	BLACK/AFRICAN AMERICAN			WHITE / CAUCASIAN			HISPANIC/ LATINO		
HSGPA	.0655*** (.0092)	.0469*** (.0092)	.0311*** (.0032)	.0238*** (.0032)	.0380 (.0203)	.0321* (.0204)			
ACT		.0339*** (.0032)	.0298*** (.0033)	.0253*** (.0011)	.0245*** (.0011)	.0249** (.0077)	.0237** (.0076)		
Intercept	.4083 (.0334)	-.1713* (.0738)	-.1851* (.0732)	.6442*** (.0106)	-.4288* (.5123)	.0426* (.0237)	.5689*** (.0667)	.0734 (.1859)	.0281 (.1859)
R²	.0740	.1043	.0462	.0462	.1106	.0906	.0431	.0665	.0749
N	1,457	1,457	1,457	10,192	10,192	10,192	282	282	282

Note: Robust standard errors reported in parentheses. * $p < 0.05$, ** $p < .01$, *** $p < 0.001$

Similar patterns were observed when looking at the results by race, after controlling for first-gen status and pell eligibility (Table 4). HSGPA, as a singular predictor, still offers a greater predictive value than ACT scores but its value was more pronounced for Black students than it was for White or Hispanic students. This finding aligns with what Noble (2003) observed during her investigation of the differential effects of using ACT Composite scores and high school averages in admissions decisions to predict first-year success outcomes. However, it is important to recognize that the unequal sample sizes for each racial group may have affected the results produced.

STATE-SPONSORED FINANCIAL AID & STUDENT SUCCESS

The fourth research question of this study sought to determine the extent to which the administration of first-year financial aid (state grants and scholarships) correlates with student success. The aid amounts provided by the state of Missouri included need-based grants (Access Missouri State Grant) and merit-based grants (Bright Flight State Grant). Aid received in the first year was established by summing the aid provided in the Fall 2014 term and the Spring 2015 term. For purposes of this analysis, graduation was utilized as the indicator for success. Low-income students were identified by utilizing Pell-eligible status. Since each of the variables were binary variables, chi square analyses were conducted to determine if a statistically significant relationship exists. The first analysis sought to determine if a statistically significant relationship exists between the receipt of first year aid and graduation for all students. The following table displays the results of that analysis.

TABLE 5
Relationship of Aid to Graduation

AID RECEIPT STATUS	GRADUATION STATUS	
	DID NOT GRADUATE	GRADUATED
NO AID RECEIVED	2,794 (37.17)	4,722 (62.83)
AID RECEIVED	2,999 (39.99)	4,500 (60.01)

Note: $\chi^2 = 12.58$, $df = 1$. Numbers in parentheses indicate row percentages. $*p < .0001$

The results proved to be significant, $\chi^2(1, N=15,015) = 12.5794, p=.0000$. It is seen that graduates who received aid graduated at a rate of 60.1%, while those who did not receive aid graduated at a rate of 62.83%.

Although it is seen that students who did not receive first-year aid graduated at higher rates than their peers who received first-year aid, it is important to consider context with this analysis. As extant literature has specified, students who receive need-based aid are typically low-income populations that have a higher probability of not graduating as compared to their more affluent peers (Bettinger, 2004). While first-year aid did not propel recipients to graduate at higher rates, it is seen that a relationship does exist and additional inference may be made to suggest that aid closes the graduation gap for these two populations.

The second analysis sought to determine if a statistically significant relationship exists between the receipt of first year aid and graduation for Pell-eligible students. Table 6 displays the results of a chi square analysis to establish a response for this inquiry.

TABLE 6
Relationship of Aid to Graduation for Pell Eligible Students

AID RECEIPT STATUS	GRADUATION STATUS	
	DID NOT GRADUATE	GRADUATED
NO AID RECEIVED	1,191 (50.94)	1,147 (49.06)
AID RECEIVED	2,126 (47.53)	2,347 (52.47)

Note: $\chi^2 = 7.15, df = 1$. Numbers in parentheses indicate row percentages. $*p < .05$

The results proved to be significant, $\chi^2(1, N=6,811) = 7.1522, p=.007$. It is seen that Pell-eligible graduates who received aid graduated at a rate of 52.47%, while those who did not receive aid graduated at a rate of 49.06%.

To expand upon answering the fourth research question, a regression analysis was run to determine the extent to which the probability of graduation increases based on the

amount of aid administered in the first year. Extant literature has outlined a connection between financial aid and student success (persistence and graduation) and has produced mixed results. Exploring this relationship for the state of Missouri was established via running a regression analysis between aid received in the first year (independent variable) and graduation (dependent variable). The binary graduation variable was used as an indicator to establish persistence for this regression.

There were 7,499 observations for this analysis, meaning that 7,499 students received at least one of the aid types outlined above in their first year. Results produced show that, for every \$1,000 awarded in the first year, the probability of graduation increases by .1591 (or 16 percentage points), with 8% of the variation in graduation being attributed to first-year aid. The same analysis was executed for the 6,811 Pell-eligible students. Results indicate that, for every \$1,000 awarded in the first year, the probability of graduation increases by .0804 (or 8 percentage points). This analysis indicates that 2.5% of the variation in graduation can be attributed to aid for this group. Although there is some literature that specifies a negative correlation between aid and persistence and graduation, the state of Missouri sees a positive correlation between these variables within each model. Each model demonstrates a statistically significant result ($p=0.0000$).

Statistically significant relationships exist between each analysis conducted that examined the receipt of first-year aid and graduation. Graduates who received first-year aid graduated at lower rates (60.1%) than their peers who did not receive first-year aid (62.83%). However, Pell-eligible students who received first-year aid graduated at a higher rate (52.47%) as compared to their Pell-eligible peers (49.06%) who did not receive this aid in the first year. Finally, this study has established the probability of graduation based on the amount of aid received in the first year. For every \$1000, awarded in the first year, the probability of graduation increases by 16%. For Pell-eligible students, the probability is lower, standing at 8%.

DISCUSSION

Although institutions have articulated an adherence to the statewide selectivity guidelines, there has been a deviation from this policy, partially in response to the COVID-19 pandemic. Due to COVID-19 protocols that restricted the administration of standardized tests, prospective students were limited in their ability to obtain a score for admissions review purposes. As such, it pushed these institutions to consider other means of assessing admissibility and pre-college characteristics that predict student success. While institutions specified the importance of qualitative performance metrics in admissions review (i.e. extracurricular involvement, quality of essays, etc.), these stakeholders still identify grades and SAT/ACT scores as the items that provide the strongest indication of institutional success as well as a confidence in their predictive value for graduation.

Previous studies lauded high school GPA (HSGPA) as the superior predictor of first-year GPA. The results of our analysis suggest that high school grade point average has a similar effect with respect to graduation rates, offering a greater predictive value than ACT Composite Scores. Allensworth and Clark (2019) reached a similar conclusion from their exploration of the strength and consistency of HSGPA as a predictor of college graduation with ACT scores. They deemed HSGPA a more effective indicator of college readiness because it measures a variety of skills and behaviors needed for success in college (Allensworth & Clark, 2019; Sawyer, 2010). Whereas, standardized tests like the ACT measure cognitive ability in a singular moment and do not reflect a student's cumulative academic performance (Allensworth & Clark, 2019; Geiser & Santelices, 2007; Sawyer, 2010). Though their study focused solely on students enrolled at institutions under the University of California (UC) System, Geiser and Santelices (2007) discovered the predictive weight associated with HSGPA increases after freshman year, making it a superior predictor of long-term college outcomes.

Results observed in this study (from analyzing ACT and HSGPA jointly) were consistent with those found by other researchers who concluded that pairing HSGPA

with standardized test scores offers a better prediction of success than a single attribute (Bridgeman et al., 2000; Geiser & Santelices, 2007; Kobrin et al., 2008; Noble & Sawyer, 2004; Ramist et al., 1993; Sackett et al., 2012). Statistically significant effects were observed and we want to be cautious not to overstate the significance of these findings. These effect sizes were modest and their associations with graduation rates notably decreased once first-gen status and pell-eligibility were included, suggesting their predictive value may be sensitive to student background characteristics. The background variables accounted for a larger portion of the variance in graduation rates (12.2%) than ACT and HSGPA combined (9.4%), but it still leaves much of the variation unexplained. Similar outcomes were observed when across racial groups. However, this was expected. Other scholars have noted how additional factors can exert varying levels of influence over a student's collegiate experience, both pre and post-enrollment (Akos & Kretchmar, 2017; Allensworth & Clark, 2019; Geiser & Santelices, 2007; Noble & Sawyer, 2004; Rothstein, 2004). Nevertheless, the high degree of variance unexplained calls into question the accuracy of predictions made using these variables. As such, Geiser and Santelices (2007) emphasized the need for admission officers to "exercise great caution" while using either variable to forecast how an individual student will do at their institution (p. 25).

Examining first-year aid's relationship to graduation displayed results that were consistent with literature that specify that positive correlations exist. (Curs & Harper, 2012; Stater, 2009). Comparing the graduation rates of first-year aid recipients to non-recipients may not be viewed as promising without considering context. This study has shown that students who received aid in their first year graduated at a rate of 62.83%, while their peers who did not receive aid graduated at a rate of 60.1%. While this rate is lower, consideration must be made for the likelihood of graduation for aid recipients. The expected graduation rates are lower and are likely due to external factors such as: academic preparation, collegiate choice, and family background (Alon, 2005; Bettinger, 2004; Dynarski, 2004). Although the graduation rate is lower for this group, it should be considered that the graduation gap may have been narrowed due, in part, to aid. Furthermore, when examining graduation for Pell-eligible students only, it is seen that Pell-eligible students that receive aid in their first year graduate at higher rates than their Pell-eligible peers who do not receive first-year aid. The implication with this analysis suggests that aid plays a role in these students' ability to persist and graduate. Finally, aid amounts have shown some

predictive value. For every \$1,000 awarded in the first year, the probability of graduation increases by 16% for all students, but increases by 8% for the Pell-eligible subset. However, the variation attributed to this result must be acknowledged. The model attributes 8% of the variation in probability in graduation to aid for all students and only 2.5% for Pell-eligible students. These substantively low variation percentages also infer that more than 90% of the variation is attributed to other factors for all students. Therefore, while the model does produce a statistically significant result, the amount of aid awarded in the first year should not be overstated to suggest that this is a significant predictor in likelihood of graduation for the state of Missouri.

Interview analysis within this study has also surfaced inconsistent descriptions of the statewide selectivity guidelines by university officials. While there was some ability to articulate the test score requirement by some officials, there was an acknowledgement of a lack of familiarity to articulate the definition. In each case, portions of the policy that referenced the calculation of percentile score were omitted. The implication indicates a lack of clarity in understanding of this policy – even for stakeholders that reside within the same institution. Although explanations of the statewide selectivity guidelines differ, there is consensus regarding the way in which Missouri’s institutions of higher education define student success. Institutions interviewed consistently defined success as: retention and graduation. This common definition is also in alignment with the MDHEWD’s larger mission to ensure there are enough graduates available to transition into careers that require higher education. While this definition is not written in the current selectivity guidelines, these guidelines seek to contribute to this larger statewide initiative.

These institutions have also established quantitative measures to gauge a student’s academic potential for success (i.e. graduation). While institutions within this study have expressed interest in other means of evaluation for admission purposes, there is hesitancy to advocate for a policy change to omit test scores. Institutions have expressed interest in monitoring the progression of test-optional students and would like to utilize this data to inform future decision making. University officials have specified that monitoring these students will require at least a year of tracking and there is a question regarding this timeframe. There are other suggestions that have specified an alternative window of tracking as one semester, while another suggestion recommends university officials consider graduation as the most

appropriate timeline. In each case, this process requires time that overlaps with the deadline required to determine next year's admissions requirements. However, institutions currently still view test scores as an integral part of the admissions process and view them as indicators that will likely remain and/or be used for scholarship purposes.

LIMITATIONS

The findings within this study present four limitations that should be considered before any attempts are made to generalize these results across the state or within each selectivity category. Acknowledging these limitations will assist the state in decision making as they examine Missouri's selectivity guidelines.

First, though survey and interview participation was voluntary and not random, it is likely that the respondents were motivated to participate due to the study's connection to the MDHEWD, a unit some may view as a supervisory authority. Although we made attempts to position ourselves as graduate students separate from the department, respondents may have been reluctant to expand upon their answers out of concern that their remarks would be reported in a manner that reflects negatively on their institution. Hence, those who participated represent a sample of convenience, and are not representative of all the colleges and universities that are expected to follow the policy.

Expanding upon the first limitation, the second limitation references survey and interview responses collected. Based on 11 survey responses received, we sought out specific institutions to interview and prioritized interview requests based on selectivity category, quality of survey answers, and any indication of conflicting answers within the survey response. We had representation from 3 of the 4 selectivity categories, so one perspective is not reflected in these results. Hence, insights from the Open Enrollment selectivity category are not reflected in this study. Furthermore, obtaining one perspective per selectivity category poses challenges to generalize for each selectivity category in this study. A singular perspective for each selectivity category does not account for nuances within the admissions process that may not have been shared via the survey. It also does not account for experiences and relationships established between these institutions and the MDHEWD.

Aid amounts discussed in this study are inclusive of state sponsored merit and need-based grants and scholarships and does not account for any federal merit or need-

based grant aid received. Hence, the analysis regarding aid is not all encompassing. Our examination of the relationship between graduation and the amount of aid received only accounts for partial aid awards. Including federal merit or need-based aid may alter results in either direction or indicate that no statistically significant relationship exists between the two variables. The addition of federal aid may also change the variation that is attributed to aid received within this same analysis.

There are other areas of inquiry that can expand research in this area. Additional populations of study include part-time and transfer students as the only students examined in this study included first-time, full-time students. Finally, to build upon research conducted within this study, it is recommended that further exploration examine the first-year performance of these students and compare it to predicted performance or compare performance amongst specified student groups within the Missouri system.

RECOMMENDATIONS

The findings from this study have prompted recommendations for the Missouri Department of Higher Education and Workforce Development as it examines the current selectivity guidelines. The recommendations outlined below were generated from data, survey, and interview analysis and are primarily derived from suggestions that institutional officials have deemed as key items to consider during this review.

PRIORITIZE HIGH SCHOOL GRADES OVER STANDARDIZED TEST SCORES

Calls for expanding access and equity in college admissions are not new but the push for change has gained new traction as a result of the pandemic. Unable to utilize their traditional mechanisms for evaluating applicants, Missouri's colleges and universities, like their peers across the country, are left wondering, what information should be considered in admissions decisions. Based on the results of our study, our first recommendation would be to place greater emphasis on the high school record and focus less on standardized test scores.

Data from the Fall 2014 cohort has affirmed HSGPA's position as the stronger indicator of a student's probability for short-term and long-term success in college. Despite concerns related to grade inflation and school differences, "high-school grades provide a fairer, more equitable and ultimately more meaningful basis for admission decision-making" (Geiser & Santelices, 2007, p. 27). Rather than maintaining the selectivity policy as is, the department should encourage its universities to give greater credence to students' high-school record when evaluating their level of college readiness for admissions purposes. Further, since adding standardized test scores to the equation does offer a modest improvement to the prediction, it makes sense to keep it as a criterion. However, we believe the department should follow the recommendation offered by Allensworth and Clark (2020) and look at school-average ACT scores, rather than students' individual scores. Citing work from Koretz and Langi (2018) and Bowen, Chingos, and McPherson (2009), they argued that school-average ACT scores would serve as a better judge of college readiness and tell more about a student's likelihood of graduating (Allensworth & Clark, 2020). From their

assessment, ACT scores tell more about the factors associated with the student's school and not the individual student (Allensworth & Clark, 2020). Also, as other researchers have pointed out, standardized test scores strongly correlate to student socioeconomic background characteristics and tend to adversely affect students from disadvantaged populations (Geiser & Santelices, 2007; Grodsky et al, 2008).

INSTITUTE RESEARCH-BASED PRACTICES TO MONITOR POLICY EFFECTIVENESS

According to stakeholder feedback, the statewide selectivity guidelines have not been revised or reviewed since their creation, at least 20 years prior to implementation (Selective Institution). There is interest in beginning this conversation with a review of the policy's effectiveness. The implication with this perspective calls into question the measures currently used and whether these are the best measures to utilize moving forward. "Maybe two factors isn't enough - maybe it takes more than that. But, success at [Institution X] isn't success at [Institution Y]" posits the stakeholder interviewed from the Selective Institution.

Furthermore, a stakeholder from the Moderately Selective Institution interviewed has specified an interest in exploring empirical research that uncovers the long-term effects of the adaptation of a statewide admissions selectivity policy. This official's interest lies in understanding the "why" behind this decision, along with evidence that can be used to make objective decisions moving forward. As implied, further research in this area will provide the state and institutional stakeholders with additional information for determining if a statewide policy is the most effective means for achieving their larger vision or provide metrics that will assist all in realizing this goal.

INCLUDE INSTITUTIONAL PERSPECTIVES

While the MDHEWD has specified that initial implementation of the statewide selectivity guidelines included institutional stakeholders, there is an expression of a desire to bring back intentional efforts to include these parties in this discussion. University officials have expressed an interest in collaborative efforts targeted at revising the statewide selectivity policy, specifying the importance of ensuring that, "everybody has a say, and is heard..." (Selective Institution). This official also urges the MDHEWD to consider the impact that the current policy (and any future policy) has on each institution. As stated from this official, "We have to make sure that the policy doesn't hurt an institution - that it doesn't cut them off at the knees and, you know, everybody's fighting for every student that they can get right now" (Selective

Institution). Working more collaboratively to ensure that institutional perspectives are heard and considered during selectivity guideline review appears to be a key indicator that will demonstrate good will from the state to the institutions.

IMPLEMENT MEASURES FOR ROUTINE MONITORING

As the MDHEWD explores revision of the current statewide selectivity policy, university officials also request that the department adopt additional measures to ensure there is “consistency across the state that people - that everyone - is following and falling into the right category” (Selective Institution). Interview feedback has demonstrated an inconsistency in knowledge of the details of the selectivity guidelines, which may also contribute to the varied approaches in adherence. Although one institution mentioned receiving feedback from the MDHEWD regarding the extent to which institutions are following the prescribed selectivity guidelines, it is not clear that each institution has undergone this evaluation. It is also not clear that these evaluative conversations occur annually, for example. Therefore, to ensure consistency in execution and feedback to maximize adherence, it is recommended that the MDHEWD implement measures for routine monitoring for all institutions that are expected to adhere to this policy on an annual basis.

CONCLUSION

Richard Sawyer (2010) once wrote that there were two primary goals driving collegiate admissions, “maximizing academic success and accurately identifying potentially successful applicants” (p. ii). Neither are small goals to accomplish. To do so requires a mixture of skill, effort and luck. But more than anything, according to Sawyer (2010), those tasked with the responsibility have to know and understand what they are working towards, what they are expected to accomplish. It seems that Missouri’s public universities have not had a clear understanding of what the state’s admissions selectivity policy is supposed to do for their respective institutions for some time. Evidence of this can be found in the varying degrees of implementation and adherence. Fortunately, this can be corrected with a realignment of priorities. The original intent behind the selectivity policy was to provide equitable opportunities for higher education for the state’s residents. This is still a noble goal to pursue but it is going to require a collaborative effort to make it reality. While it is too early to say whether maintaining a statewide selectivity policy is the best course of action, the information gained from this study offers the department a place to start and a captive audience to engage.

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APPENDIX A

INSTITUTIONAL SURVEY

This survey is being conducted on behalf of the Missouri Department of Higher Education and Workforce Development (MDHEWD) by doctoral students in the Department of Leadership, Policy and Organizations through the Peabody College at Vanderbilt University. Please read through the following consent form before indicating your consent at the bottom of the page.

Purpose of the Study

The purpose of our larger study is to provide the Office of Postsecondary Policy with a resource that outlines the admissions policies and practices implemented by its public institutions **prior to the COVID-19 Pandemic** and a listing of indicators that are the strongest predictors of student success and completion within the state. Through this survey, we hope to gather baseline information on the performance metrics the state's public four-year universities are using to gauge a student's academic potential for admissions purposes.

Procedures

Completion of the survey should take approximately 20 - 25 minutes. By using the link provided, you will be able to complete the survey on any device connected to the internet (Computer, Tablet, Phone). You will need to complete the survey in one session, and once you click "submit" at the very end, you will not be able to return.

Confidentiality

The researchers will keep all of the information you provide completely confidential and will only use it for the purposes of the study. Responses will be statistically compiled into summaries and will never be presented in any way that would permit readers to identify you or your institution.

Voluntary Participation

Your participation in this survey is completely voluntary. You can decide not to participate or to discontinue your participation at any time. All questions marked with a red asterisk (*) in Section 1 are required. The questions provided in Section 2 are optional.

Contact Information

If you should have any questions about this research study, please contact Emelia Dunston (emelia.d.dunston@vanderbilt.edu) or Autumn Boyd (autumn.boyd@vanderbilt.edu) in the Peabody College at Vanderbilt University. For additional information about this study, giving consent, or your rights as a participant in this study, please feel free to contact the Vanderbilt University Institutional Review Board Office at (615) 322-2918 or toll free at (866) 224-8273.

Do you consent to participation in this survey?

- YES, I have read the above information and consent to participation in this survey (Go to Section 1)
- NO, I do NOT consent to participation in this survey. (Choosing this option will end the survey). (Skip to end of survey)

Instructions

Read each question carefully and answer based on your institution's practices and procedures prior to the COVID 19 Pandemic. There are questions towards the end that ask you to provide an update on how the COVID-19 Pandemic has impacted your admissions practices and procedures.

What is the name of your institution? (select from dropdown list)

- Harris-Stowe State University
- Lincoln University
- Missouri Southern State University
- Missouri State University
- Missouri University of Science & Technology
- Missouri Western State University
- Northwest Missouri State University
- Southeast Missouri State University
- Truman State University
- University of Central Missouri
- University of Missouri – Columbia
- University of Missouri – Kansas City
- University of Missouri – St. Louis

Which statement best describes the structure of your institution's Office of Admissions? (select one)

1. Multiple divisions for graduate, undergraduate and professional programs, with separate admissions offices
2. Multiple divisions for graduate, undergraduate and professional programs, with one centralized admissions office
3. Other: please explain

Which statement best describes the general admissions practices of your institution? (select one)

1. Any individual wishing to attend will be admitted without review of conventional academic qualifications.
2. Any high school graduate (or person with equivalent credentials) will be admitted.
3. The majority of individuals who meet some specified level of academic achievement or other qualifications above and beyond high school graduation are admitted.
4. Among those individuals who meet some specified level of academic achievement or other qualifications above and beyond high school graduation, only a limited number will be admitted.

Please select the option that best describes your institution's high school completion requirement for degree-seeking entering students (select one):

1. High school diploma is required and GED is accepted
2. High school diploma is required and GED is not accepted
3. High school diploma or equivalent is not required
4. Other (please explain)

Does your institution require or recommend a general college-preparatory program for degree-seeking students? (Select one)

1. Require
2. Recommend
3. Neither required nor recommended

Do you have an open admission policy, under which virtually all secondary school graduates or students with GED equivalency diplomas are admitted without regard to academic record, test scores, or other qualifications?

1. Yes
2. No

If yes, check which applies (select one):

1. Open admission policy as described above for all students
2. Open admission policy as described above for most students, but selective admission for out-of-state students
3. selective admission to some programs
4. Other (please explain)

Please indicate the relative importance of each of the following academic and nonacademic factors in your first-time, first-year, degree-seeking (freshman) admission decisions. (select one for each category)

	Very Important	Important	Limited Importance	No Importance	Not Applicable
Academic					
Rigor of secondary school record					
Class rank					
Academic GPA					
Standardized test scores					
Essay(s)					
Letters of Recommendation					
Nonacademic					
Interview					
Extracurricular activities					
Talent/ability					
Character/personal qualities					
First generation					
Alumni/ae relation					
Geographical residence					
State residency					
Religious affiliation/commitment					
Racial/ethnic status					
Volunteer work					
Work experience					
Level of applicant's interest					

SAT/ACT Policies

Does your institution make use of at least one of the following standardized tests (SAT, ACT, or SAT Subject Test) in admission decisions for first-time, first-year, degree-seeking applicants? (select one)

1. Yes
2. No

If yes, place check marks in the appropriate boxes below to reflect your institution's policies for using each option in admission. (Select one for each category)

	Require	Recommend	Require for some	Consider if submitted	Not used
SAT or ACT					
ACT only					
SAT only					
SAT Subject Tests					

If yes, how are admissions test scores used at your institution? (check all that apply)

1. We do not require the submission of admissions test scores and consequently make no regular use of them.
2. We require test scores for admission to some but not all academic programs.
3. Scores are routinely considered in reaching an overall judgment regarding admissibility for practically all freshman applications.
4. Scores for practically all freshman applicants are reviewed to see if there are indications that the individual may have difficulty in completing the academic program without special assistance.
5. Scores are checked only when other application credentials fall below some specific level.
6. Scores are used by the institution in freshman class profile descriptions and by prospective applicants as part of a self-selection process.
7. Scores are used for placement decisions.
8. Scores are required or recommended but seldom play any role in the admissions decision or course placement of individual students

Does your institution use applicants' test scores for academic advising? (select one)

1. Yes
2. No

Please indicate which tests your institution uses for placement (e.g., state tests) (select all that apply):

1. SAT
2. ACT
3. SAT Subject Tests
4. AP
5. CLEP
6. Institutional Exam
7. State exam (specify): _____.

Does your institution have minimum standards below which an applicant is generally not considered eligible for admission?

- 1. Yes
- 2. No

If yes, please enter the minimum:

- 1. High School GPA: _____
- 2. ACT: _____
- 3. SAT: _____
- 4. Other: _____

Are exceptions to the formal academic requirements for admission granted?

- 1. Yes
- 2. No

Who at your institution has primary responsibility for establishing broad guidelines and for setting the specific policies that apply to entering freshmen?

Has COVID-19 altered the way in which your institution examines applicants as opposed to prior years?

- 1. Yes
- 2. No

If yes, please explain how COVID-19 has altered the way in which your institution examines applicants.

Financial Aid

Check off criteria used in awarding institutional aid (need based, merit based or both). Check all that apply.

	Need Based	Merit Based
Academics		
Alumni Affiliation		
Art		
Athletics		
Job Skills		
ROTC		
Leadership		
Minority Status		
Music/Drama		
Religious Affiliation		
Residency		

What percentage of your first-year students who demonstrated financial need had 100% of their need met?

End of Survey

This concludes our survey. Thank you for your participation. If questions arise later about this study, please contact Emelia Dunston or Autumn Boyd in the Peabody College at Vanderbilt University.

APPENDIX B

INTERVIEW PROTOCOL

This interview is being conducted on behalf of the Missouri Department of Higher Education and Workforce Development (MDHEWD) by doctoral students in the Department of Leadership, Policy and Organizations through the Peabody College at Vanderbilt University.

Purpose of the Study

The purpose of our larger study is to provide the Office of Postsecondary Policy with a resource that outlines the admissions policies and practices implemented by its public institutions and a listing of indicators that are the strongest predictors of student success and completion within the state. Through this survey, we hope to gather baseline information on the performance metrics the state's public four-year universities are using to gauge a student's academic potential for admissions purposes.

ADMISSIONS

1. Please indicate who has the authority to render admissions decisions for your undergraduate student population.
2. You selected "other" when asked about information regarding your institution's open admission policy. Please describe your institution's open admission policy.
3. There are academic and nonacademic factors that you listed as 'very important' in your institution's admissions process. They were (insert list of items). Please:
 - a. Rank them in order of importance with the first item being the most important and the last item being the least.
 - b. What do each of these items tell your institution about an applicant?
4. Are there any items within your admissions process that you have seen are predictors of student retention or graduation? If so, what are those items?
5. You indicated that your institution has decided to forego utilizing standardized test scores for admission. Please indicate why this decision was made.
6. If standardized test scores are not being utilized for admission, what information is being used to replace this item?

COVID-19

(for those that answered YES to the question on the institutional survey about COVID-19 altering the way they examine applicants)

1. You indicated that COVID-19 has altered the way in which your institution examines applicants. Please explain what adjustments have been made to your process.
2. Do you foresee that your institution will continue with these adjustments to the admissions process or return to its prior process this upcoming year?

SUCCESS FACTORS

1. How does your institution define student success?
2. Which items has your institution seen as good predictors for student success?
3. What evidence does your institution have that suggests that these are the best predictors of student success?
4. Does your institution require or recommend degree-seeking students complete the core requirements of a traditional high school college prep curriculum?

MDHEWD

For the institutions whose admissions policies are not in alignment with the state admissions selectivity policy:

1. Your admissions policy differs from the state prescribed policy. Why did you decide to implement the customized policy?
2. Has the adoption of your current policy produced the outcomes your institution desired?
3. Did your institution communicate this adjustment to the MDHEWD?
4. Describe the communication that the MDHEWD has had with your institution regarding the admissions policy.
5. How would you describe your institution's relationship with the MDHEWD?
6. Did your institution play a role in the development of this policy?
7. How often are you in contact with representatives from the MDHEWD?

For the institutions whose admissions policies are in alignment with the state admissions selectivity policy:

1. Is your institution considering (or previously considered) adjusting its adherence to the state policy?
 - a. If so, what does/did your institution hope to achieve by making this adjustment?
2. In what ways has this policy benefited your institution?
3. Describe the communication the MDHEWD has had with your institution regarding the admissions policy.
4. How would you describe your institution's relationship with the MDHEWD?
5. Did your institution play a role in the development of this policy?
6. How often are you in contact with representatives from the MDHEWD?

APPENDIX C

TABLE 1
Descriptive Statistics of Study Variables (N = 14,786)

STUDENT CHARACTERISTICS	MEAN	SD	OBS
RACE			
Black/African-American			1,484
American Indian/Alaska Native			51
White/Caucasian			11,494
Hispanic/Latino			304
Asian/Pacific Islander			397
Non-resident Alien			68
Other Race			556
Unknown Race			432
COMPLETION STATUS (1=GRADUATED)			
Graduated			9,222
Did Not Graduate			5,793
ADDITIONAL VARIABLES			
HSGPA	2.55	1.44	14,786
ACT	24.1	4.47	14,786
First Generation College Student (1=Yes)	.218	.413	13,310
Pell Eligible (1=Yes)	.387	.487	13,310
Financial Aid Received (1=Yes)	1	0	7,431
Amount of Aid Received (1st Year Only)	\$1,784	\$880.27	7,431

Note: HSGPAs were provided on an 11pt scale and converted to a 4pt for the purposes of this study.

APPENDIX D

TABLE 2

Importance of selected academic and nonacademic factors in first-time, first-year, degree-seeking (freshman) admission decisions at Missouri's public four-year universities

	VERY IMPORTANT	IMPORTANT	LIMITED IMPORTANCE	NO IMPORTANCE	NOT APPLICABLE	TOTAL
Rigor of secondary school record	1 (9%)	4 (36%)	2 (18%)	3 (27%)	1 (9%)	11
Class Rank	2 (18%)	2 (18%)	6 (55%)	1 (9%)	0 (0%)	11
Academic GPA	10 (91%)	1 (9%)	0 (0%)	0 (0%)	0 (0%)	11
Standardized Test Scores	3 (27%)	5 (45%)	3 (27%)	0 (0%)	0 (0%)	11
Essay(s)	0 (0%)	2 (18%)	1 (9%)	1 (9%)	7 (64%)	11
Letters of Recommendation	0 (0%)	0 (0%)	4 (36%)	1 (9%)	6 (55%)	11
Interview	0 (0%)	1 (9%)	1 (9%)	1 (9%)	8 (73%)	11
Extracurricular Activities	0 (0%)	1 (9%)	2 (18%)	2 (18%)	6 (55%)	11
Talent/Ability	0 (0%)	1 (9%)	1 (9%)	2 (18%)	7 (64%)	11
Character/Personal Qualities	0 (0%)	1 (9%)	1 (9%)	2 (18%)	7 (64%)	11
First Generation	0 (0%)	0 (0%)	2 (18%)	4 (36%)	5 (45%)	11
Alumni/ae relation	0 (0%)	0 (0%)	2 (18%)	3 (27%)	6 (55%)	11
Geographical residence	0 (0%)	0 (0%)	1 (9%)	5 (45%)	5 (45%)	11
State residency	0 (0%)	0 (0%)	1 (9%)	5 (45%)	5 (45%)	11
Religious affiliation/commitment	0 (0%)	0 (0%)	0 (0%)	3 (27%)	8 (73%)	11
Racial/ethnic status	0 (0%)	0 (0%)	2 (18%)	4 (36%)	5 (45%)	11
Volunteer work	0 (0%)	0 (0%)	1 (9%)	3 (27%)	7 (64%)	11
Work experience	0 (0%)	0 (0%)	1 (9%)	3 (27%)	7 (64%)	11
Level of applicant's interest	0 (0%)	0 (0%)	2 (18%)	3 (27%)	6 (55%)	11

