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Describing College Success Indicators for First-Generation College Students in Colleges of Agriculture

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Abstract

Earning a bachelor's degree has been documented as a potential social equalizer in American society. Yet, it has also been documented that first-generation college students (FGCS) have incongruently accessed and earned college degrees. This phenomenon has potentially perpetuated life-long differences in social outcomes in American society. As research continues to explain the experiences of FGCS, little has been done to explore differences for FGCS by college major or affiliation. However, a small but growing body of researchers are examining the experiences and outcomes of college of agriculture and related sciences students, specifically those enrolled at land grant institutions. The researchers in this study sought to describe college success indicators including on-campus involvement, leadership, and sense of belonging by generational status, and college affiliation at a large, midwestern, public, research-intensive institution. Overall, it was found that no differences were reported by generational status or college affiliation for the investigated college success indicators. These findings are different than previous literature in that FGCS were not lesser than their peers. Consequently, these findings add to the understanding of FGCS college experiences insofar as college affiliation may be playing a mitigating role in disparities among FGCS.

***Keywords*:** First-generation college students, Post-secondary engagement, Retention, Colleges of Agriculture.

Introduction/Review of Literature

The bachelor's degree has been continuously found to be a potential social equalizer for the American population (Ford, 2018; Torche, 2011). Individuals who participated in postsecondary education were less likely to be underutilized in the labor market (U.S. Department of Education [USDOE], 2019), while those who completed a bachelor's degree had higher earning potential than those who did not (Choy, 2001; Ford, 2018). Although not all sub-populations of America have had equal returns from the college experience, one such population, first-generation college students (FGCS), are becoming a well-researched sub-group of college participants. Contemporary research regarding FGCS has been grounded by Choy (2001) who used large, nationally representative data, to document the disparities for FGCS. Since Choy's (2001) work, other researchers have shown that FGCS have different experiences in preparation (Attewell et al., 2006), access (Horn & Nuñez, 2000), and subsequent retention to degree completion (Cataldi et al.,

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2018).

According to the National Education Longitudinal Study (NELS:88), and of specific interest to this study, by the mid-1990s, FGCS comprised over 47% of students who entered postsecondary education (Kojaku & Nuñez, 1998), and about one-third of the overall postsecondary student population (Nuñez, et al., 1998). Therefore, in researching FGCS, literature has been used to suggest that this increasingly large population of college students is potentially disadvantaged in its ability to fully obtain the opportunities afforded from participating in higher education (Ward et al., 2012). Therefore, FGCS are considered an at-risk population for completing a bachelor's degree (Schultz, 2004). Parallel to other potentially at-risk populations in the literature, in general, FGCS have shown disparities in parental support, financial support, persistence, resilience, and collegiate cultural capital as compared to their continuing-generation counterparts (Choy, 2001; Ward et al., 2012). Compounded in these disparities as "intersecting sites of oppression" (Lohfink & Paulsen, 2005, p. 409) are the at-risk descriptors of race, social class, income class, gender, and locality (Ward et al., 2012; Yee 2016). According to Wilbur and Roscigno (2016), the intersectionality of various at-risk descriptors and FGCS status is uniquely different than the simple sum of the descriptors.

College Preparation

Students classified as first-generation associate with other classifications of historically disenfranchised college-going populations. Based on data, Choy (2001) asserted that FGCS were also likely to be minority/non-white, and from low socioeconomic status (SES). This potentially reveals a compounding disparity for FGCS, since the U.S. postsecondary education system enrolls students disproportionally across SES, with 36% low-income youth enrolling in college (Balemian & Feng, 2013). Factors associated with college preparation negatively associate with FGCS, minority students, and students from lower SES families. Factors included a lower expectation to enter college, and therefore less likelihood to take the necessary steps leading to college admittance such as entrance exam preparation, visiting colleges, investigating financial aid decisions, and taking rigorous high school coursework in subjects such as mathematics (Adelman, 1999; Choy, 2001; Horn & Nuñez, 2000).

These data follow a trend in research indicating a 40% increase in remediation needs of incoming undergraduate students taking at least one remedial course (Attewell et al., 2006; Chen, 2005). Additionally, Ishitani (2006) noted that as remedial needs increased, so too did time to degree completion. Two-year colleges had the highest rate (58%) of remedial coursework by type of college (Attewell et al., 2006). In the research, a potential relationship exists between generational status, academic preparedness, remediation in college, institutional type, and persistence to degree attainment.

College Access

Choy (2001) wrote that access to postsecondary education disparately benefitted students from households with more highly educated parents; students of higher-educated parents pursued postsecondary education within two years of graduation at disparate rates compared to students of parents who were less-educated. For example, according to Choy (2001), FGCS entered college within two years of graduation from high school at a 34% lower rate compared to their peers whose parents had at least a bachelor's degree. Horn and Nuñez (2000) found that students' intentions to attend four-year institutions, and their overall enrollment rate in postsecondary education after high school, were significantly less statistically for students of less-educated parents. Graduates whose parents did not earn at least a bachelor's degree were also twice as likely to enroll in two-year postsecondary education programs versus four-year postsecondary education, compared to their counterparts (Choy, 2001). Additionally, descriptive research was used to show that FGCS enrolled in statistically different ways into colleges based on selectivity criteria (Pascarella et al., 2004). FGCS had a lower rate of entrance into highly selective institutions.

First-generation students faced significant challenges in making the transition to college once accepted (Terenzini, et al., 1994). FGCS had less opportunity to learn about the collegiate experience from their immediate social group (Ward et al., 2012). Research has shown that FGCS are also less likely to have parental support, financial support (Choy, 2001), and cultural understanding (Hopkins, 2011). The variety of disparities increase the potential for problematic transitions to higher education between FGCS and their counterparts (Soria & Stebleton, 2012; Terenzini et al., 1996).

College Experiences

First-generation college students have also been documented to have varying experiences within college compared to continuing-generational peers. Negative predictors for college outcomes, for example, retention or graduation rates, disproportionally over-effect FGCS compared to their continuing generation college student (CGCS) counterparts (Pascarella et al., 2004; Tinto, 2012). College readiness (Choy, 2001), student debt-load (Somers et al., 2004; Martinez et al., 2009), full-time and part-time workload (Choy, 2001; Wilbur & Roscigno, 2016), and sense of belonging (Soria & Stebleton, 2012) contributed to first-generation students' departure from college. Research studies have provided data to document that FGCS entered college with a different cultural understanding of higher education compared to their CGCS counterparts (Hopkins, 2011). These underlying differences in understanding the culture of college correspond with disadvantageous descriptors for first-generation college students, such as lower GPAs, higher likelihood for periods of non-enrollment (Martinez, et al., 2009), lower persistence in academic engagement (Dika & D'Amico, 2016), and a lower likelihood to complete a bachelor's degree in five years or less (Choy, 2001; Pascarella et al., 2004).

According to Tinto (1993), departing education before completion of a degree had negative consequences for the individual. Likelihood to remain in college and persistence to be on track for graduation favored CGCS over FGCS after three years (Warburton et al., 2001). FGCS were twice as likely to depart after the first year of college compared to those whose parents had a bachelor's degree or higher (Choy, 2001). A myriad of variables negatively impacted persistence throughout postsecondary education. FGCS typically work in excess of 35 hours per week, and have lower levels of engagement in campus activities, plus other variables that correlated to higher likelihood of departure (Choy, 2001). Moreover, Radunzel (2018) found that a reduced risk to dropout after the first year at a four-year institution was associated with: higher first-year GPA, being female, being Hispanic or Asian (compared to White), affluence of home neighborhood, hours worked while in college, intention to live on campus, education goals, full-time enrollment, and higher annual family income.

When studying college attainment, correlational research was used to investigate a myriad of predictor variables including, learning (Lundberg et al., 2007), engagement strategies (Yee, 2016), quality and type of engagement (Pike & Kuh, 2005), non-cognitive growth (Ting, 2003), and self-efficacy (Vuong et al., 2010). Vuong et al. (2010) found statistically significant differences in academic success existed between first-generation and continuing-generation sophomores. Within the same study, no statistical difference was found for level of self-efficacy based on generational status, but persistence was impacted differently for the two groups (Vuong et al., 2010). In addition, the purpose for entering college was different for the various types of students who enrolled. Specifically, students considered "working-class" (Wilkins, 2014, p. 173) consistently espoused a pragmatic or job-specific skill goal (Mullen, 2011).

Engagement and Participation

Engagement or involvement is a construct used in a myriad of educational research as both a predictor and an outcome perpetuated by variations in operationalization of the construct. Theoretically, Astin (1991) framed engagement by level and quality of participation, while the National Survey of Student Engagement (NSSE) defined engagement as "educational practices that are strongly associated with high levels of learning and personal development" (Kuh, 2001, p.12). Engagement is further developed in other literature to include behavioral, emotional, and cognitive investments in learning (Yee, 2016).

Terenzini et al. (1996) described institutional academic involvement for students based on generational status. Research into FGCS found that at 23 universities, FGCS completed fewer credit hours in the first-year, had fewer co-curricular experiences, worked more hours per week while studying fewer hours, were less likely to participate in an honors program, were less likely to perceive that faculty were concerned about students and teaching, and made smaller first-year gains on a standardized measure of reading comprehension. Institutional academic involvement continued to be a disparity a decade later. Chen (2005) also found disparities in credits earned, course selection, and diversity of majors for FGCS as compared to CGCS. Additionally, academic success indicators were persistently lower for FGCS; these included GPAs, remediation rate, withdrawal rate, and likelihood to repeat a course when compared to CGCS.

Pascarella et al. (2004) built upon preceding literature and investigated engagement after the first year of college. Pascarella and associates (2004) demonstrated that many of the disparities in institutional academic engagement persisted for FGCS into their second and third academic years. The additional objectives of the follow-up study included describing several types of individual development variables. First-generation students were found to have lower levels of cognitive development, motivation, and overall GPA throughout the second and third years of college compared to their counterparts (Pascarella et al., 2004). However, data were used to showcase no net difference for writing skill, reading comprehension, or critical thinking between the generation statuses.

Kuh et al. (2008) investigated the impact of academic engagement variables on academic performance, as measured by GPA, to offer a concrete outcome from student engagement. The general effect model found that including academic engagement statistically and substantively increased the model's explanatory power for GPA outcomes in students' first year of college. Of note, parent's level of education was almost mitigated by the academic engagement variables included in the model (Kuh et al., 2008). Additional research by Pike and Kuh (2005) used involvement as a mediating variable and subsequently found that commuting to campus, along with lower educational aspirations, explained much of the difference in involvement in the college experience between FGCS and other students.

Participation in "social and academic communities" (p. 121) increased the types of support experienced while in college (Tinto, 1993). Institutions had an impact on students' perception of feeling supported by fostering social interactions (Kuh et al., 2005). A wide network of interactions consisting of friends, mentors, and social relationships provided support for FGCS (Gibbons et al., 2019). Support from family and friend groups was associated with moderate levels of academic stress reduction (Rayle & Chung, 2007).

Lundberg et al. (2007) built upon previous findings by investigating involvement variables as a path analysis to self-reported student learning in academic settings. Framed by Astin's I-E-O, path assessment of student background inputs through involvement variables, the model was used to predict self-reported learning. Findings from regression analysis reported that generational status had a negative effect on involvement. FGCS increasingly felt like outsiders in higher education settings due to lower levels of academic and social involvement, and lesser quality engagement (Lundberg et al., 2007). Conversely, race/ethnicity positively influenced involvement, but negatively influenced the learning outcome. While FGCS were less involved than other students, they reported greater academic learning gains.

The relationship between student engagement and academic success has been well-documented. Svanum and Bigatti (2009) found that the level of student engagement was positively associated with college success indices, including degree completion. Through ethnographic study, Yee (2016) operationalized engagement as activities in which students participate to be academically successful and concluded that a narrower variety of engagement strategies was employed by FGCS to interact with academic situations. FGCS were seen to employ single engagement strategies that emphasized self-

independence, while middle class students employed dual engagement strategies that emphasized interaction, in addition to independence (Yee, 2016).

Sense of Belonging

The construct, sense of belonging, was found to positively predict levels of academic engagement (Soria & Stebleton, 2012). O'Keefe (2013) asserted that increasing a student's sense of connectedness, or sense of belonging, led to increased retention and completion. Factors that attributed to a student's sense of belonging included perceiving that the institution cares for student well-being, faculty-student relationships, and appropriate mental health services (O'Keefe, 2013).

Strayhorn (2008) found that faculty-student interactions, peer interactions, and engagement in active learning strategies supported personal and social learning gains during college. Ting (2003) asserted that psychological and cultural backgrounds of students effected their abilities to integrate into new university communities. FGCS demonstrated that non-cognitive variables, such as perceived sense of community, were indicators of academic success. Non-cognitive variables were found to effect minority FGCS populations more than their first-generation, Caucasian counterparts. Additionally, FGCS who had long-term goals persisted at a higher rate and had more certainty for college majors compared to CGCS (Ting, 2003).

Leadership

Leadership skills have become an expectation by employers for college graduates (Strawn et al., 2017). The Association of Public Land Grant Universities (APLU, 2009) stated that employers listed leadership as one of their top desired skills of new college graduates. College has been identified as an ideal time to structure leadership development experiences (Buschlen & Dvorak, 2011).

Studies have shown that leadership programming is a vital component to preparing leaders for the workplace (Simpson et al., 2012; van der Meer et al., 2019). Involvement in structured leadership programs has been found to positively influence non-academic outcomes for college students, such as collaboration, and citizenship (Dugan & Komives, 2007). Leadership experiences for college students have been linked to effectively enhancing community values, awareness or consciousness of self, and positive group values (Buschlen & Dvorak, 2011). Many leadership programs engage students in extra- and co-curricular experiences (van der Meer et al., 2019); this type of engagement has been demonstrated to contribute to positive learning outcomes (Pascarella & Terenzini, 2005). Although leadership programming has been documented to relate to positive collegiate outcomes, research specifically on FGCS and leadership variables was not found in the literature reviewed.

FGCS in Colleges of Agriculture and the Related Sciences

The research on FGCS is salient for land-grant institutions because FGCS are often an over-represented population within biological sciences majors (Carnevale, 2013; Dika & D'Amico, 2016; Giorgi et al., 2018). Additionally, many colleges of agriculture and the related sciences at public land-grant institutions report overall higher graduation rates for their college (Johnson, 2017) and by first-generational status (L. Burns, personal communication, October 22, 2019). Furthermore, research on the behaviors of underrepresented populations, specifically FGCS, race, and gender, by area of study (Torche, 2011), college major (Azmitia et al., 2018), and enrollment trends is sparse.

Although research on FGCS in colleges of agriculture is limited, student experiences within colleges of agriculture have been researched. Freshman academic success, retention and transfer have been researched for college of agriculture students. Retention has been shown to relate to academic indicators such as GPA and entrance performance exams (Garton et al., 2000; Garton et al. 2002; Koon et al., 2009). Shoulders et al. (2019) reported that students who had higher academic achievement indicators prior to, and during freshman year, were more likely to transfer out of colleges of agriculture after their freshman year.

Dyer et al. (2002) found alternative variables influencing academic success, showcasing the potential importance of prior agricultural experience as a predictor for college of agriculture freshman retention. The relationship between academic outcomes and prior experiences, such as youth organization participation (Ball et al., 2001), and early college credits (Smith et al., 2010), for college of agriculture students has also been explored with mixed findings.

Research using generational status within larger predictive modeling has offered mixed results. Estepp et al. (2019) found that generational status has a low but significant correlation with overall freshmen GPA and retention to sophomore year within a college of agriculture. In that study, neither generational status nor SES was found to be a predictor of freshman GPA (Estepp et al., 2019). Alternatively, Johnson (2019) found that generational status was a significant difference for students not returning to a college of agriculture after their freshman year.

However, FGCS are achieving higher rates of college graduation in the land-grant colleges of agriculture who were contacted by the researcher in this study. For example, at the University of Arkansas, in their 2010 freshman cohort, FGCS students graduated at a rate of 27% for four-year and 43% for six-year graduation rates (Johnson, 2017). Comparatively, college of agriculture students from the same freshman cohort graduated at a rate of 38% for four-year and at a rate of 50% for six-year graduation rates. In their longitudinal study, researchers found similar results (Johnson, 2017). At the University of Nebraska-Lincoln, the six-year graduation rate for College of Agricultural Sciences and Natural Resources students, across all students, was higher than the university rate for seven of the last eight cohorts, by at least 6 percentage points (J. Muller, personal communication, October 17, 2019). At Oklahoma State University, in 2018, students in the Ferguson College of Agriculture graduated at a rate at least 8 percent higher than non-colleges of agriculture students for four-year and six-year graduation rates (L. Burns, personal communication, October 22, 2019). Furthermore, FGCS in Oklahoma State University's Ferguson College of Agriculture graduated at a higher rate than non-college of agriculture FGCS, by nine percentage points.

Conceptual Framework

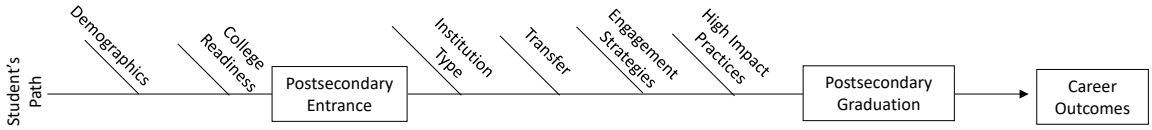
The Input-Experience-Outcome (I-E-O) model has been used as a foundation for several models of student postsecondary education outcomes (Kennedy & Upcraft, 2010; Lundberg et al., 2007; Strayhorn, 2008). According to researchers, in the I-E-O model, students enter college with various personal descriptors, as inputs, and then interact with various environmental experiences to reach an output. Astin's model and theory have become foundational for assessing college student success (Kennedy & Upcraft, 2010). The overall model reflects the interaction of student personal descriptors with their various environmental experiences to reach an output from college. This functional relationship supports the idea that prior-to-enrollment life and college experiences work together to produce an outcome (Astin, 1977; Kennedy & Upcraft, 2010).

An additional salient model was offered by Tinto (1993). Tinto's longitudinal model of student departure has been used to theorize that students enter college with personal attributes and characteristics that shape precursor goals and intentions for college (Tinto, 1993). The goals continuously modify longitudinally due to engagement in academic and social interactions (Pascarella & Terenzini, 2005). As students continuously assess their personal goals and aspirations, the outcome likelihood of college departure shifts and results in either persistence or departure from the collegiate setting (Tinto, 1993).

For the purposes of the broader, overarching line of inquiry for this study, the researchers conceptualized components of Astin's (1991) I-E-O college impact model and the longitudinal model of student departure into a unified framework (see Figure 1). The researchers' conceptual framework began with longitudinal input variables of pre-collegiate entry student experiences, and demographics. These pre-entry attributes are the foundation for a student's choice to enter postsecondary education. Experiences

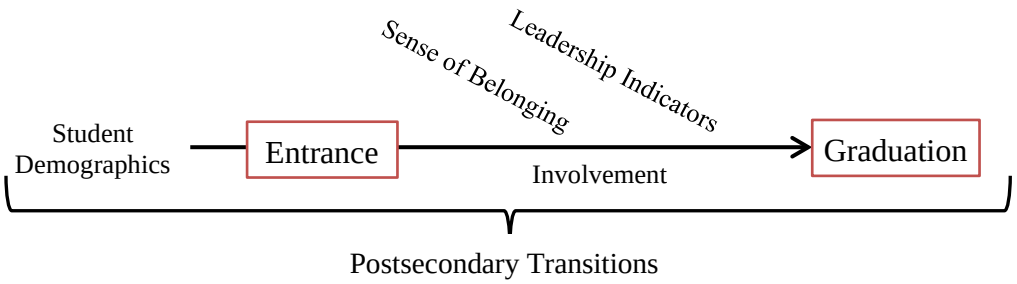
during college interact with the pre-collegiate variables to influence the decision to persist to degree completion. Outcomes of this conceptual model are operationalized as career success indicators such as employment rate, salary, and prestige of profession.

Figure 1. Overarching Conceptual Framework



Specific to this study, the I-E components of the overarching conceptual frame were investigated (see Figure 2). Pre-enrollment demographics such as generational status, race, and gender were described. Post-enrollment experiences included categorization by college and engagement strategies. For this study, engagement strategies were described as belongingness, leadership indicators, and on-campus activity involvement. Graduation is conceptualized as the ultimate outcome transition, but not measured in this study.

Figure 2. Study Conceptual Model



Because the study is descriptive research, it is limited by the data reported from the Student Life Survey and the Multi-Institutional Survey of Leadership student cohorts surveyed. Therefore, the findings are not considered generalizable to broader populations. Studying outcomes for students who engaged in postsecondary education was the premise for this study.

Purpose and Objectives

The purpose of this study was to describe college success indicators including on-campus involvement, leadership, and sense of belonging by generational status and college affiliation at The Ohio State University (OSU). The researchers' objectives specifically included studying first-generation and continuing-generation students and their colleges of affiliation by:

1. Describing OSU student on-campus involvement using the OSU Student Life Survey.
2. Describing OSU student leadership indicators using the Multi-Institutional Study of Leadership.
3. Describing OSU student sense of belonging on campus using the Student Life Survey and Multi-Institutional Study of Leadership.

Data and Methods

Data Sources

Two datasets were used in this study to describe student behaviors for various time periods. First, the Student Life Survey (SLS) is an annually-conducted survey regarding student collegiate experiences at

OSU. Second, OSU participates every three years in the internationally distributed Multi-Institutional Study of Leadership.

Student Life Survey

The Ohio State University SLS is managed and distributed through the Office of Student Life, Center for the Study of Student Life. A randomly selected sample of OSU undergraduate, graduate, and professional students are invited to participate in the annual survey. For the purposes of this study, responses related to on-campus involvement and student sense of belonging from undergraduates in the 2019 survey (n = 726) were analyzed.

Multi-Institutional Study of Leadership

"The MSL is an international research program focused on understanding the influences of higher education in shaping socially responsible leadership capacity and other leadership related outcomes (e.g., leadership efficacy, cognitive skills, resilience)," (Dugan et al., 2014, p. 6). The Multi-Institutional Study of Leadership (MSL) is conceptually framed by Astin's (1991) I-E-O college impact model, adapted to include experiences outside of a college context and, also, retrospective questioning to gain pre-college data (Anderson, 2012). The MSL has over 400 variables built into scales and composite measures (Early, 2017). Undergraduate student data from the 2018 survey of OSU (n = 2635) were analyzed in this study.

Analysis Procedures

Descriptive statistical analysis was conducted using SPSS, version 26. Access to the SLS and MLS data was granted through a partnership with the Office of Student Life. Due to the descriptive nature of the study, non-responses were eliminated. Generational status of college students was reported as a binary, nominal variable. FGCS were defined as students for whom neither parent, nor any legal guardian, had earned at least a bachelor's degree.

College affiliation of students was a self-reported categorical variable. Respondents reported the college in which they were affiliated or enrolled at OSU. For the purposes of the study, respondents affiliated with the College of Food, Agricultural, and Environmental Sciences (CFAES) were compared to all other college affiliations. Additionally, CFAES affiliates were compared to specific colleges based on similar size, and percentage of generational status.

On-campus Involvement

Descriptive statistics were used to describe the sample of respondents from the SLS. Involvement was assessed by respondents selecting, from a provided list, all on-campus activities in which they participated outside of class instruction. Respondents self-described involvement using a free-response item. Frequencies and percentages were reported for descriptive variables of gender identity, race and ethnicity, and age. Frequencies and percentages were reported for the variables of generational status and college affiliation. Survey items measuring college affiliation were designed to assess respondents' affiliation to an academic program. Responses were recoded and collapsed from program affiliation into associated college affiliations.

Leadership

Descriptions of leadership for the targeted demographic variables were reported from the Multi-Institutional Survey of Leadership (MSL), 2018 cohort. Three constructs for leadership were described. Reported constructs were overall *Leadership Capacity, Leadership Efficacy,* and *Leadership Motivation*. A mean construct score was developed from items within the survey. Constructs chosen for analysis from MSL followed the items chosen by Rosch (2018) representing readiness, willingness, and ability to lead.

Sense of Belonging

Sense of Belonging was measured in both the SLS 2019 cohort and the MSL. For the SLS 2019 cohort, Sense of Belonging was a computed construct derived from responses. The scale was computed from a summation of responses on six, 4-point Likert-type items. Responses were coded from one to four, where one equated to a response of strongly disagree, and no neutral was present. The Sense of Belonging construct scale resulted in a range of 6 to 24. To parallel reported findings from the MSL constructs, the researcher computed an *averaged* construct score for the SLS Sense of Belonging construct. The computed average construct score ranged from one to four, where an *averaged* scale score of one represented a lower sense of belonging while a four represented a higher sense of belonging. Means, standard deviations, and confidence intervals were analyzed for Sense of Belonging for the overall sample, college affiliations within the sample, and generational status. The scale was assessed for validity through a panel of experts and reliability through a pilot test and analysis of the data for internal consistency.

Sense of Belonging was assessed using the MSL 2018 cohort. Within the MSL, the Sense of Belonging construct was calculated by an averaged item score for self-reported items. Scale average for MSL Sense of Belonging ranged from one to five, where an average construct score of five represented a higher sense of belonging and a score of three represented a neutral sense of belonging.

Acknowledged Limitations for Methodology

The variables of interest from the SLS and MSL data in this study did not uphold the assumptions of normality. Therefore, the discussion is limited to the sample, and is not generalizable. The assumption of normality was not upheld for the variable Sense of Belonging from the SLS and MSL samples, based on investigation of the Shapiro-Wilk test ($p < .001$; Field, 2017). For the SLS sample, visualization through histogram distribution represented a positive skew (.38) and the Q-Q plot demonstrated a non-linear plotting. Additionally, for the MSL sample, visualization through histogram distribution represented a negative skew (-.32) and the Q-Q plot demonstrated a non-linear plotting.

Assumptions were tested for the three leadership variables from the MSL sample; normality was not upheld. Investigation of the Shapiro-Wilk test ($p < .001$; Field, 2017) for the variables *Leadership Capacity*, *Leadership Efficacy*, and *Leadership Motivation* from the MSL sample did not uphold the assumption of normality. Visualization through the Q-Q plot demonstrated a non-linear plotting with a deviation for lower response scores for each of the leadership variables.

Discussions pertinent to FGCS from the SLS and MSL sample must be read with caution. Specifically, the percentage of respondents identifying as FGCS may not be accurately representative of the student body of The Ohio State University. Findings were not congruent with other studies. Giorgi et al. (2018) reported that over 40% of the Wooster campus, and 30% of CFAES students on the Columbus campus of OSU were classified as FGCS, while the samples in this study were under 25% FGCS in CFAES or majors in agriculture and the related sciences.

Results

Survey Demographics

The age range for the sample from the SLS 2019 cohort was 18 - 53 years of age, with 95.7% (n = 694) of the sample being under 24 years of age. For the SLS sample, 3.7% (n = 27) of the sample reported being within the age range of 25-34 years of age, while less than 1% (n = 5) reported being over 35 years of age.

For the target variable of generational status from the SLS 2019 cohort, a minority of the sample (n = 147, 20.2%) classified themselves as a FGCS. For the target variable of college affiliation with the

university, 49 respondents (6.6%) reported being students in the College of Food, Agricultural and Environmental Sciences. The colleges with affiliations larger than CFAES were the Colleges of Arts and Sciences (CAS, *n* = 287, 39.5%), Engineering (*n* = 149, 20.5%), Fisher College of Business (*n* = 82, 11.3%), and Education and Human Ecology (CEHE, *n* = 48, 6.6%). Of the students who identified as CFAES, 22.4% (*n* = 11) classified as FGCS. Of the five largest colleges, CEHE had the largest percentage (27.1%) of students who identified as FGCS, followed by CAS (22.6%) and CFAES (22.4%). Table 1 represents the percentage of FGCS for the five largest colleges at OSU. The age range for respondents who identified as CFAES were 18 – 22 years of age. CFAES affiliated respondents were found to be predominately White (*n* = 44, 89.8%), and a majority woman (*n* = 35, 71.4%).

Table 1

Students Identifying as FGCS for Five Largest Colleges at OSU (n = 726)

	College				
	CAS	Engineering	Business	CFAES	CEHE
Percentage	22.6	12.1	13.4	22.4	27.3

Note. College names shortened. Colleges listed in order of enrollment size, from largest to smallest, left to right.

Within the sample of students in the 2018 cohort of the MSL, respondents self-reported their primary college major. It was found that business (*n* = 395, 15.2%), social sciences (*n* = 368, 14.1%), health-related professions (*n* = 285, 11.0%), engineering (*n* = 269, 10.3%), and education (*n* = 235, 9.0%) were the five most frequently reported majors. Respondents who reported majoring in agriculture comprised less than 6% of the sample (*n* = 153, 5.9%).

Respondents ages ranged from 17 to 71 years of age. A substantive majority of respondents were under 24 years of age (*n* = 1831, 90.9%). It was found that respondents age 25 - 34 comprised 5.3% (*n* = 106) of the sample, while those over 34 years of age were 3.6% (*n* = 73) of the sample. Class rank within the sample was found to be 38.2 % (*n* = 975) freshmen, 24.7% (*n* = 24.7) sophomores, 20.0% (*n* = 511) juniors, and 17.0 % (*n* = 433) seniors or greater. Non-responses for age were 23.6% (*n* = 621) and were 3.2% (*n* = 85) for class rank. Additionally, generational status of respondents was found to be 45.7% (*n* = 901) FGCS. Of the sample, 25.6% (*n* = 512) had parents who had at least some college experience, but had not earned a bachelor's degree, therefore being classified as FGCS. Non-response for generational status was 25.2% (*n* = 664) of the sample.

On-campus Involvement

Findings for the on-campus participation by college and generational status are presented in Table 2. Most respondents, for OSU, and CFAES specifically, reported being involved in student organizations. The same is true for respondents who identify as FGCS, for CFAES and university wide. Involvement in on-campus employment was the second largest activity respondents reported, with 31.5% university wide and a majority of CFAES students (53.1%) reporting being employed on-campus. First-generation college students reported less involvement regardless of college affiliation, except for on-campus employment where they were more involved by 3.6%. Respondents affiliated to CFAES were more involved for each activity type than the overall reported OSU involvement. Additionally, FGCS in CFAES reported being more involved than their university-wide counterparts for all activity types. First-generation college students in CFAES were more involved than their continuing-generation counterparts in the activities of undergraduate research, and capstone project or experience.

Table 2

Percentage On-campus Participation by College, and Generational Status (n = 718)

Activity	University		CFAES	
	Total (*n* = 571)	First-Gen (*n* = 147)	Total (*n* = 49)	First-Gen (*n* = 11)
Student Organization	58.9	53.8	69.4	54.5
Social Fraternity or Sorority	12.1	5.5	18.3	18.1
Intramural Sports	15.1	10.3	20.4	18.1
Service	12.4	13.8	20.4	18.1
Undergraduate Research	13.0	10.3	24.5	27.2
On-campus Job	31.5	35.1	53.1	45.4
Learning Community	12.0	6.2	14.2	0.0
Capstone	7.7	9.7	14.2	27.2
Not Involved	16.9	24.1	10.2	9.1

Additionally, findings for participation in multiple on-campus experiences were reported in Table 3. At OSU it was found that less students who affiliated with CFAES reported no involvement in on-campus activities compared to the overall university (10.2% compared to 17.5%). Furthermore, CFAES consistently reported larger percentages of participation for multiple types of on-campus activities. Nearly three times the percentage of CFAES students reported being involved in 4 or more of the on-campus activities than their university peers. Conversely, FGCS at OSU consistently reported lower levels of on-campus participation than their continuing generational peers. Nearly one-quarter (24.8%) of the FGCS at OSU reported not being involved in any on-campus activities.

Table 3

Percentage of Students Involved in Multiple On-Campus Activities by College, and Generational Status (n = 718)

	University		Generational Status	
# of Activities	Overall	Ag. Related	Continuing	First-Gen
None	17.5	10.2	15.0	24.8
1	32.9	16.3	31.5	33.1
2	25.6	28.6	27.4	19.3
3	16.2	22.4	17.1	14.5
4 or more	7.8	22.4	8.9	8.3

Leadership

Mean scores for the three leadership indicator scales were calculated for the overall university and students studying agriculture and the related sciences from the MSL. Respondents reported an overall capacity for leadership (μ = 4.14, *SD* = .50), a neutral level of efficacy for leadership (μ = 3.08, *SD* = .69), and an overall motivation for leadership (μ = 3.91, *SD* = .55). Respondents majoring in agriculture and the related sciences reported an overall capacity for leadership (μ = 4.15, *SD* = .49), a neutral level of efficacy for leadership (μ = 3.11, *SD* = .67), and an overall motivation for leadership (μ = 3.91, *SD* = .55). These results are considered substantively similar by college affiliation.

Mean scores for the three leadership indicator scales were calculated for FGCS and continuing generation peers. For the scale, *Leadership Capacity*, FGCS (μ = 4.16, *SD* = .51) and continuing generation peers (μ = 4.15, *SD* = .47) reported an overall positive capacity for leadership. For the scale, *Leadership Efficacy*, FGCS (μ = 3.11, *SD* = .68) and continuing generation peers (μ = 3.11, *SD* = .67) reported a neutral efficacy for leadership. For the scale, *Leadership Motivation*, FGCS (μ = 3.90, *SD* = .51) and continuing generation peers (μ = 3.91, *SD* = .55) reported an overall motivation for leadership. These results are considered substantively similar by generational status.

Sense of Belonging

Sense of Belonging was a calculated construct scale from the SLS comprised of 6 items. Overall, respondents reported a sense that they belonged on campus, (μ = 3.07 *SD* = .58). Averaged scale scores by college affiliation for Sense of Belonging are represented in Table 4. Of the largest five colleges represented in the sample, respondents who affiliated with CAS reported the lowest Sense of Belonging (μ = 2.99, *SD* = .60). Respondents affiliated to CEHE reported the highest Sense of Belonging (μ = 3.21, *SD* = .53). Respondents affiliated with CFAES reported a sense that they belonged on campus (μ = 3.15, *SD* = .53). Colleges with fewer than 20 persons represented in the data were combined into an *Other* college affiliation category.

Table 4

Sense of Belonging, by College, SLS 2019 Cohort (n = 670)

College	*n*	μ	*SD*	95% CI
Arts and Sciences	258	2.99	.604	[2.92, 3.07]
Business	76	3.14	.533	[3.02, 3.27]
CFAES	48	3.15	.529	[2.99, 3.30]
CEHE	47	3.21	.534	[3.05, 3.37]
Engineering	135	3.02	.558	[2.93, 3.12]
Exploratory	33	2.95	.662	[2.72, 3.19]
Medicine	36	3.22	.548	[3.04, 3.41]
Other	37	3.26	.612	[3.05, 3.46]

Note. College names shortened.

Findings for Sense of Belonging were calculated by generational status. For both FGCS and CGCS, respondents reported an overall Sense of Belonging on campus. Students classified as continuing generational college students were found to have an *averaged* reported scale score of 3.06 (*SD* = .59). Students classified as FGCS were found to have an *averaged* reported scale score of 3.07 (*SD* = .57). Table

5 presents a comparison for the target variables of Sense of Belonging and Leadership indicators by generational status and college affiliation.

Table 5

Scale Means for Targeted Variables by Field of Study and Generational Status

Variables	University		Generational Status	
	Overall	Ag. Related	Continuing	First-Gen
SLS Sense of Belonging [a]	3.07	3.15	3.06	3.07
MSL Sense of Belonging [b]	3.69	3.73	3.66	3.71
Leadership Capacity [b]	4.14	4.15	4.15	4.16
Leadership Efficacy [b]	3.08	3.11	3.11	3.11
Leadership Motivation [b]	3.91	3.91	3.91	3.90

Note. Scale scores are calculated based on survey responses.
[a] Scale score averaged, range 1 – 4, with no neutral.
[b] Scale score averaged, range 1 – 5, with neutral of 3.

Sense of Belonging for respondents in the MSL was a calculated average of scale items. The range for mean score was one to five with neutral response being three. For the overall sample, respondents were found to have an average score of 3.69 for Sense of Belonging (*SD* = .83). Respondents who majored in agriculture and the related sciences were found to have an average score of 3.73 for Sense of Belonging (*SD* = .79). Findings for Sense of Belonging for FGCS and their CGCS were computed. Respondents classified as FGCS had a higher score (μ = 3.71, *SD* = .82) than CGCS respondents (μ = 3.66, *SD* = .87).

Generational status has historically been categorized as a binary variable (Choy, 2001). Within the MSL dataset, responses allowed for describing the sample based on a wider definition of generational status. Descriptive statistics for leadership indicators from the MSL 2018 cohort were run with classifications for parental education attainment (high school diploma or less, some college without bachelor's degree, bachelor's degree or higher). Findings under this broader categorization were used to conclude no differences in the measures of overall capacity, efficacy, or motivation to lead. FGCS reported similar beliefs for *Leadership Capacity* (μ = 4.15, *SD* = .516) with their peers of parents with some college (μ = 4.16, *SD* = .510), and CGCS peers (μ = 4.15, *SD* = .474). FGCS reported similar beliefs for *Leadership Efficacy* (μ = 3.10, *SD* = .684) with their peers of parents with some college (μ = 3.11, *SD* = .673), and CGCS peers (μ = 3.11, *SD* = .674). FGCS reported similar beliefs for *Leadership Motivation* (μ = 3.88, *SD* = .569) with their peers of parents with some college (μ = 3.91, *SD* = .551), and CGCS peers (μ = 3.91, *SD* = .547).

Additionally, descriptive statistics for Sense of Belonging from the MSL 2018 cohort were run for sense of belonging with classifications for parental education attainment (high school diploma or less, some college without a bachelor's degree, bachelor's degree or higher). Findings under this broader categorization were used to conclude that there were no differences in the overall sense of belonging; FGCS reported a marginally higher (μ = 3.73, *SD* = .815) sense of belonging than peers of parents with some college (μ = 3.70, *SD* = .834), and CGCS (μ = 3.66, *SD* = .866) students. Findings were similar to earlier studies that were used to conclude that little difference existed for some college and no college experience

for parents (Choy, 2001). Perceived feelings of belonging, while marginal in this study, were higher for FGCS, regardless of definition, and therefore, constitute a potential line of inquiry for further study.

Conclusions and Discussion

On-campus Involvement

Undergraduate students at OSU were involved in a variety of on-campus activities. Students in CFAES were more involved in the items measured in this study than their non-college of agriculture peers across campus. FGCS who affiliated with CFAES were more involved than their FGCS, non-college of agriculture peers across campus. Findings were similar to earlier studies that were used to conclude that little difference was found for students in which parents had some college or no college (Choy, 2001). Using these findings, further inquiry is warranted regarding level of involvement in student organizations at OSU and their potential for mitigating disparities for FGCS. Additionally, students affiliated with CFAES regardless of generational status participated in on-campus employment more than non-college of agriculture peers. This finding is supported by the literature painting the picture that FGCS may need employment to remain in postsecondary education (Somers et al., 2004).

According to Ward et al. (2012), financial need of FGCS and CFAES students, may lead to higher involvement in work-related activities during postsecondary education. A high volume of work-related activity may have potential implications for employment load on college departure and dropout (Wilbur & Roscigno, 2016). The high involvement of CFAES students in academically related activities may support an earlier finding for higher graduation rates for CFAES students (Giorgi et al., 2018). Additionally, overall, on-campus involvement might mitigate the influence of generational status, or employment status, that have been previously found to be negative predictors to persistence and graduation (Dika & D'Amico, 2016).

An outcome from these findings may imply that employment for students in CFAES is more related to their interests. A respondent who affiliated with CFAES responded in a free-response item that their on-campus employment was "OSU Horse Farm." Therefore, the type of employment may be a mitigating factor for the negative influence of work on persistence. Work type, practicality, or relatedness to degree is worth further investigation as it may influence predictors such as sense of belonging, or community engagement. Additionally, academically related employment may also offer a way to mitigate the negative influence of work on persistence (Choy, 2001; Terenzini et al., 1996; Wilbur & Roscigno, 2016), and, consequently, reduce the need to accrue debt, which has been found to be a stronger negative predictor for FGCS success than their CGCS peers (Somers et al., 2004).

For discussion, percentage of involvement was compared to respondents in the sample from the College of Education and Human Ecology. At OSU, CEHE is similar in size and percentage of FGCS as CFAES. Within this sample, CFAES students were more involved than their CEHE counterparts. For students affiliated with CEHE within the sample, 10% were involved in on-campus employment, and 21% were involved in student organizations. These two activities had the largest involvement for both the whole university, and CFAES. Additionally, of note, CEHE students were not involved (<1%) in undergraduate research, an area of involvement for nearly one in four CFAES students. College administration should consider the implications of the varying levels of involvement for students from different colleges as it relates in the literature to persistence to degree attainment.

College of Food, Agricultural, and Environmental Sciences students in the dataset were also more engaged in educationally purposeful activities, such as undergraduate research, learning communities, and capstone experiences. Employment for CFAES students may also be contributing to educational engagement. A heightened level of involvement in educationally purposeful activities may be leading to positive academic, and social outcomes for CFAES students (Kuh et al., 2008).

The higher level of involvement by students who affiliate with CFAES, especially FGCS within the college, represented a new finding compared to previous literature of FGCS engagement (Pike & Kuh, 2005; Soria & Stebleton, 2012). This may support the assertion by Yee (2016) that FGCS are not unengaged, but *differently engaged* in college. These variations in involvement should be considered in further research since academic engagement has been demonstrated to mitigate parental level of education on academic outcomes (Kuh et al., 2008).

For discussion, faculty-student interaction was not included in this research design, but the lower involvement in capstone experiences and undergraduate research might hint that students were not engaging with faculty. Continuing to explore faculty-student interactions at CFAES could contribute to the body of knowledge around high impact practices and their relationship to retention and graduation. Faculty-student interactions have been demonstrated to promote leadership conceptualization and growth (Strawn et al., 2017).

Leadership

Undergraduate students in this study self-reported that they have the capacity to be leaders while holding a neutral belief about their ability to engage in leadership. The students who majored in agriculture and the related sciences did not differ from their non-agriculture peers in their levels of agreement for the three leadership measures in this study. Undergraduate students identifying as FGCS did not differ in their levels of agreement from their CGCS peers for the three leadership measures in this study.

The overall belief in abilities to lead by CFAES, FGCS, and the general student body of OSU may relate to the large participation in student organizations, many of which are student led. Additionally, these perceptions of leadership, may have direct translation into leadership skills that employers are expecting of college graduates (APLU, 2009). Understanding these beliefs related to leadership experiences and development may benefit the overall campus climate and influence a sense of belonging (van der Meer et al., 2019). Students consistently report positive perceived benefits from leadership experiences on postsecondary campuses (van der Meer et al., 2019). Therefore, continued investigations are warranted for exploring students' neutral feelings toward leadership efficacy.

Sense of Belonging

Undergraduate students in this study self-reported that they felt like they belong. Students did not differ in their perceived sense of belonging by college affiliation, or by generational status at OSU. A lack of difference for sense of belonging for FGCS and their CGCS peers can be considered a substantive conclusion from this research. A lower sense of belonging has been described as a factor leading to college departure specifically for FGCS (Soria & Stebleton, 2012) and associated with FGCS (Ting, 2003).

For discussion, disparities between FGCS and CGCS perceived sense of belonging has also been documented to associate with perceived quality of mental health (Stebleton et al., 2014). Therefore, if students at OSU, regardless of college affiliation or generational status, feel like they belong, the potential exists for them to be more mentally well, and therefore, less likely to depart the institution which would perpetuate future academic and after college successes.

Overall Summary

FGCS in this study did not report disparities in the investigated indicators of college success when compared to CGCS and college affiliations. Additionally, differences in involvement, leadership, or sense of belonging were not found based on the comparisons in this study. When viewing the findings through the lens of this study's Overarching Conceptual Model (see Figure 1), the lack of differences for CFAES and FGCS may be indicators leading to the higher graduation rates for students in colleges of agriculture and related sciences that were suggested by sources used in this study. Therefore, further research must be

conducted to explore this potential phenomenon as it relates to the *career outcomes* component of the researchers' Overarching Conceptual Model.

Regarding the *career outcomes* component, given that the USDOE (2019) reported a trend showing a positive relationship between employment descriptors and college-educated populations when participants had attended college, Ford's (2018) assertion that the bachelor's degree is a potential social equalizer for the American population needs further study, especially when taking into account generational status. In that regard, given that Cataldi, et al. (2018) published data showing no substantive difference in employment after degree completion by generational status, further research must be conducted to continue explaining the variables in the Overarching Conceptual Model for this study, especially pre-postsecondary entrance characteristics, postsecondary transition management, and career onboarding.

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