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# Historically underrepresented students: influences of rurality, parent education level and family income on graduate school intentions

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**Introduction:** Despite increasing rates of graduate school attendance, students from historically underrepresented backgrounds enroll in graduate programs at lower rates than their peers. Although there is a growing body of research on current graduate students' perspectives on what impacted their decision to pursue graduate education, few studies have examined the intention to pursue graduate education specifically among second- and third-year undergraduate students from first-generation, rural, and/or low-income backgrounds.

**Method:** Our study investigated the predictive roles of self-efficacy, outcome expectations, mentoring, and belongingness on students' intentions to pursue graduate education. Participants included 179 undergraduate students who were low-income, rural, and/or from a first-generation background. Participants completed online surveys to answer the research questions related to social cognitive beliefs and graduate school intentions.

**Results:** Only the two social cognitive variables, self-efficacy and outcome expectations, emerged as significant predictors of graduate school intention. Belongingness and mentoring did not significantly impact graduate education intentions. Participants who identified as rural, low-income, and first-generation had lower mentoring support scores compared to their peers. Participants with higher graduate school self-efficacy and outcome expectations demonstrated higher graduate school intentions.

**Discussion:** The results suggest that social cognitive variables, specifically graduate school self-efficacy and outcome expectations, impact graduate school intentions in underrepresented college students. Also, the additive effects of multiple marginalized identities appears to negatively impact beliefs about attending graduate school. Therefore, Social Cognitive Career Theory can be a powerful tool in helping rural, first-generation, and low-income students increase their beliefs about being able to successfully attend and complete graduate school. Focusing on these social cognitive variables may help increase the number of students from these historically excluded backgrounds to pursue more schools after their undergraduate career.

## KEYWORDS

graduate education, underrepresented students, social cognitive career theory, first-generation college students (FGCS), rural students

## Introduction

Over the past 10 years, the number of students who earned a graduate degree increased by over 18% in the United States (Irwin et al., 2023). Among those planning to attend graduate school, almost 88% thought a graduate degree would afford them better career opportunities and more than 84% believed graduate school could earn them a higher earning potential (Wendler et al., 2012). Despite these expectations, undergraduate students from historically underrepresented populations, such as those from first-generation, rural, and/or low-income backgrounds, are enrolling in graduate programs at lower rates than other populations. According to the Baccalaureate and Beyond survey (Henderson et al., 2022), students with parents who earned a degree or attended some college enrolled in graduate school at higher rates than those who were first-generation college students. Interestingly, in the same survey, low-income students (i.e., Pell-grant eligible) enrolled in master's degree programs at higher rates but still enrolled in doctoral programs at lower rates compared to those who were not Pell-grant eligible. The overall increase in graduate school attendance combined with differences by demographic factors indicates a need to understand what predicts undergraduate students' intention to pursue graduate education.

To date, less is known about what specific factors impact the *intention* to pursue graduate education among undergraduate students from historically underrepresented backgrounds. The extant literature has primarily assessed how academic factors, social capital, and social-cognitive variables have impacted students' graduate school decision-making and/or academic persistence (e.g., Eagan et al., 2013; Gardner and Holley, 2011; Tate et al., 2015). Of note, most existing studies have sampled current graduate students to retrospectively examine what most influenced their intentions, rather than assessing graduate school intentions among current undergraduate students who are in the process of planning or seriously considering graduate school attendance. These retrospective studies primarily considered gender and race or ethnicity, finding mixed results on the impact of these variables on graduate student enrollment (Mullen et al., 2003; Xu, 2016; Perna, 2004). This study sought to fill gaps in the literature by examining intentions to pursue graduate education among undergraduate students from first-generation, low-income, and/or rural backgrounds.

## Underrepresented prospective graduate students

Students who identify as rural, low-income (defined as Pell-grant eligible), and/or first-generation are underrepresented and have been historically excluded from higher education, including graduate school education. Defined as students whose parents did not complete a four-year college degree (US Department of Education, 1998), first-generation college student status has been explored as a contextual variable impacting graduate school enrollment. Several studies reported that parent education level impacts both graduate school aspirations and enrollment, although the degree of impact varies by type of graduate degree and graduate school discipline (English and Umbach, 2016; Mullen

et al., 2003; Rocconi et al., 2015). Although some have explored the intersection of first-generation status and low-income variables (e.g., Tate et al., 2015), the intersection of rurality and low-income household with first-generation status is rarely reported. Therefore, little is known about the graduate school intentions of these students who hold multiple underrepresented identities. We hypothesized that students whose identities and backgrounds intersect with multiple forces of marginalization (e.g., rurality and first-generation status) would report lower consideration of graduate school, given the additional educational barriers and systemic inequities they may encounter.

Rurality is defined as non-metro counties, or counties with less than 50,000 residents (US Department of Agriculture, n.d.). Students from rural communities complete college at lower rates, are more likely to qualify for need-based financial aid, and are more likely to be the first in their family to attend college compared to their non-rural peers (Postsecondary National Policy Institute, 2023); they are also less likely to enter into and complete a doctoral degree (O'Neal and Perkins, 2021). First-generation college students, or those whose parents have not completed an undergraduate degree, are less likely to expect to earn a graduate degree and less likely to complete a graduate degree once enrolled compared to continuing-generation students (RTI International, 2021). In a retrospective study, first-generation social sciences graduate students reported less family support for graduate school pursuits and less overall financial support for graduate study compared to their peers (Tidwell and Logan, 2024). Even when controlling for GPA, race, gender, and SES, first-generation college students appear to be less likely to apply to any type of graduate school (Carlton, 2015).

As noted in Ali and McWhirter (2006), experiences of stigma and stereotype threat related to being viewed as undereducated, too insular in their communities, and/or less capable than their peers can add additional barriers for rural, low-income, and/or first-generation college students pursuing graduate school. Statti and Torres (2020) explained that many students holding these identities may lack access to resources and community support needed to bolster their educational opportunities. As an example, Raymond and Black (2008) found that underrepresented college students exhibited a deficit in knowledge about financing graduate education (e.g., assistantships and tuition remission) despite indicating an overall strong interest in pursuing master's or doctoral degrees. Alternatively, McCulloh (2022) interviewed rural college students who noted how their close-knit community provided social support during their college adjustment and helped to offer informational support when their caregivers lacked knowledge about college admissions. It is evident that both individual and contextual factors influence the higher education experience for students with underrepresented identities.

## Social cognitive career theory

In the current study, Social Cognitive Career Theory (SCCT; Lent et al., 1994) served as an organizing framework for considering factors predictive of intent. The theory posits that a person's career interests, goals, and actions are tied to (1) their overall confidence in their ability to succeed at certain tasks (self-efficacy) and (2) belief that the result of completing those tasks will be

positive overall (outcome expectations). According to this model, self-efficacy and outcome expectations serve as predictors of an individual's interests, which in turn predict intentions, or goals, to achieve a given outcome (Lent et al., 1994). Moreover, self-efficacy and outcome expectations are shaped by both supports and barriers in the immediate environment and by more distal background factors (such as culture, aptitude, learning opportunities, and so on). SCCT thus provides an important theoretical foundation for understanding why differences in intent to pursue graduate school might exist.

There is some empirical support for this theory as applied to intentions to pursue graduate education, particularly the central role of self-efficacy. In a study of underrepresented, low-income students, Tate et al. (2015) found that research self-efficacy, but not academic self-efficacy or social self-efficacy, was a significant predictor of intent to pursue graduate education. The authors noted that these results may be explained by the fact that the students sampled were members of a program providing specialized resources and support. Borrego et al. (2018) also examined self-efficacy as a predictor in undergraduate engineering students' intention to pursue graduate school, finding that increases in self-efficacy directly predicted the likelihood of enrolling in a graduate program. Outcome expectations were significantly predictive of students' plans to enroll in a doctoral program but not a master's program. More recently, Deemer et al. (2020) identified science self-efficacy and outcome expectations as positively related to science career interests, but these variables were not directly connected to graduate school intentions in a large group of undergraduate STEM majors. Wofford (2021) explored graduate school self-efficacy in STEM majors and found it was influenced by academic ability and STEM self-efficacy, with no differences by parent education level or SES. Beyond this, relatively little is known about the social cognitive beliefs of students seeking to enroll in graduate programs, indicating a need for continued investigation.

## Supports for graduate education

SCCT highlights contextual supports and barriers as key predictors of self-efficacy, and thus of interests and intentions. Important supports that have been explored in relation to graduate school intent include access to social capital, including connection to mentorship and an increased sense of belonging. Coleman (1988, p. S95) describes social capital as a "resource for action" through which individuals can develop expectations, information, and norms. Mentorship and sense of belonging, as aspects of social capital, can positively impact college adjustment, commitment to educational setting, and retention (Credé and Niehorster, 2012; Joanis et al., 2022; McCulloh, 2022; Soldner et al., 2012) in underrepresented college students, suggesting that these factors may affect graduate school beliefs as well.

As a contextual support and form of social capital, mentoring has been shown to positively impact students' perspectives about graduate school, increase feelings of preparedness, and expand students' social networks (Luna and Prieto, 2009). Specifically, past research has demonstrated that students report positive experiences with mentors related to preparing to attend graduate school (Huss et al., 2002) and gaining awareness of graduate school expectations, such as how to conduct research (Meza et al., 2018).

However, first-generation college students and those from low-income backgrounds have reported that lack of support from faculty or other mentors negatively impacted beliefs about graduate school (Gardner and Holley, 2011; Huss et al., 2002; Ramirez, 2012). Given these findings, it is important to understand how mentorship and its resulting social capital might contribute to students' intent to pursue graduate programs in spite of systemic barriers they face.

Along with mentorship, sense of belonging has been shown across decades of higher education research to be strongly predictive of college students' campus and community engagement (Masika and Jones, 2016), academic persistence (Wolf et al., 2017), and overall college adjustment (Hurtado et al., 2007). Although the literature on sense of belonging among both current and prospective graduate students is limited, a study by O'Meara et al. (2017) found that having ongoing mentors and positive experiences within their departments was more important to graduate students' sense of belonging than self-reported experiences of microaffirmations and microaggressions. This finding, combined with the significant empirical evidence on sense of belonging in relation to positive student outcomes (see Strayhorn, 2012), lays the foundation for considering belongingness as a potential factor in undergraduate students' intention to pursue graduate education.

## Purpose of study

Given the limited research on what factors most influence graduate school intent in students who are from rural, first-generation, and/or low-income families, we sought to explore the role of social-cognitive variables, combined with the variables of mentorship and belongingness. Understanding what impacts graduate school intent for these students will help us increase educational and career goal attainment for more students. The broad aim of this study was to examine what factors predict the intent to pursue graduate school education in historically excluded undergraduate students. Our research questions included:

- 1: What are the social cognitive beliefs (graduate school-going self-efficacy and outcome expectations) and social capital support experiences (mentoring and sense of belonging) of students from rural, low-income, and/or first-generation backgrounds?
  - 1a: Are there differences in these variables by rurality, first-generation, or low-income status?
- 2: Of these variables, what predicts graduate school intent in this population?

Consistent with past research (e.g., Tate et al., 2015), we hypothesized that mentoring experiences, belongingness, outcome expectations, and self-efficacy beliefs would all significantly predict graduate school intent.

## Methods

### Participants

After receiving institutional review board approval, eligible participants were recruited via email, departmental listservs, and

a general psychology subject pool at a public university in the Southeastern United States. Overall, the university includes ~24% first-generation college students and 29% low-income students. To participate in the study, all students had to be at least 18 years old, currently enrolled in their second or third year of college, and self-identify as being from at least one of three demographic groups: low-income, rural, and/or first-generation background. We operationalized “low-income” as Pell or partial Pell grant eligible and first-generation as being the first in one’s family to attend college. We sampled only second or third-year students, given their increased likelihood of considering graduate education, learning about admissions procedures/requirements, and clarifying career goals. Those who did not meet these eligibility requirements were removed from the analysis, in addition to participants who did not correctly answer two embedded attention check items. This left a final sample of 179 undergraduate students.

The participants averaged 20.85 years ( $SD = 4.38$ ) in age and were predominantly white (78.8%) and non-Hispanic (90.5%). Over half (73.2%) were female. Only 23 (12.8%) of the 179 participants accessed the survey through the introductory psychology subject pool, with the rest learning of the survey through our other recruitment methods. In the total sample, participants reported 61 different majors across 7 different colleges (e.g., Agriculture, Engineering, Business, Arts and Sciences). The most common major was Psychology (18.43% of total sample) followed by Animal Sciences (8.4% of the total sample). Participants could select which underrepresented groups described them, and 76.0% reported being first-generation, 44.7% identified as rural, and 69.3% were low-income. As shown in Table 1, just over one-third of the sample (37.4%,  $n = 67$ ) identified with only one of these groups, just over another third of the sample (35.2%,  $n = 63$ ) identified with two of these groups, with the remaining participants (27.5%,  $n = 49$ ) identifying with all three. Therefore, over half of the participants represented at least two of our underrepresented identities.

In addition to indicating whether they were from a rural community with a dichotomous yes/no response, participants were also asked to self-rate their home community’s level of rurality on a 1 (Very rural) to 10 (Very Urban) scale. Completing this rating helped us contextualize the rurality of their home communities. The average was 3.97 ( $SD = 2.57$ ) with participants who identified as being from rural communities rating them as more rural ( $M = 2.53$ ) than did participants who did not identify as rural ( $M =$

5.15,  $t_{(176)} = 7.85$ ,  $p < 0.001$ ). Most participants indicated very strong consideration of pursuing graduate school ( $M = 70.37$  on a 100-point scale).

## Procedures

Data collection occurred during the fall semester of 2022. Participants used an anonymous link to complete the survey and were required to provide consent beforehand. Participants could exit the survey at any time. Any participant who provided consent to participate was given the option to enter a gift card raffle. Additionally, participants recruited via the general psychology pool received course credit for completing the survey.

## Measures

### Demographics

In addition to asking students if they identified as the first in their family to attend college, as being from a rural home community, or from a low-income household (i.e., full or partial Pell-grant eligibility), demographic information collected for this survey included gender, age, race, ethnicity, and college major and department. An adapted version of the MacArthur Subjective Social Status Scale (Adler et al., 2000) was used to assess participants’ perceived rurality of their home community.

### College-going self-efficacy scale-short form-graduate education

The original CGSES (Gibbons and Borders, 2010) is a 30-item measure developed to assess middle school students’ self-efficacy for both attending and persisting in college. Hardin et al. (2021) developed and validated a 14-item short-form version of the original measure called the CGSES-SF (Hardin et al., 2021) with a sample of high school students. The CFSES-SF (Hardin et al., 2021) covers the original five content areas (financial issues, academic ability, family-related issues, life skills, and decision-making skills) across two domains (attendance and persistence). All factor loadings on the CGSES-SF (Hardin et al., 2021) were high ( $>0.48$ ), and the total score exhibited strong inter-item reliability ( $\alpha = 0.93$ ). Additionally, the correlation coefficient between the original measure and the CGSES-SF (Hardin et al., 2021) was 0.98. For this study, we adapted the CGSES-SF by revising the wording of the items to replace “college” with “graduate school,” and from “high school” to “undergraduate degree.” A sample item is: “I can choose the undergraduate classes needed to get into a good graduate school program.” A 4-point Likert scale (1 = not at all sure, 2 = somewhat sure, 3 = sure, 4 = very sure) is used, with higher scores indicating higher self-efficacy perceptions. Cronbach’s alpha reliability in the current study was good ( $\alpha = 0.915$ ).

### College student mentoring scale

Crisp (2009) developed the CSMS, a 25-item measure, to quantitatively assess mentoring across four dimensions: psychological and emotional support, degree and career support, academic subject knowledge support, and existence of a role model.

TABLE 1 Demographics of sample.

Group	Women	Men	Other	Total
First-gen only	27	3	0	30
Rural only	8	1	0	9
Low income only	21	6	1	28
First-gen & rural	14	1	1	16
First-gen & low income	27	9	4	41
Rural & low income	3	3	0	6
First-gen, rural, & low income	31	15	3	49
Total	131	38	8	179



A confirmatory factor analysis demonstrated strong psychometric properties and factor loadings were found to be acceptable (Crisp, 2009). Items are rated on a 5-point Likert scale (strongly agree = 1, agree = 2, neutral = 3, disagree = 4, strongly disagree = 5) in response to the prompt, “While in college, I have had someone in my life who...”; a sample item is “expresses confidence in my ability to succeed academically” (Crisp, 2009). Due to a survey formatting error, the first two items (from the Psychological and Emotional Support [PES] subscale) were combined into one. These items were removed from analysis, resulting in a 23-item total score and a PES-subscale score based on only 6 items. For ease of interpretation, scores were reversed so that higher scores = greater mentoring support. Cronbach’s alpha reliabilities were strong for the total score ( $\alpha = 0.956$ ) and subscales, ranging from 0.82 for the 6-item PES subscale to 0.89 for the 6-item Existence of a Role Model (ERM) subscale.

### College outcomes expectations questionnaire

The 19-item College Outcomes Expectations Questionnaire (COE; Flores et al., 2008) assesses beliefs about the value of pursuing postsecondary education. Participants respond to items on a 10-point Likert scale from 1 (*strongly disagree*) to 10 (*strongly agree*). We adapted the COE for the purpose of this study, changing the words “college” to “graduate school education.” A sample item is “A graduate school education will give me the kind of lifestyle that I want.” Higher scores on the COE indicate more favorable expectations regarding graduate school education. In the original COE development study, Flores et al. (2008) reported strong internal consistency using a sample of college students ( $\alpha = 0.93$ ); additionally, convergent validity was established as COE scores were positively correlated with a related construct, college self-efficacy beliefs. The COE is a widely used measure within social-cognitive career theory (SCCT; Lent et al., 1994). Cronbach’s alpha in the current study is good ( $\alpha = 0.943$ ).

### Departmental sense of belonging and involvement

The 20-item Departmental Sense of Belonging and Involvement scale (DeSBI; Knekt et al., 2020) was created to assess students’ sense of belonging and involvement in their “home” academic department. Since the DeSBI was developed specifically for students in a biology department, we reworded the items to be more general (i.e., “my academic major.”) A sample item is “I can really be myself in my academic department.” Participants indicate their level of agreement with each item on a 6-point Likert scale. Knekt et al. (2020) reported a three-factor structure: (1) sense of belonging; valued competence (2) sense of belonging; social acceptance, and (3) involvement. For this study, we used only the sense of belonging scales. Factor analyses suggested strong psychometric properties. The correlation between the two belonging subscales was 0.57, indicating the constructs are related but different; moreover, internal consistencies were 0.90 for sense of belonging; valued competence, and  $\alpha = 0.89$  for sense of belonging; social acceptance. In the current study, both the 5-item Valued Competence Scale ( $\alpha = 0.913$ ) and the 6-item Social

Acceptance scale ( $\alpha = 0.895$ ), as well as the 11-item Total Score ( $\alpha = 0.925$ ) demonstrated strong inter-item reliabilities.

### Consideration of graduate education

Given the very limited instruments assessing undergraduate students’ intent to pursue graduate education, we developed the following question as an outcome variable: “How seriously have you considered pursuing graduate school?” Participants used a slider scale from 0–100, with qualitative descriptors ranging from “None at all” to “A great deal.”

## Results

### Differences based on demographics

Our first research question was about the social cognitive beliefs (graduate school-going self-efficacy and outcome expectations) and support experiences (mentoring and sense of belonging) of students from rural, low-income, and/or first-generation backgrounds, and whether there are any differences in these variables based on rurality, first-generation, or low-income status. Means and standard deviations on all variables are presented by group in Table 2. Due to the significant overlap of identities for our participants (e.g., only 4 low-income, Pell-eligible continuing generation students from rural home communities; only 14 rural continuing generation students), we only examined main effects.

We conducted a MANOVA to test our research sub-question about the extent to which there are between-groups differences in any of the social cognitive and support variables. In our first analysis, we included the two social cognitive variables (self-efficacy and outcome expectations) and the mentoring and belongingness total scores. Multivariate tests showed small but significant effects of low income (Pell-eligibility) only,  $F_{(4,148)} = 2.87$ ,  $p < 0.05$ ,  $p\eta^2 = 0.07$ . *Post-hoc* tests indicated that low-income (Pell-eligible) students had significantly lower mentoring scores ( $M = 2.50$ ,  $F_{(1,151)} = 10.07$ ,  $p < 0.01$ ,  $p\eta^2 = 0.06$ ) than non-Pell eligible students ( $M_s = 2.94$ ).

We conducted another MANOVA to examine possible main effects of these demographics on the mentoring and belongingness subscales (because the measures of the social cognitive variables—self-efficacy and outcome expectations—did not have subscales, they are not included here). Results showed a main effect of Pell-eligibility only  $F_{(6,147)} = 2.41$ ,  $p < 0.05$ ,  $p\eta^2 = 0.09$ . *Post-hoc* tests indicated that Pell-eligible students had significantly lower scores on all four mentoring subscales, compared to non-Pell eligible students  $F_{(1,152)} > 4.05$ ,  $p_s < 0.05$ ,  $p\eta^2_s > 0.03$ .

Although sample sizes did not allow us to look for interactions among these groups, we did code participants as identifying with 1, 2, or all 3 groups and found significant differences based on this 3-level variable in a subsequent MANOVA,  $F_{(8,298)} = 2.49$ ,  $p < 0.05$ ,  $p\eta^2 = 0.06$ . Although there were no differences on the social cognitive variables (self-efficacy, outcome expectations), there were significant differences on both the Belongingness and Mentoring total scores. *Post hoc* analyses indicated that participants with two of these identities had higher belongingness scores ( $M = 4.45$ ) than participants with all three ( $M = 3.93$ ) but did not

TABLE 2 Means (standard deviations) on all measures, by group.

Measure	Home community		Generation status		Family income		Total
	Not rural	Rural	Cont. gen.	First gen.	Not Pell	Pell	
Consider GE	68.36 (30.72)	72.84 (29.71)	76.62 (25.52)	68.41 (31.43)	71.22 (28.87)	69.96 (30.99)	70.35 (30.27)
CGSES-GE	2.68 (0.62)	2.67 (0.70)	2.72 (0.57)	2.66 (0.68)	2.86 (0.65)	2.59 (0.64)	2.67 (0.66)
GEOE	7.49 (1.44)	7.41 (1.89)	7.35 (1.81)	7.49 (1.61)	7.56 (1.93)	7.41 (1.52)	7.46 (1.65)
<b>Mentor support</b>							
PES	2.55 (0.75)	2.44 (0.95)	2.86 (0.61)	2.39 (0.88)	2.8 (0.8) <sup>a</sup>	2.37 (0.83) <sup>a</sup>	2.50 (0.84)
DCS	2.82 (0.75)	2.68 (1.04)	2.97 (0.64)	2.69 (0.95)	3.11 (0.71) <sup>a</sup>	2.59 (0.92) <sup>a</sup>	2.75 (0.89)
ASKS	2.39 (0.88)	2.24 (1.16)	2.72 (0.73)	2.19 (1.06)	2.59 (1) <sup>a</sup>	2.2 (1.00) <sup>a</sup>	2.32 (1.01)
ERM	2.6 (0.83)	2.33 (1.11)	2.82 (0.75)	2.37 (1.02)	2.86 (0.89)	2.31 (0.97)	2.48 (0.98)
Total	2.6 (0.71)	2.43 (1.00)	2.85 (0.62)	2.42 (0.90)	2.85 (0.78) <sup>a</sup>	2.38 (0.86) <sup>a</sup>	2.52 (0.86)
<b>Sense of belonging</b>							
VC	3.87 (1.06)	3.69 (1.24)	3.95 (1.03)	3.75 (1.17)	3.82 (1.19)	3.78 (1.12)	3.80 (1.14)
SA	4.73 (0.76)	4.48 (1.15)	4.71 (0.81)	4.59 (1.00)	4.66 (0.84)	4.61 (1.00)	4.62 (0.95)
Total	4.34 (0.78)	4.13 (1.11)	4.36 (0.83)	4.21 (0.97)	4.29 (0.90)	4.23 (0.96)	4.25 (0.94)

<sup>a</sup> Indicates pairs of means that differ significantly ( $p < 0.05$ ).

Consider GE, to what extent have you considered pursuing graduate school?; CGSES-GE, college-going self-efficacy scale, graduate education; GEOE, graduate education outcome expectations; PES, psychological and emotional mentoring support; DCS, degree and career mentoring support; ASKS, academic subject knowledge mentoring support; ERM, existence of a role model mentoring support; VC, valued competence; SA, social acceptance.

differ from participants with only one of these identities ( $M = 4.27$ ). On the other hand, students who identified with all three (i.e., as rural, low-income, and first-generation) had lower mentoring support scores ( $M = 2.04$ ) than students with only 2 ( $M = 2.64$ ) or 1 of these identities ( $M = 2.76$ ). The groups also differed on all of the subscales except the Valued Competence subscale of the belongingness measure. Students who identified with all three (i.e., as rural, low-income, and first-generation) had lower scores on all four mentoring support subscales than students with only one of these identities; they also had lower scores on the Degree and Career Mentoring Support (DCM) and Existence of a Role Model Mentoring Support (ECM) subscales compared to students with two of these identities. As with the total scores, students with two of the identities had higher social acceptance subscale scores than participants with all three.

## Predictors of consideration of graduate school

Our second research question pertained to the extent to which social cognitive and support variables predicted consideration of graduate school. To determine whether we could examine this question in our total sample, we first looked for differences in intent to pursue graduate school based on rurality, first-generation status, and income. Results showed no differences in consideration of graduate school for any of these demographic variables,  $F_{(1,174)} < 2.94$ ,  $ps > 0.08$ . However, there was a main effect of number of underrepresented identities,  $F_{(2,175)} = 4.22$ ,  $p < 0.05$ . As might be expected, participants with 2 of these identities had lower consideration of graduate school ( $M = 61.50$ ) than those with

only 1 ( $M = 75.30$ ,  $p < 0.05$ ); however, participants with all 3 identities did not differ in consideration of graduate school ( $M = 74.78$ ) compared to either other group ( $ps > 0.05$ ). We therefore included the number of underrepresented identities as a predictor in subsequent analyses.

As shown in the bottom half of Table 3, for the total sample, higher self-efficacy for pursuing graduate school and greater positive outcome expectations for graduate education were both correlated with stronger intent to attend graduate school; neither sense of belonging nor mentoring support, however, were associated with consideration of graduate school. The same pattern held for students with two or three of the underrepresented identities. For students with only one of the identities, only outcome expectations was significantly correlated with intent to pursue graduate school.

We conducted a hierarchical linear regression. Number of underrepresented identities (1, 2, or 3) was entered in Step 1, the mentoring and belongingness total scores in Step 2, the social cognitive variables of graduate school going self-efficacy and outcome expectations in Step 3. As shown in Table 4, only Step 3 accounted for significant variance in intention to pursue graduate school ( $\Delta R^2 = 0.23$ ,  $F_{(2,148)} = 22.64$ ,  $p < 0.001$ ). Both self-efficacy ( $\beta = 0.31$ ,  $p < 0.001$ ) and outcome expectations ( $\beta = 0.31$ ,  $p < 0.001$ ) were significant predictors; none of the other variables was significant (all  $\beta$ s  $< |0.12|$ ,  $ps > 0.05$ ).

Analyses were repeated entering the mentoring and belongingness subscale scores in Step 2. Although one of the belongingness subscales (Social Acceptance) had a significant beta weight ( $\beta = -0.21$ ,  $p < 0.05$ ) in Step 2, the addition of the belonging and mentoring subscales did not account for significant unique variance ( $\Delta R^2 = 0.03$ ,  $F_{(6,146)} = 0.83$ ,  $p > 0.54$ ). As in the prior analysis with the total scores, only Step 3 (adding the two

TABLE 3 Correlations among variables.

	Intent	Mentoring support	Department belongingness	Self-efficacy	Outcome expectations
1 or 2 identities					
Intent	–	–0.079	–0.046	0.206	0.326**
Mentoring support	0.225	–	0.246	0.392**	–0.059
Department belongingness	0.142	0.573**	–	0.025	0.110
Self efficacy	0.518**	0.347**	0.359**	–	0.099
Outcome expectations	0.576**	0.400**	0.317**	0.633**	–
3 identities and total sample					
Intent	–	0.118	–0.140	0.399**	0.307**
Mentoring support	0.079	–	0.447**	0.484**	0.041
Department belongingness	–0.043	0.437**	–	0.246	0.078
Self efficacy	0.388**	0.420**	0.205**	–	0.308
Outcome expectations	0.409**	0.116	0.140	0.345**	–

\* $p < 0.05$ .

\*\* $p < 0.01$ .

In the top half of the table, correlations for participants with only one underrepresented identity are shown above the diagonal and correlations for participants with any 2 of the identities are shown below the diagonal. In the bottom half of the table, correlations for participants with all 3 identities are shown above the diagonal and correlations for the total sample are shown below the diagonal.

TABLE 4 Hierarchical regression analyses predicting consideration of graduate school.

Model		Unstandardized coefficients		Standardized coefficients	Change R2
		B	Std. Error	Beta	
1	(Constant)	73.80	6.14		0.002
	Num of identities	–1.77	3.02	–0.048	
2	(Constant)	78.39	14.14		0.004
	Num of identities	–1.56	3.16	–0.042	
	Mentoring	1.85	3.39	0.051	
	Belonging	–2.28	2.88	–0.072	
3	(Constant)	14.15	15.76		0.233**
	Num of identities	–1.67	2.79	–0.045	
	Mentoring	–3.44	3.18	–0.095	
	Belonging	–3.63	2.55	–0.114	
	Self-efficacy	14.60	3.88	0.313**	
	Outcome expectations	5.88	1.46	0.309**	

\*\* $p < 0.01$ .

social cognitive variables) was significant ( $\Delta R^2 = 0.24$ ,  $F_{(2,144)} = 24.44$ ,  $p < 0.001$ ). As in the first analysis, both self-efficacy ( $\beta = 0.36$ ,  $p < 0.001$ ) and outcome expectations ( $\beta = 0.29$ ,  $p < 0.001$ ) were significant. The Social Acceptance Score remained significant in Step 3 ( $\beta = -0.29$ ,  $p < 0.01$ ).

## Discussion

Our study sought to explore what factors predicted the intent to pursue graduate education among historically underrepresented college students. We included graduate school self-efficacy and

outcome expectations along with mentoring and sense of belonging as these constructs appear in past research as impactful. All participants identified as rural, first-generation college, and/or low-income. Most participants embodied at least two of these marginalized identities.

Given the overlap of identities for our participants, it is perhaps not surprising that they demonstrated similar graduate school intention levels to each other. Importantly, there was a significant impact on graduate school intention for students holding more than one underrepresented identity. It appears that the additive effects of multiple marginalized identities negatively impact beliefs about attending graduate school. [Statti](#)

and Torres (2020) and McNamee and Ganss (2023) highlighted the importance of universities adding an intentional focus on rural students, many of whom are first-generation college and from low-income households. McNamee and Ganss (2023) also specifically called for research exploring what impacts rural and first-generation college student retention and completion, and our study highlights the importance of considering their graduate school plans as well.

Although the final model accounted for 25% of the total variance in intentions to pursue graduate school, only the two social cognitive related variables, self-efficacy and outcome expectations, were significant. This finding appears to provide strong support for SCCT (Lent et al., 1994), which positions self-efficacy and outcome expectations as predictors of interests, which in turn predicts choice goals (which in this case can be understood as the intention to pursue graduate education). These results align with those of Tate et al. (2015) and Borrego et al. (2018), who found that graduate education self-efficacy was a strong predictor of graduate school intent. In both studies, demographic variables were not significant predictors of graduate school intent; our results show no differences in intent based on their specific cultural background.

A few main differences were found by first-generation and low-income status, although these were not tied to graduate school intent. First-generation college students reported lower levels of mentoring compared to their peers. Sims and Ferrare (2021) found that first-generation students sought to increase their professional network, suggesting a lack of mentoring and several studies reported that first-generation students regularly sought mentoring support (e.g., Cooper et al., 2019; McCulloh, 2022; Ramirez, 2012). Our participants from lower-income families also differed from their peers, reporting both lower self-efficacy and less mentoring. These results echo those from Ramirez (2012) and Huss et al. (2002), whose participants identified a lack of support and financial challenges as barriers to graduate school.

Our results diverged from past research suggesting that mentoring and departmental belongingness are predictive of students' academic persistence and goals. In our study, neither mentoring nor belongingness were statistically significant predictors of students' intention to pursue graduate education. Given that past qualitative research highlights the role of belonging and mentorship (e.g., Gantt et al., 2024; Luna and Prieto, 2009), these results were surprising. It is possible that students' cultural identities and backgrounds impacted the extent to which they viewed mentoring and departmental belongingness as important to their intentions to pursue graduate education. For example, rural students, especially those from rural Appalachia, may hold cultural values of self-reliance and the "bootstrapper mentality" (Gibbons et al., 2020). As such, these students may perceive their intention to pursue graduate education as being connected to their sense of self and their personal goals, but not to the relationships they have with other people or to the specific climate they experience in an academic department. Their perception might be "My intent to pursue graduate school is based on me and what I want, regardless of whether I have mentors or feel accepted within the program." In this way, rural students' cultural context might overlay or alter factors that are predictive of their intention to pursue graduate education.

## Implications and limitations

Several limitations must be noted about our study. First, participants were from a single university and self-selected to participate in the study. It may be that those who participated were already set in their decision to attend graduate school and had already overcome any doubts or barriers to this goal. Second, the university is located in Central Appalachia, whose residents hold a strong sense of self-reliance, independence, and mistrust of outsiders (Gibbons et al., 2019), which may have impacted their belongingness and mentoring responses. Third, while we had a robust participant size, we were unable to fully explore differences by specific demographics due to the small number of participants representing these factors. Specifically, there were not enough participants representing rural, low-income, and first-generation status to explore cumulative effects. An additional limitation was our error in the mentoring scale where we inadvertently combined two items that then had to be dropped from the analysis. It is possible that this error impacted overall results from that scale. Fourth, although we included a self-rating to better understand rurality of their home community, it is possible that participants under- or overrepresented the rurality of their hometowns. Therefore, it is possible that their definition differed from the federal definition of rural. Lastly, our recruitment method may have missed students from some majors as many of our participants came from introduction to psychology courses. It is possible that our participants are not representative of undergraduates overall.

## Implications

Results from this study have important implications for research examining students' intentions to pursue graduate education. First, we recommend that postsecondary institutions intentionally consider graduate school intentions in addition to retention and completion for rural, first-generation, and low-income students. Through an SCCT lens (Lent et al., 1994), fostering rural, first-generation, and low-income students' self-efficacy and outcome expectations for graduate school seems to increase intent to pursue graduate school. These intentions can inform choice goals and behaviors that promote undergraduate retention and persistence (Polinsky, 2003). Given that many fields require an advanced degree, it is important that universities do all they can to help students achieve their career goals, especially when additional education may be required. For example, these students may lack the social and cultural capital related to understanding what graduate school is, the potential benefits and implications of attending graduate school, and how to navigate the selection and application process. Universities can assist students by offering planning workshops that demystify graduate school and provide concrete information about how to pursue advanced education. Doing so can offer new learning experiences that increase graduate school self-efficacy beliefs.

Second, because self-efficacy and outcome expectations appear to strongly influence students' intentions to pursue graduate education, programmatic and academic/career counseling efforts with historically excluded undergraduate student populations



might be tailored to address these variables. These efforts can focus on providing verbal encouragement to instill confidence in their ability to succeed in graduate programs or by introducing them to role models from similar backgrounds who attended graduate school. Higher education professionals might consider implementing peer education and support programs specifically for historically underrepresented student populations who express interest in pursuing graduate education. It is possible that peer-to-peer support, more so than formal mentorship, might provide students with the appropriate level of accountability and resources they desire when considering the pursuit of graduate education.

Third, additional research can further our understanding of graduate school intentions and attendance. Given the predictive roles of self-efficacy and outcome expectations on students' intentions, future studies may consider testing other variables within the social cognitive career theory (SCCT; Lent et al., 1994) model, such as individual-level inputs (e.g., proactive personality) and participation in goal-directed activity (e.g., researching graduate education programs). Testing these additional SCCT variables may provide a fuller picture of the characteristics and specific actions that most impact students' intentions to pursue graduate education. Next, researchers may consider utilizing a qualitative design to better capture students' internal processes and motivations for considering graduate school education. Since our sampled population experiences unique barriers and supports related to their cultural contexts, it is possible that traditional survey instruments are not responsive to the range of values, belief systems, and lived experiences that play a role in students' intentions to pursue graduate education. For example, conducting focus groups with rural, low-income, and/or first-generation students interested in graduate school might be a useful way of not only learning more about their specific needs and intentions, but also providing a supportive space where students can build community, share resources and information, and encourage each other's future career/educational aspirations. Lastly, more research is needed to help address the apparent gap between students' intentions to pursue graduate education and their actual enrollment in graduate programs. It might be useful to conduct studies with undergraduate student populations who initially considered but ultimately changed their minds about pursuing graduate education. Generating knowledge of what factors led to this changed decision can help illuminate educational resources that might be missing or unidentified barriers that ultimately contribute to the inequitable rates of graduate school attendance among historically excluded undergraduate populations. Relatedly, empirically validated measures of intention to pursue graduate education are needed, and future researchers might consider focusing on culturally responsive scale development.

Our results suggest that directly attending to graduate school self-efficacy and outcome expectation beliefs is vital to supporting low-income, rural, and/or first-generation college students as they consider steps after college graduation. It is not enough to simply tell these students they should consider attending graduate school; mentors and advisors need to help them find value in furthering their education and increase their beliefs that they can successfully enter and complete graduate education. Social Cognitive Career Theory (SCCT; Lent et al., 1994) highlights how increasing supports, reducing barriers, and providing new

learning experiences can help increase self-efficacy and outcome expectation beliefs. Therefore, practitioners working with these underrepresented students might broach conversations about the support systems and possible barriers related to graduate school. Supports might include: family and peers who believe the student can be successful in graduate school; academic and financial resources needed to enter and complete graduate school; and concrete information related to demystifying graduate school (Hardin et al., 2024). Alternatively, perceived barriers that might negatively impact graduate school intentions can include: financial concerns, family responsibilities, lack of role models, discrimination, and lack of social support. Intentionally asking about perceived supports and barriers and then offering new learning experiences, such as informational interviews, concrete information about graduate school, or experiences with near-peer role models, can help students successfully navigate the path to further education if they want it.

This study explored the impact of self-efficacy, outcome expectations, mentoring, and perceived belongingness on graduate school intentions in rural, first-generation, and low-income college students. The results suggest that these students want to attend graduate school and that these intentions are impacted by their social cognitive beliefs. Additionally, results indicated that embodying two of these identities decreases beliefs about their ability to successfully enter and complete graduate school. Universities can help these underrepresented students by increasing their awareness of the unique needs of these students and offering targeted support.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by University of Tennessee Knoxville IRB. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

KS: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. MG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. EH: Formal analysis, Funding acquisition, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. KC: Writing – original draft, Writing – review & editing. JH: Writing – original draft, Writing – review & editing. HA: Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## References

- Adler, N. E., Epel, E. S., Castellazzo, G., and Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. *Health Psychol.* 19, 586–592. doi: 10.1037/0278-6133.19.6.586
- Ali, S. R., and McWhirter, E. H. (2006). Rural appalachian youth's vocational/educational postsecondary aspirations: applying social cognitive career theory. *J. Career Dev.* 33, 87–111. doi: 10.1177/0894845306293347
- Borrego, M., Knight, D. B., Gibbs, K., and Crede, E. (2018). Pursuing graduate study: factors underlying undergraduate engineering students' decisions. *J. Eng. Educ.* 107, 140–163. doi: 10.1002/jee.20185
- Carlton, M. T. (2015). First generation students and post-undergraduate aspirations. *SAGE Open* 5. doi: 10.1177/2158244015618433
- Coleman, J. S. (1988). Social capital in the creation of human capital. *Am. J. Sociol.* 94, S95–S120. doi: 10.1086/228943
- Cooper, K. M., Gin, L. E., Akeeb, B., Clark, C. E., Hunter, J. S., Roderick, T. B., et al. (2019). Factors that predict life sciences student persistence in undergraduate research experiences. *PLoS ONE* 14:e0220186. doi: 10.1371/journal.pone.0220186
- Credé, M., and Niehorster, S. (2012). Adjustment to college as measured by the student adaptation to college questionnaire: a quantitative review of its structure and relationships with correlates and consequences. *Educ. Psychol. Rev.* 24, 133–165. doi: 10.1007/s10648-011-9184-5
- Crisp, G. (2009). Conceptualization and initial validation of the College Student Mentoring Scale (CSMS). *J. Coll. Stud. Dev.* 50, 177–194. doi: 10.1353/csd.0.0061
- Deemer, E. D., Navarro, R. L., Byars-Winston, A. M., Jensen, L. E., and Chen, C. P. (2020). Investigating graduate education and undergraduate research intentions of college science students. *J. Career Assess.* 28, 43–58. doi: 10.1177/1069072718823777
- Eagan, M. K. Jr., Hurtado, S., Chang, M. J., Garcia, G. A., Herrera, F. A., and Garibay, J. C. (2013). Making a difference in science education: the impact of undergraduate research programs. *Am. Educ. Res. J.* 50, 683–713. doi: 10.3102/0002831213482038
- English, D., and Umbach, P. D. (2016). Graduate school choice: an examination of individual and institutional effects. *Res. High. Educ.* 39, 173–211. doi: 10.1353/rhe.2016.0001
- Flores, L. Y., Navarro, R. L., and DeWitz, S. J. (2008). Mexican American high school students' postsecondary educational goals: applying social cognitive career theory. *J. Career Assess.* 16, 489–501. doi: 10.1177/1069072708318905
- Gantt, H. S., Cain, L. K., Gibbons, M. M., Thomas, C. F., Wynn, M. K., Johnson, B. C., et al. (2024). "Knowing i had someone to turn to was a great feeling": mentoring rural-appalachian STEM students. *Behav. Sci.* 14, 1–17. doi: 10.3390/bs14010075
- Gardner, S. K., and Holley, K. A. (2011). "Those invisible barriers are real": the progression of first-generation students through doctoral education. *Equity Excell. Educ.* 44, 77–92. doi: 10.1080/10665684.2011.529791
- Gibbons, M. M., and Borders, L. D. (2010). A measure of college-going self-efficacy for middle school students. *Prof. Sch. Couns.* 13, 234–243. doi: 10.5330/PSC.n.2010-13.234
- Gibbons, M. M., Brown, E. C., Daniels, S., Rosecrance, P., Hardin, E. E., Farrell, I., et al. (2019). Building on strengths while addressing barriers: career interventions in rural Appalachian communities. *J. Career Dev.* 46, 637–650. doi: 10.1177/0894845319827652
- Gibbons, M. M., Taylor, A. L., Brown, E., Daniels, S. K., Hardin, E. E., Manring, S., et al. (2020). Assessing postsecondary barriers for rural Appalachian high school students. *J. Career Assess.* 28, 165–181. doi: 10.1177/1069072719845329
- Hardin, E. E., Gibbons, M. M., Cook, K. D., Sexton, K., and Bagwell, L. (2021). Development and validation of a short form of the college-going self-efficacy scale. *J. Career Assess.* 29, 303–318. doi: 10.1177/1069072720968241
- Hardin, E. E., Murphy, S., and Gibbons, M. M. (2024). The assessment of post-secondary supports: a new measure of an understudied SCCT construct. *J. Career Dev.* 51, 598–618. doi: 10.1177/08948453241280104
- Henderson, M., Drummond, M., Thomsen, E., Yates, S., and Cooney, J. (2022). *Baccalaureate and Beyond (BB: 16/20): A First Look at the 2020 Employment and Education Experiences of 2015-16 College Graduates (NCES 2022-241)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Hurtado, S., Han, J. C., Sáenz, V. B., Espinosa, L. L., Cabrera, N. L., Cerna, O. S., et al. (2007). Predicting transition and adjustment to college: biomedical and behavioural science aspirants' and minority students' first year in college. *Res. Higher Educ.* 48, 841–887. doi: 10.1007/s11162-007-9051-x
- Huss, M. T., Randall, B. A., Patry, M., Davis, S. F., and Hansen, D. J. (2002). Factors influencing self-rated preparedness for graduate school: a survey of graduate students. *Teach. Psychol.* 29, 275–281. doi: 10.1207/s15328023TOP2904\_03
- Irwin, V., Wang, K., Tezil, T., Zhang, J., Filbey, A., Jung, J., et al. (2023). *Report on the Condition of Education 2023 (NCES 2023-144rev)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Joanis, S., Burnley, J., and Mohundro, J. D. (2022). Social capital's impact on college graduation rates, debt, and student loan defaults. *J. Coll. Stud. Retention Res. Theory Pract.* 24, 366–385. doi: 10.1177/1521025120918879
- Knekt, E., Rowland, A. A., Corwin, L. A., and Eddy, S. (2020). Measuring university students' interest in biology: evaluation of an instrument targeting Hidi and Renninger's individual interest. *Int. J. STEM Educ.* 7, 1–16. doi: 10.1186/s40594-020-00217-4
- Lent, R. W., Brown, S. D., and Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *J. Vocat. Behav.* 45, 79–122. doi: 10.1006/jvbe.1994.1027
- Luna, V., and Prieto, L. (2009). Mentoring affirmations and interventions: a bridge to graduate school for Latina/o students. *J. Hispanic High. Educ.* 8, 213–224. doi: 10.1177/1538192709331972
- Masika, R., and Jones, J. (2016). Building student belonging and engagement: insights into higher education students' experiences of participating and learning together. *Teach. Higher Educ.* 21, 138–150. doi: 10.1080/13562517.2015.1122585
- McCulloh, E. (2022). An exploration of parental support in the retention of rural first-generation college students. *J. Coll. Stud. Retent. Res. Theory Pract.* 24, 144–168. doi: 10.1177/1521025120907889
- McNamee, T. C., and Ganss, K. M. (2023). Rural students in higher education: from college preparation and enrollment to experiences and persistence. *Peabody J. Educ.* 98, 380–395. doi: 10.1080/0161956X.2023.2238508
- Meza, J. I., Rodriguez, K., Trujillo, C., and Ladd-Viti, C. (2018). Helping students at the margins get into graduate school: evaluating a multifaceted mentoring program. *Mentor Innovative Scholarship Acad. Advising*, 20, 26–41. doi: 10.18113/P8MJ2061075
- Mullen, A. L., Goyette, K. A., and Soares, J. A. (2003). Who goes to graduate school? social and academic correlates of educational continuation after college. *Sociol. Educ.* 76, 143–169. doi: 10.2307/3090274
- O'Meara, K., Griffin, A., Kuvaeva, K., Nyunt, G., and Robinson, N. T. (2017). Sense of belonging and its contributing factors in graduate education. *Int. J. Doctoral Stud.* 12, 251–279. doi: 10.28945/3903

## Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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- O'Neal, L., and Perkins, A. (2021). Rural exclusion from science and academia. *Trends Microbiol.* 29, 953–956. doi: 10.1016/j.tim.2021.06.012
- Perna, L. W. (2004). Understanding the decision to enroll in graduate school: sex and racial/ethnic group differences. *J. High. Educ.* 75, 487–527. doi: 10.1080/00221546.2004.11772335
- Polinsky, T. L. (2003). Understanding student retention through a look at student goals, intentions, and behavior. *J. Coll. Stud. Retention Res. Theory Pract.* 4, 361–376. doi: 10.2190/H9HV-5M07-RUFD-NA39
- Postsecondary National Policy Institute. (2023). *Rural Students in Higher Education* [Fact sheet]. Washington, DC: Postsecondary National Policy Institute.
- Ramirez, J. J. (2012). The intentional mentor: effective mentorship of undergraduate science students. *J. Undergraduate Neurosci. Educ.* 11, A55–A63.
- Raymond, K. J., and Black, K. (2008). Assessing the graduate school readiness and preparation needs of low-income, first-generation and minority college students. *Opportunity Matters A J. Res. Inf. Educ. Opportunity Pract. Programs* 1, 44–55.
- Rocconi, L. M., Ribera, A. K., and Nelson Laird, T. F. (2015). College seniors' plans for graduate school: do deep approaches learning and holland academic environments matter? *Res. High. Educ.* 56, 178–201. doi: 10.1007/s11162-014-9358-3
- RTI International. (2021). *First-Generation College Graduates' Enrollment After Earning a Bachelor's Degree* [Fact sheet]. RTI International.
- Sims, L. R., and Ferrare, J. J. (2021). "Since I am from where I am from": how rural and urban first-generation college students differentially use social capital to choose a college major. *J. Res. Rural Educ.* 37, 1–21. doi: 10.26209/jrre3706
- Soldner, M., Rowan-Kenyon, H. T., Inkelas, K. K., Garvey, J., and Robbins, C. C. (2012). Supporting students' intentions to persist in STEM disciplines: the role of living-learning programs among other social-cognitive factors. *J. Higher Educ.* 83, 311–336. doi: 10.1080/00221546.2012.11777246
- Statti, A., and Torres, K. (2020). The forgotten minority: exploring deficiencies in access to education and technology in rural America. *Peabody J. Educ.* 95, 173–182. doi: 10.1080/0161956X.2020.1745608
- Strayhorn, T. L. (2012). *College Students' Sense of Belonging: A Key to Educational Success for All Students*. New York, NY: Routledge. doi: 10.4324/9780203118924
- Tate, K. A., Fouad, N. A., Marks, L. R., Young, G., Guzman, E., Williams, E. G., et al. (2015). Underrepresented first-generation, low-income college students' pursuit of a graduate education: investigating the influence of self-efficacy, coping efficacy, and family influence. *J. Career Assess.* 23, 427–441. doi: 10.1177/1069072714547498
- Tidwell, M. L., and Logan, E. S. (2024). Differences in support within the social science graduate admissions pipeline. *Stud. Graduate Postdoctoral Educ.* 15, 65–81. doi: 10.1108/SGPE-01-2023-0010
- US Department of Agriculture. (n.d.). *Rural Classifications*. Washington, DC: U.S. Department of Agriculture.
- US Department of Education. (1998). *Higher Education Act*. Washington, DC: U.S. Department of Education.
- Wendler, C., Bridgeman, B., Markle, R., Cline, F., Bell, N., McAllister, P., et al. (2012). *Pathways Through Graduate School and Into Careers*. Princeton, NJ: Educational Testing Service.
- Wofford, A. M. (2021). Modeling the pathways to self-confidence for graduate school in computing. *Res. Higher Educ.* 62, 359–391. doi: 10.1007/s11162-020-09605-9
- Wolf, D. A. P. S., Perkins, J., Butler-Barnes, S. T., and Walker Jr, T. A. (2017). Social belonging and college retention: results from a quasi-experimental pilot study. *J. Coll. Stud. Dev.* 58, 777–782. doi: 10.1353/csd.2017.0060
- Xu, Y. J. (2016). Advance to graduate school in the US: How the path is different for women in STEM. *Int. J. Gender Sci. Technol.* 8, 420–441.