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# A Method for Investigating Sense of Community in Construction Management Programs

**Keywords:**

**Sense of Community; Diversity; Workforce Development**

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# A Method for Investigating Sense of Community in Construction Management Programs

## Abstract

The U.S. Construction industry has historically lacked diversity, specifically in respect to female and minority populations. This lack of diversity may limit organizational performance and hinder a firms' ability to fill employment needs with talented individuals. Undergraduate construction management programs can support the construction industry by attracting and retaining a diverse student population. Previous findings indicate that promoting a sense of community is an important factor in supporting underrepresented populations in construction programs. This study proposes a method for collecting and analyzing self-reported sense of community across a construction management program. A previously validated survey instrument was used to measure sense of community within a construction program and investigate differences between demographic groups. The findings provide baseline values for benchmarking sense of community and an investigation of differences in the reported sense of community between demographic groups. The method employed provides an effective means for investigating sense of community, identifying areas where corrective measures may be needed, and tracking the results of interventions over time.

## Introduction

It is well documented that the dominant demographic of U.S. construction managers is white males (Data USA, 2018; United States Bureau of Labor Statistics, 2018a). While this has been the norm since the start of the industry and will likely be the trend for the foreseeable future, it is important to seek ways to increase participation from women and racial/ethnic minority groups. One of the primary benefits of developing a diverse workforce is gaining access to a larger pool of talent to meet the demand of the growing industry (Cox and Blake, 1991, Forbes 2011). A diverse workplace is also shown to promote creativity, inclusive solutions, problem solving and organizational flexibility while reducing costs associated with talent acquisition and legal exposure (Carr-Ruffina, 2005; Cox and Blake 1991).

As the construction industry seeks to create a more diverse workforce, it is important to provide an inclusive environment where underrepresented populations feel valued. For the construction industry, this should include efforts at the program level at colleges and universities. Previous research indicates that community involvement and a positive sense of community promotes recruiting, retention and student performance for all students, including underrepresented populations (Bigelow, Bilbo, Ritter, Mathew and Elliott, 2016; Shane, Lopez del Puerto, Strong, Mauro, and Wiley-Jones, 2012). Research also indicates that support from peers is related to academic success for first-generation college students. These studies establish the importance of investigating and monitoring sense of community within undergraduate construction management programs.

For this study, the authors adopted a definition for sense of community proposed by McMillan and Chavis (1986). "Sense of community is a feeling that members have a belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together". The basis for this definition are four primary elements that include 1) membership – a feeling of belonging or personal relatedness, 2) influence – a sense of mattering and being able to make a difference to the group, 3) fulfillment of needs – the belief that certain needs will be met by way of membership to the group, and 4) shared emotion connection – the belief that members share spaces, time and experiences together. The purpose of this study was to design and employ a methodology for measuring and investigating sense of community within an undergraduate construction management (CM) program at a Midwestern university. To do this, a previously validated survey instrument was administered to collect a standard measure of community that could be compared among demographic characteristics. The researchers were unaware of previous attempts at measuring



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sense of community within an undergraduate CM program. Therefore, no benchmark values have been proposed for identifying low, average, and high sense of community. In addition to presenting a method for measuring and investigating sense of community, this study will provide initial benchmark data for interpreting reported sense of community within construction programs. Because the dominant demographic in the CM program was white males, the study sought to investigate differences between the reported sense of community of the dominant demographic and underrepresented populations, namely females and racial/ethnic minorities. The study also provided data to compare reported values for sense of community between first-generation college students and non-first-generation students. Additionally, the institution participating in the study provided a unique opportunity to compare related, but separate programs in the same department. The survey was also administered to students in the Interior Design (ID) program, which had a dominant demographic of white females. This allowed researchers to compare overall values for sense of community and consider differences between females in a male dominant program (CM) and females in a female dominant program (ID). The research questions for this study were:

1. What are the reported sense of community values for CM students based on demographic characteristics?
2. Is there a difference between the reported sense of community for the dominant demographic (white males) and underrepresented populations?
3. Is there a difference between the reported sense of community of first generation CM students and non-first generation CM students?
4. Is there a difference between the reported sense of community for females in a male dominant program and females in a female dominant program?

The results of this study will assist the participating institution along with other colleges and universities in measuring and interpreting reported sense of community among demographic groups. In addition to collecting benchmark data for reported sense of community and looking for differences between demographic groups, the study will also indicate areas where additional research is needed.

### Literature Review

National statistics for construction industry participation confirm that white males are the dominant demographic group. For the year 2017, the United States Bureau of Labor Statistics (2018a) reported that of the estimated 10,692,000 persons employed in the construction industry, only 9.1% were women. In regards to race, 6.1% were black or African American, 1.9% were Asian, and 88.8% of all persons employed were white. Hispanic or Latino ethnicity was reported by 29.8% of the workforce. It is important to note that these estimates include all sectors of the construction industry (trade workers and construction management). For the year 2016, Data USA (2018) provided the following estimates for professional construction managers. Based on an estimated population of 554,481 employed professionals, 9.2% were female. In regards to race, 3.1% were black or African American, 2.1% were Asian and 90.5% of construction managers were white. Viewed alone, these estimates indicate a lack of gender and racial diversity in the construction industry. This observation is reinforced when compared to the overall U.S. workforce where 46.9% are female, 12.1% are black or African American, 6.2% are Asian and 78.4% of workers are white (United States Bureau of Labor Statistics, 2018a). It is clear that the construction industry does not represent the available workforce and is heavily populated by white males. Additionally, the diversity gap appears to grow larger when considering construction managers as a profession.

The benefits of diversity in the workplace has been the focus of extensive research. Diversity has been shown to drive innovation, creativity and problem solving through creating heterogeneous teams that bring multiple points of view and a broad base of experiences together (Cox & Blake, 1991; Forbes, 2011). Diversity can also help firms attract top candidates, especially in tight labor markets. Firms must build a reputation as a welcoming employer of a diverse workplace in order to fill talent acquisition demands (Cox & Blake, 1991; Forbes, 2011). Along with recruiting, effectively managing diverse groups can lead to cost savings resulting from reduced turnover through improved job satisfaction (Cox & Blake, 1991) and may lesson exposure to legal claims associated with discrimination and sexual harassment



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(Carr-Ruffina, 2005). Diversity has been shown to foster organizational flexibility which stems from including minority groups with a higher tolerance for ambiguity and by employing less standardized systems necessary to manage a diverse workplace (Cox & Blake, 1991). Techniques learned from managing diversity can be applied when managing corporate cultural barriers that often surface when participating in joint ventures between firms (Carr-Ruffina, 2005). Mor Barak (2014, p. 246) also cites studies that reflect "the positive effect that diversity management has on a company's image and stock prices". One factor driving improved financial performance stems from diverse firms seeking to purchase services who tend to favor partners with a reputation for diversity (Cox & Blake, 1991). While the appeal of the benefits cited will have varying interest for firms based on their individual needs, the overall benefits of a diverse workplace should not be overlooked, especially in the highly competitive construction industry.

According to the United States Bureau of Labor Statistics (2018b), the path to a career in construction management is through undergraduate construction management programs. Therefore, in order to meet the diversity demands of the construction industry, CM programs should place an emphasis on recruiting and retaining a diverse range of students. While there are many factors that influence recruiting and retention, the available literature indicates that creating community is an important aspect of recruiting, retention/persistence and student success for diverse populations and first-generation students.

Building community and the development of learning communities has been the focus of extensive research in higher education. Student learning communities are described by Lenning and Ebbers (1999) as "consciously and proactively structured student groups organized to promote student learning" (p.11). When comparing students within a formal learning community to students with an unstructured curricular path, Tinto (1997) found that learning community involvement led to more positive views of the college experience and higher levels of student persistence. Tinto credits supportive peer groups that formed within the learning communities as a significant contributor to student persistence. Similarly, McKinney, McKinney, Franiuk and Schweitzer (2006) demonstrated that community could be stimulated by instructors and that strong communal ties within the classroom contribute to increased student satisfaction with the learning experience and improved levels of performance.

First-generation college students have received much attention due to the barriers they face in achieving academic success. Researchers have proposed lack of academic preparation (Zalaquett 1999), lack critical thinking preparation (Terenzini, Springer, Yaeger, Pascarella, and Nora, 1996), and lack of first-hand knowledge of the college experience from family (Zalauett, 1999) as possible barriers. However, Dennis, Phinney and Chuateco (2005) reported that peer support is a strong predictor of college grades and adjustment for minority first generation-students. They reference classmates who form study groups and share assignments as an example of peer support. They also propose that sense of community is closely related to peer support and may be an indicator of academic success leading to student retention for first-generation students.

While the previous studies address the community in a typical college setting, the following research was performed within undergraduate CM programs. With an emphasis of recruiting and retaining female construction engineering students, Shane, Lopez del Puerto, Strong, Mauro, and Wiley-Jones (2012) implemented a cornerstone learning community with curricular (cohort) and identity building (women's organizations) components for freshman and transfer students. The result was an increase in female enrollment at levels that exceeded the university, college and departmental gains. Bigelow, Bilbo, Ritter, Mathew and Elliott (2016), reported that of 15 variables identified from previous studies, sense of community was rated as the most influential factor for retaining female students within a construction program.

The literature presented in this section establishes the need to measure and investigate sense of community within undergraduate CM programs. The construction industry and the profession of construction management lack diversity, especially when compared to the actual workforce by gender, race, and ethnicity as reported by the United States Bureau of labor statistics (2018a). In addition to accessing a larger pool of employment candidates, increasing diversity could hold many benefits for construction firms including increased creativity and improved problem solving. In order to meet industry needs, undergraduate CM programs need to understand the role that sense of community plays in supporting

underrepresented populations. By establishing a means to measure sense of community and through reporting obtained values, undergraduate CM programs will be able to identify areas of concern and track the impact of interventions over time as they strive to increase diversity in the student population.

### Methodology

To address the research questions a descriptive survey methodology was employed using a previously validated survey instrument by Community Science (2018). The researchers were granted approval to use the SCI-2 Survey instrument by Community Science. The SCI-2 survey instrument included twenty-four questions, each with a four point Likert scale response. The researchers sought to measure community within the CM program as a whole. Community at the departmental level is referred to as a "curricular area learning community" (Lenning & Ebbers, 1999, p. 26), and is different from "student type" learning communities (p.44) which could include each underrepresented population (E.g. females, racial and ethnic minorities). Therefore, respondents were instructed to consider their major degree program only (construction management or interior design) when completing the survey instrument.

Demographic data for each respondent was also collected. The demographic factors included degree program, age, year in school, gender, race, and if the respondent was a first generation college student. The demographic questions were followed by two open response questions for students to comment on what they have observed contributes most to creating a sense of community and what could be done to strengthen the sense of community within their major.

The study was granted approval by the Institutional Review Board and administered to CM and ID undergraduate students at a Midwestern university over the spring semester 2018. The available population of CM students was approximately 180 and the population of ID students was 130. In an effort to collect data from freshman through senior students a purposeful sampling (Leedy & Ormrod, 2005) technique was employed. Based on a comprehensive list of courses offered in the CM and ID programs, courses were grouped by their common rank (freshman level course, sophomore level course, etc.) and then one or two courses per rank were randomly selected to participate in the study. The survey instrument was administered by the researchers in the classroom with printed copies of the survey. Following the data collection the responses were coded for analysis in SPSS. Responses were excluded if any part of the data relative to the analysis was missing. Descriptive statistics were used to describe the nature of the data and to look for trends and possible relationships. Due to the ordinal nature of the data collected through the Likert scale responses, a nonparametric Mann Whitney U test was used to look for differences between groups. The threshold for significance testing was set at .05.

The researchers acknowledge that the inferential scope of the study is limited because it examined a single undergraduate CM program. However, because this is an underdeveloped field of study, the lessons learned will serve other institutions as they conduct similar investigations and the results will provide initial benchmarks for reported sense of community values. The researchers also acknowledge significant differences in the number of responses when comparing different demographic groups. While this is unfortunate, the participation rates of women and minorities surveyed for this study were consistent with the previously reported levels of industry participation in the U.S. and should not impact the ability of the test statistic to detect differences between groups.

### Data Analysis

Researchers visited classes in the CM and ID programs to invite students to participate in the study. A total of 192 students completed at least part of the survey, 111 CM responses and 81 ID responses. The response totals represent approximately 62% of the undergraduate CM population and 62% of the undergraduate ID population. Of the 192 CM responses, 10 were excluded for missing data (demographic data or one of the sense of community measures), reducing the responses available for analysis to 103 CM and 79 ID.

Of the 103 CM students with complete data sets, 7 were female (6.8%), 12 (11.7%) were non-white (indicating racial/ethnic minority) and 86 (83.5%) were white males. Of the CM students with complete

data sets; 16 (16%) were freshman, 22 (21%) were sophomores, 33 (32%) were juniors, and 32 (31%) were seniors. A total of 35 (34%) of the CM respondents were first generation college students. Of the 79 ID students with complete data sets, 7 (8.9%) were men, 8 (10.1%) were non-white (indicating racial/ethnic minority) and 65 (82%) were white females. Of the ID students with complete data sets; 14 (18%) were freshman, 15 (18%) were sophomores, 25 (32%) were juniors, and 25 (32%) were seniors.

In response to research question #1, Table 1 and Table 2 report the mean sense of community scores by major for different demographic groups. These totals were based on 24 Likert scale questions from the SCI-2 instrument. Responses were coded as 0 at the low end of the scale to 3 at the high end giving a maximum possible sense of community score of 72.

**Table 1. Mean Sense of community Scores, Cumulative and by Gender (out of 72 points).**

Category	CM	Interior Design
All Responses	42.7	40.7
Women	50.1	40.3
Men	42.2	44.9

From Table 1 we see that the mean sense of community score for CM students was 42.7, which is in line with but two points higher than ID students. CM women reported a sense of community that was nearly eight points higher than male CM majors. While additional analysis will be performed to look for statistically significant differences between groups, it is important to note that females in a male dominant program (CM) appear to have much higher scores than males. While less pronounced, a similar trend is seen in the ID program where males scored nearly five points higher than females in the female dominant program.

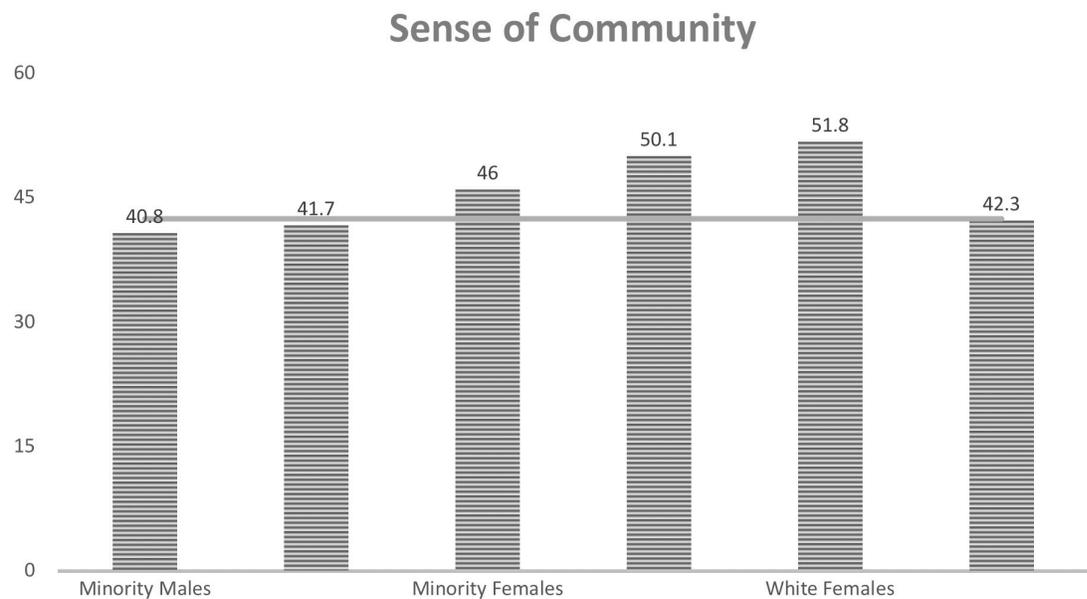
Table 2 presents sense of community scores based on a combination of gender, race and other demographic characteristics for CM students.

**Table 2. CM Program Mean Sense of community Scores by Gender/Race/First Generation.**

Category	N	Mean Score	Standard Deviation
Minorities (non-white)	12	41.7	6.46
White	91	42.8	11.50
White Males	86	42.3	11.11
White Females	5	51.8	15.72
Minority Males	10	40.8	6.76
Minority Females	2	46.0	1.41
First Generation College	35	42.3	10.81
Non-First Generation College	68	42.9	11.19

From Table 2 one can compare reported sense of community values based on multiple demographic characteristics to look for trends and opportunities for additional analysis. Minority (non-white) students (41.7), report scores that are about one point lower than white students (42.8). When gender and race are considered together, additional differences can be seen between white males (42.3), minority males (40.8), white females (51.8), and minority females (46.0). There is a minimal difference between first generation college students (42.3) and non-first generation college students (42.9), both scores being in line with the mean score for all CM student (42.7). For additional clarity these results are shown as a bar chart in Figure 1.

Research question #2 sought to investigate differences between the reported sense of community for the dominant demographic (white males) and underrepresented populations. Figure 1 shows the reported values for each group in relation to the dominant demographic.



**Figure 1. Sense of Community by demographic group (construction management).**

The reference line in Figure 1 presents how the mean score of the dominant demographic of white males compares to each underrepresented population. This figure indicates that minority males and all minorities (non-white) generally score lower than white males. We also see that females, minority (non-white) females and white females generally score higher than white males.

The Mann-Whitney U test was then used to test for differences between each underrepresented population and white males. The Mann-Whitney U test was used because of the ordinal nature of the reported data and the potential for non-normal distributions. While groups were not tested for normal distributions, the Levene test was used to confirm equal distributions (homogeneity of variance) which is an assumption for the Mann-Whitney U test. Table 3 presents the results for the Mann-Whitney U test. For each underrepresented population, no difference was detected at the .05 level of significance.

**Table 3. Differences between Dominant Demographic and Underrepresented Groups.**

Groups	Mann-Whitney U	Z Score	Sig. 2-tailed
White Males & Females	204.5	-1.406	.160
White Males & White Females	136.5	-1.368	.171
White Males & Racial/Ethnic Minorities	489	-.293	.770
White Males & Minority Males	385	-.540	.589
White Males & Minority Females	68	-.504	.614

Research question 3 was to test for a difference between the reported sense of community of first generation CM students and non-first generation CM students. From Table 2 we see a minimal difference between first generation CM students of 42.3 and non-first generation CM students of 42.9. The results of the Mann-Whitney U test support this observation and indicate no significant difference between groups (U=1155, Z=-.244, Sig=.807 2-tailed).

Research question four was to test for a difference between the reported sense of community of females in a male dominant program and females in a female dominant program. From Table 1 we see that females in the CM program had a mean sense of community score of 50.1, where females in the ID program had much lower mean score of 40.3. However, the results of the Mann-Whitney U test indicate no significant difference between groups ( $U=156.5$ ,  $Z=-1.649$ ,  $Sig=.099$  2-tailed).

### Discussion and Observations

The purpose of this study was to propose a method to measure and investigate sense of community among demographic groups within an undergraduate CM program. Based on the data and analysis presented in the previous section, the authors offer the following discussion and observations.

In response to the first research question, baseline values for sense of community have been reported for CM majors overall and several demographic groups. The mean score of 42.7 out of 72 possible points for all CM majors can be used for reference in future studies when applying SCI-2 survey instrument to other CM programs. There are also several demographic variations that are worth noting. Women in the CM program reported a mean score of 50.1 which is 7.9 points higher than male students. While there are no previous studies to compare these results to, it is somewhat surprising that females report a stronger sense of community than males who represent a much larger percentage of the CM student population. In addition, a similar trend is found with male ID students who reported higher values of community than females in a female dominant program. While minority (non-white) students scored slightly lower (1.1 points) than white students, this trend is more pronounced when we compare specific underrepresented populations to the dominant demographic. The mean score for minority males is 1.5 points lower than white males. Although higher than white males, minority females scored 5.8 points lower than white females. The observation of lower sense of community scores for minority students is concerning, especially in light of the need to develop a more diverse construction workforce. No obvious differences were apparent when comparing first generation college students to non-first generation college students in the CM program.

The reported sense of community scores for CM students should serve as a starting point for establishing benchmark values for similar programs. However, at this time they do not indicate areas of deficiency or success. As more data becomes available, a mean score of 42.7 for CM majors may viewed as exemplary or an area of concern. The greatest value of measuring sense of community may remain at the individual program level where community can be monitored and the results of interventions can be measured over time.

The data presented does indicate a trend at the participating institution that warrants additional investigation. While it is encouraging that the underrepresented population of females appear to report higher sense of community values than white males, minority students reported slightly lower scores than white students within their same gender. The data indicate at the same institution, two underrepresented groups may have a much different experience in respect to sense of community.

In response to the second research question, the Mann-Whitney U test was used to investigate differences between the reported sense of community for the dominant demographic (white males) and underrepresented populations. The previous paragraph provided initial insights into possible differences between groups. However, the results of the test indicated no significant difference between sense of community scores for white males and the following groups: females, white females, racial/ethnic minorities, minority males, and minority females. Although no statistical difference was detected, it is difficult to ignore the trends in the mean scores, especially when we consider race/ethnicity. Lower sense of community scores for minority students identifies an opportunity to implement purposeful measures aimed at short and long term improvement.

In response to the third research question, no difference was found between the reported sense of community of first generation (42.3) and non-first generation CM students (42.9). While first generation students may face many obstacles, sense of community does not appear to be a concern at the participating institution.

The final research question compared the sense of community of females in a male dominant program to females in a female dominant program. This research question stemmed from a previous study that reported sense of community as an important factor for retaining women in a CM program (Bigelow et al., 2016). The participating institution provided researchers the opportunity to compare two related programs, CM where males are the dominant demographic and ID where females are the dominant demographic. In response to the fourth research question, no statistically significant difference was found between the reported sense of community of females in a male dominant program (50.1) and females in a female dominant program (40.3). However, the reported values do prompt several questions. The fact that females in a male dominant program appeared to report a greater sense of community than females in a female dominant program is somewhat counterintuitive. A similar result is also seen when comparing males in a female dominant program to males in a male dominant program. Although there is no other data to compare the mean scores to, reported sense of community for female students does not appear to be a cause for concern at the participating institution.

In addition to the four research questions, the study provided additional insights that may be of value to academic and industry professionals. When preparing the demographic portion of the survey instrument, the researchers referenced other academic studies for guidance on question design and wording. The options provided on the survey instrument related to race were: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, and Prefer to self-describe. The researcher observed that when delivering the survey, some students were uncomfortable with the wording of some of the race description options. Additionally, the following responses were provided by respondents for the "Prefer to self-describe" option: Hispanic, Latino, Bi-Racial Black/White. While the survey options were the same as those used by United States Census Bureau (2018), the study did not provide the option to indicate Hispanic or Latino ethnic status. According to the Census Bureau, "People who identify their origin as Hispanic, Latino, or Spanish may be of any race". Additionally, the survey did not indicate that respondents could choose more than one option for race, black and white for example. The researchers recommend that future studies provide additional clarification on the definition for each racial category, provide options to indicate ethnic heritage and to encourage self-described answers when necessary. Similar considerations would apply to reporting gender.

### Conclusions

This study successfully employed method for measuring and investigating sense of community using an existing survey instrument. The data presented in the previous chapters provides new insights into our understanding of community and diversity within undergraduate construction management programs. It also introduces several questions that warrant additional investigation. The researchers offer the following recommendations for future research to further our understanding of community and diversity within undergraduate construction programs.

The sense of community values reported with this study represent a single Midwestern undergraduate construction program. Collecting additional data on a greater scale would provide a richer understanding of community among underrepresented populations and establish a reference point for longitudinal analysis. Although the analysis did not confirm a statistical difference between the white males and underrepresented populations at the .05 level of significance, the mean scores do indicate that females had higher sense of community values than white males. While this is an encouraging result in light of literature that points to sense of community as an important factor in retaining female students, it warrants additional investigation to understand why females scored highly against the dominantly male population.

Although the difference is not statistically significant, the data also indicate that racial minorities report lower values than white males and white students of the same gender. Additional research is needed to understand this trend and to propose strategies for building community within racial minorities at the program level. The authors also recommend that future studies be conducted to monitor sense of community throughout the undergraduate degree program and in relation to actual student retention.

The dominant demographic in construction and specifically the profession of construction management is white males. If the trend continues, it could serve as a barrier to growth and advancement for the industry. Undergraduate CM programs can support the industry by working to attract and retain a diverse population of students. In order to accomplish this, program leaders should take measures to support underrepresented populations and work to foster a strong sense of community for members. The results of this study contribute to our understanding of community, specifically among underrepresented populations within a CM program. Additional research is needed to further the goal of changing the demographic makeup of the construction industry.

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