International Journal of Construction Education and Research

ISSN: 1557-8771 (Print) 1550-3984 (Online) Journal homepage: www.tandfonline.com/journals/uice20

Attracting Students to Construction Education Programs: An Exploration of Perceptions by Gender

Ben F. Bigelow, Anusree Saseendran & Jonathan W. Elliott

To cite this article: Ben F. Bigelow, Anusree Saseendran & Jonathan W. Elliott (2018) Attracting Students to Construction Education Programs: An Exploration of Perceptions by Gender, International Journal of Construction Education and Research, 14:3, 179-197, DOI: 10.1080/15578771.2017.1280101

To link to this article: https://doi.org/10.1080/15578771.2017.1280101

INTERNATIONAL JOURNAL OF CONSTRUCTION EDUCATION AND RESEARCH
2018, VOL. 14, NO. 3, 179–197
https://doi.org/10.1080/15578771.2017.1280101

Routledge
Taylor & Francis Group

Attracting Students to Construction Education Programs: An Exploration of Perceptions by Gender

Ben F. Bigelow, PhD[a], Anusree Saseendran[a] and Jonathan W. Elliott, PhD[b]

[a]Department of Construction Science, Texas A&M University, College Station, Texas, USA; [b]Department of Construction Management, Colorado State University, Fort Collins, Colorado, USA

ABSTRACT

Demand for construction managers is considerable and is projected to grow through the next decade. To meet the demand for construction managers, construction management programs will have to produce enough graduates. However, to produce graduates, programs must first attract students to their programs. This study collected data from students enrolled in a construction management (CM) degree program at multiple universities to learn about their perceptions of factors that attracted them to a construction management degree program. A comparative analysis was performed to identify differences in influential factors by gender. The results indicate that very few differences exist, in regard to the factors that attract students to construction degree programs, between male and female students. It was also found that while all factors identified were positively influential, there are substantial differences between the factors regarding how many students they reach and their level of positive influence. Career opportunities was found to be the most influential factor in attracting students of both genders to CM programs, followed by, internships, non-internship work experience, and fieldtrips to job sites. Factors were also identified for CM programs trying to increase their female enrolment to focus on.

ARTICLE HISTORY
Received 22 July 2016
Revised 19 December 2016
Accepted 5 January 2017

KEYWORDS
Construction education; gender; graduates; recruiting

Introduction

Construction is a rapidly growing industry, and the global volume of construction is predicted to increase 85% ($15.5 trillion) by 2030 (About PWC, 2013). Given current construction market conditions, the demand for construction managers and tradespeople has become a pressing concern for the U.S. construction industry (National Center for Construction Education and Research, 2013). As construction volume increases, and many retire from the industry, the need not only to replenish, but to increase the construction workforce is apparent. The Bureau of Labor Statistics (BLS, 2016) predicts a 13% increase (790,400 new jobs), in the construction industry from 2014 to 2024. The employment of construction managers specifically is projected to grow by 5% through 2024 (BLS, 2016). This equates to 1,780 additional construction managers every year not including the replacement of existing construction professionals who leave the industry. To meet this projected increase, construction management (CM) programs must produce enough graduates to meet the demand.

CONTACT Anusree Saseendran anusree.auh@gmail.com 3137 TAMU, College Station, TX 77840, USA.

To produce qualified graduates, a CM program must first attract and then retain students. Studies have been conducted to identify methods for attracting female students in CM programs. The factors with the highest positive influence on attracting female students included; internships, awareness of career opportunities, fathers taking daughters to work, having a father in the industry, and non-internship work experience (Bigelow, Bilbo, Matthew, Ritter, & Elliott, 2015). For retaining students; the community of students, construction lab classes, in-class innovation, internships, and involvement in student organizations were the most positively influential factors (Bigelow, Bilbo, Ritter, Matthew, & Elliott, 2016). These studies established a baseline for effective recruitment and retention of female students in CM degree programs. However, male students have remained unstudied and minimal research addressing effective ways to attract or retain male students in CM programs exists. The lack of research on male students is not surprising, as most construction related degree programs are overwhelmingly male. However, it is crucial that construction education programs target recruitment efforts to successfully meet the projected demand for construction management professionals. Given industry demand, but also considering the practical limitations of university budgets and resources, it is necessary that recruiting efforts be effectively tailored to both male and female students to ensure success. Therefore the comparison of factors that attract male and female students is advantageous for CM programs.

This study compared male and female students on the factors identified in previous research that attract female students in CM degree programs. The resultant exploratory research questions include: 1) What are the differences in the factors that influence male and female students to pursue a CM undergraduate degree? 2) What are the differences in the factors that influence a transfer or change of major student compared to students who have remained at the same school in the same program for males and females? And 3) What are the a differences in the factors that influence lower level (freshman & sophomores) students and upper level (junior and seniors) students between males and females?

This study contributes to the understanding of the factors that have the greatest positive influence attracting students, both male and female, to CM degree programs. Understanding these factors can help CM programs be more efficient in their efforts to recruit students. Further, an important step in understanding women in CM degree programs is comparison of their perceptions with their male counterparts. The importance of these issues is underscored by the lack of diversity in construction higher education and the expected demand for professionals in the industry. This study is significant as it represents the first empirical comparison of male and female students in CM education in the context of recruitment.

Review of literature

A small amount of research has been conducted comparing male and female CM students. Thevenin, Elliott and Bigelow (2016) report that mentors and role models were present for over 80% of CM students, and female students were more likely to have them. However, this research was focused on self-efficacy not attraction of students. Francis and Prosser (2013) considered the effect of career counselors in attracting students to construction careers and reported that most have low knowledge of the construction industry and direct more male students to it. These papers are pertinent to this research as they compare male and female students on factors that are similar to those identified for this study, however, because they do not deal directly with recruitment, the applicability of these studies to this research is limited.

Males make up the majority of students in CM education, and thus literature addressing the recruitment of males directly was not found. However, the issue of gender diversity has driven much research regarding CM students and the underrepresentation of women in the construction industry in the United States, as well as in other countries (Gale, 1994; Gale & Cartwright, 1995; Dainty, Bagilhole, & Neale, 2000; Agapiou, 2002; Lingard & Lin, 2004; Loosemore & Waters, 2004; Lingard & Francis, 2005; Menches & Abraham, 2007; Ball, 2014; Alberta Innovation, n.d.). Given the large volume of research identifying and analyzing factors that attract female students, this study utilized those same factors in surveying male students to provide for a baseline comparison.

Considerable efforts have been made to improve diversity and increase female participation in the construction industry through research and implementation of initiatives specifically aimed at women and minorities. (Menches & Abraham, 2007). Despite these efforts, women continue to be underrepresented due to the construction industry's culture, the nature of the work, and its project-based setup (Arditi & Balci, 2009). Despite these issues, to increase female students in CM programs, considerable research has been conducted to identify factors that attract female students. Bigelow and colleagues (2015) analyzed 16 factors, identified in previous research, that attract female students. Table 1 displays these attraction factors, and the research they emerged from.

Given the lack of research on factors that attract male students to CM education, these factors were used as the basis for comparison of male and female students. Comparison based on these factors provides insight into what factors positively influence both male and female students to select a CM degree programs.

Methodology

This study could be classified as a quantitative priority mixed methods design as both qualitative and quantitative data were collected however the results focus primarily on the quantitative results obtained, while the integration of the quantitative and qualitative

Table 1. Factors identified by previous research to attract female students in CM programs (in no particular order).

Attracting Factor	Citation
Internships	*Menches & Abraham, 2007; Fielden et al., 2000*
Field trips to job sites	*Menches & Abraham, 2007; Fielden et al., 2000*
Non-internship work experience	*Bennett et al., 1999; Fielden et al., 2000; Gale, 1994; Menches & Abraham, 2007*
Community service	*Lopez del Puerto et al., 2011*
TV or magazine ads	*Amaratunga, Haigh, Shanmugam, Lee & Elvitigala, 2006*
Scholarships and other funding	*Fielden et al., 2000; Davey Stoppard, 1993*
Father in the industry	*Moore, 2006*
Mother in the industry	*Moore, 2006; Bennett et al., 1999; Davey & Stoppard, 1993*
Father taking you to work	*Fielden et al., 2000*
Mother taking you to work	*Fielden et al., 2000*
Male role model (nonparent)	*Moore, 2006; Bennett et al., 1999*
Female role model (nonparent)	*Menches & Abraham, 2007; Moore, 2006; Bennett et al., 1999; Fielden et al., 2000; Gale, 1994*
High school advisor/counselor	*Lopez del Puerto et al., 2011; Yates, 2013*
College Advisor/counselor	*Moore, 2006*
Mentoring program	*Lopez del Puerto et al., 2011; Menches & Abraham, 2007; Moore & Gloeckner, 2007*
Career Opportunities	*Gale, 1994*

results represent only a very small portion of the analysis. The researchers approached the study from a pragmatic viewpoint where emphasis was placed on understanding the problem.

This research was exploratory in nature, as it investigated the differences in factors that attract students to CM programs by gender. Further the study sought to find links between these factors and those considered in previous research comparing male and female CM students. This study performed a comparative analysis of male and female students' based on their perceptions of the influence these factors had on their decision to choose a CM degree.

Data were collected from CM students in the spring of 2014 using a self-administered, researcher-designed survey. A total of 97 female students enrolled at Arizona State University (ASU), Auburn University (AU), Colorado State University (CSU), Purdue University (PU), and Texas A&M University (TAMU), and 468 male students enrolled at Colorado State (CSU) and Texas A&M (TAMU) were surveyed. All participants were enrolled in a CM degree. Following pairwise deletion, 460 male and 84 female surveys remained. These responses equaled an estimated response rate of 50% for female students and 40% for male students at the Universities where data were collected. Given pairwise deletion, the actual sample for each question varied. The survey was administered to male and female students in person at CSU and TAMU. However, at the other universities, the female data were collected via an online survey. The universities were chosen based on the size of their CM programs, all of which exceeded 340 total students at the time of this study. Schools with large programs were chosen to ensure a robust sample. CSU and TAMU were also chosen out of convenience to the researchers. Human Subjects approval was obtained for the study.

To mitigate threats to internal validity, and refine the survey, two focus groups were conducted prior to data collection. Female CM students from TAMU made up the focus groups, which consisted of seven and eight students, respectively. Focus group participants took the survey and the researchers led discussion with the participants afterward to identify weaknesses in the survey. After the completion of each focus group, the researchers revised the survey based on the feedback received. Focus group data were not included in the final data set.

To identify the factors that are the most influential, the survey asked participants to rate the level of influence of each identified factor (Table 1) on a 5-point Likert-type scale (where 1 = Highly Positive, 2 = Slightly Positive, 3 = No Influence, 4 = Slightly Negative, 5 = Highly Negative). Each item also included a "Not Applicable" response option that was included with "no influence" responses in the analysis. These Likert scale responses allowed the researchers to analyze the responses using descriptive and appropriate analytic statistics. The survey also contained open-ended questions to explore what other factors attracted male students and to search for factors not already identified in the literature for attracting female students.

Data collected from male and female respondents were compared to identify patterns and differences in the level of influence each factor had on their decisions to pursue a CM degree program. Descriptive and analytical statistics were used to compare male and female students, transfer and non-transfer students, and lower and upper level students on their perceptions of each factor. Because of the open-ended responses, qualitative data coding was also employed to search for any themes present.

Results and discussion

Sample description

The purpose of this study was to compare the factors that most influence male versus female students to join a CM degree program. The male sample consisted of 460 CM undergraduate students, of which 280 students were from TAMU and 180 from CSU. The female sample comprised of 90 CM undergraduate students (ASU, n = 14; AU, n =14; CSU, n =12; PU, n = 8; and TAMU, n = 42).

Students of all academic classifications in CM programs participated in the study, and slightly more than half were juniors and seniors (n = 54, 60% for females, n = 235, 51.3%). The specific break down by academic classifications can be found in Figure 1. Participants came from all socioeconomic statuses, but the great majority (90%) of both male and female students self-identified as "lower middle class," "middle class," or "upper middle class." Only a small percentage of male and female students identified with an "upper class" or "lower class" background. These results suggest that the extreme upper and lower ends of the socio-economic scale represent a very small portion of CM degree students. Socioeconomic status of the sample is graphically displayed in Figure 2.

All female participants indicated that, at the time of the survey, they planned to remain in their CM major, while five male participants (1%) planned to change their major. When asked about their career plans, 93% of female students and 92% of male students anticipated going to work in the construction industry after graduation. The majority of both male and female students (56% and 68% respectively) plan to work in the commercial construction industry segment. Figure 3 displays the students' industry segment preferences. Nearly half (48%) of the female students indicated they hoped to work in the office, whereas only 35% of male students hoped to work in the office, with the balance hoping to work in the field. Approximately 28% of male students and 38% of female students were neither transfer nor change-of-major students, this difference suggests that male students are much more likely to transfer into a construction education program than a female student. Figure 4 displays these results.

Figure 1. Student classification.

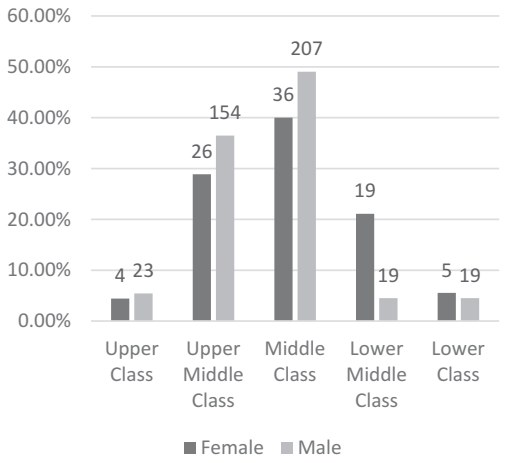

Figure 2. Self-reported socio-economic status.

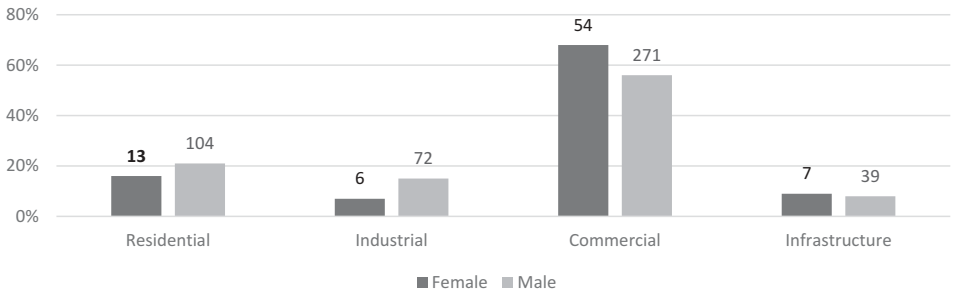

Figure 3. Preferred sector of employment (male & female).

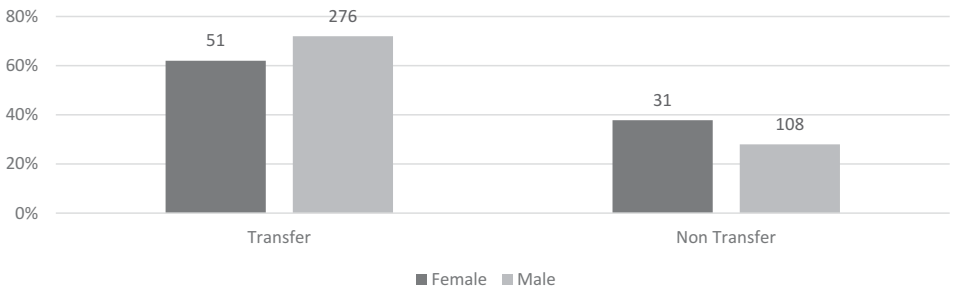

Figure 4. Transfer status (male & female).

Male versus female factors

Table 2 displays the results of each attraction factor on male and female students. While there is consistency between the two groups on many factors, there are differences as well. Specific discussion on each factor is provided following the table. These findings are presented in response to the first research question: What are the differences in the factors that influence male and female students to pursue a CM undergraduate degree?

Table 2. Results of individual attraction factors for male and female students.

	Highly Positive (%)		Slightly Positive (%)		Slightly Negative (%)		Highly Negative (%)		No Influence (%)	
Factors	M	F	M	F	M	F	M	F	M	F
Internship	42.88	57.78	18.60	6.67	12.03	0	.44	0	26.04	35.55
Field trips to job sites	34.95	35.80	34.50	40.74	18.90	0	.44	0	11.21	23.45
Non internship work experience	40.13	32.22	20.83	21.11	23.02	1.11	.88	0	15.13	45.56
Community service	18.86	28.89	27.63	30	39.69	0	1.31	0	12.5	41.11
Ads	31.24	4.44	8.95	4.44	45.84	4.44	.78	0	13.19	86.67
Funding	14.13	35.56	22.96	22.22	44.15	0	.44	2.22	18.32	40
Father in industry	27.03	32.22	15.16	11.11	29.45	0	.44	0	27.91	56.66
Mother in industry	4.51	12.22	5.64	4.44	43.79	0	0	1.11	46.05	82.22
Father taking to work	26.48	26.67	15.10	10	32.16	0	.22	0	26.04	63.34
Mother taking to work	5.21	9.68	5.21	9.68	45.80	0	0	1.07	43.76	79.57
A male role model	28.73	27.78	28.29	23.33	26.10	0	.22	0	16.67	48.89
A female role model	5.71	15.56	9.89	11.11	50.33	0	.66	1.11	33.41	72.23
A high school advisor	5.47	6.67	12.25	7.78	56.67	3.33	1.09	3.33	24.51	78.89
A college advisor	14.25	31.11	26.06	27.78	40.09	1.11	1.56	1.11	18.04	38.89
Mentoring program	3.53	10	4.41	3.75	48.34	1.25	.66	1.25	43.04	83.75
Career opportunities	72.53	74.44	14.96	14.44	4.91	2.22	0	0	7.59	8.89

Career opportunities

Career opportunities represent a highly effective factor for attracting both male and female students, with 89% of female students and 88% of male students identifying it as a positive influence. A *t*-test confirmed that there was no significant difference on its influence over male and female students. The results suggest that it is the most highly influential factor in attracting more students to CM degree programs, and hence, efforts to attract more students to CM programs should focus specially on career opportunities. Results are shown in Figure 5.

Internships

Approximately 36% of the female respondents and 38% of the male respondents indicated that internships had "no impact" in their decision to pursue a CM degree (Figure 6). Almost all others reported it as positive with the majority indicating internships were "highly positive" influences in their decision. These findings suggest that internships are a good tool to attract both male and female students. It is important to note however, that the results of a *t*-test (t (145) = 1.98, p = .0001) indicate that male and female students differed significantly regarding the influence of internships. Inspection of the two group means indicates that the average score for female students (M = 1.03) is significantly lower

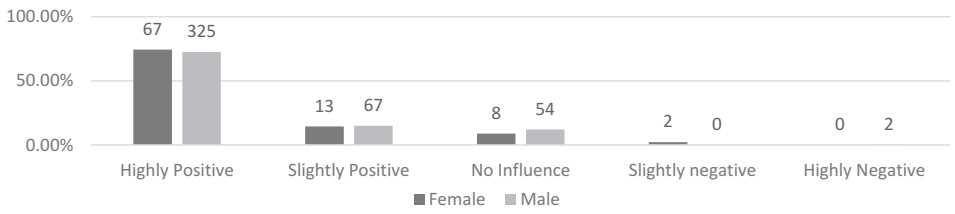

Figure 5. Career opportunities.

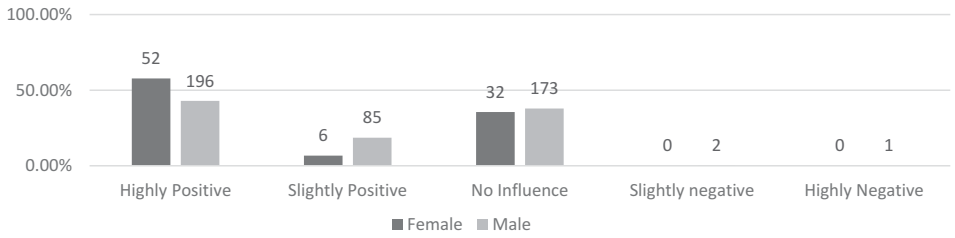

Figure 6. Internships.

than the score (1.33) for males. The difference between the means is .30 on a 5-point scale. The effect size (d = .52) was medium for this factor (Cohen, 1988). So internships are more positively influential in attracting female students than male students. This difference does not mean internships are not effective in attracting male students, only that they are more positively influential for female students.

Non-Internship work experience

Non-internship work experience was a positive influence for 32% of female respondents and 40% of male respondents. However, as seen in Figure 7, 46% of female and 37% of male students indicated that it had no impact. These results suggest that there is only a small difference in the percentage of male vs. female students who have this kind of work experience, and its influence is comparable between male and female students. The results of a t-test indicated there was no significant difference between the two groups.

Field trips to job sites

With a high frequency of participants having been on field trips, field trips to job sites should not be overlooked as part of a strategy to attract both male and female CM students. Further with nearly 70% of male and female students reporting positively about this factor (Figure 8), it is a factor that reaches a large portion of students and positively influences them. The results of a t-test indicated there was no significant difference by gender, suggesting this factor is a good recruiting strategy for both male and female students.

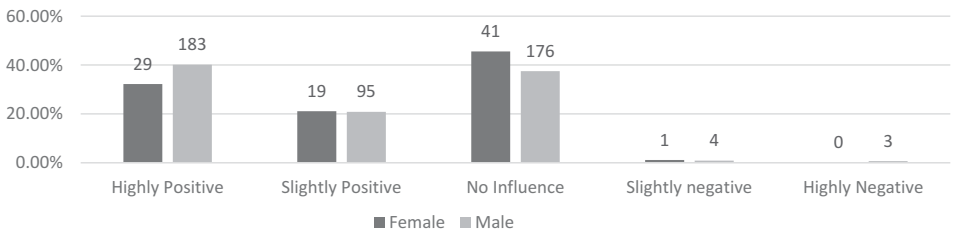

Figure 7. Non-internship work experience.

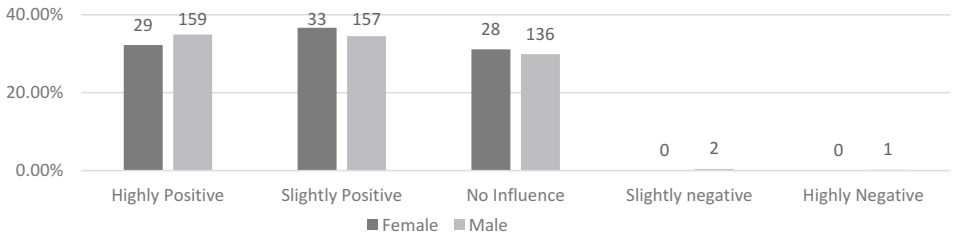

Figure 8. Field trips to job sites.

Father in the industry

Children may follow in their parents' footsteps in regard to career choice, however, the majority of participants (nearly 57%), both male and female, indicated that a father in the industry did not have an influence in attracting them to a CM degree (Figure 9). This is likely the result of students whose fathers work in other industries. Nevertheless this was a positive influence for both male and female students. Only six male participants (>1%) and no female participants indicated that having their father in the industry was a negative influence. Although it is positive for both groups, the results of a *t*-test indicate that male and female students were significantly different regarding the influence of a father in the industry (t (87) = 1.99, p = .02). Inspection of the two group means indicates that the average score for female students (M = 1.26) is significantly lower than the score (1.46) for males. The difference between the means is .20 on a 5-point scale. The effect size (d = .33) was medium for this factor (Cohen, 1988). These results indicate that while a father in the construction industry has a positive influence on both male and female students, it was more positively influential on daughters than sons.

Father taking to work

Respondents who had been taken to work by a father displayed results very similar to "father in the industry." As can be seen in Figure 10, most of the participants (56% male, 63% female) reported no influence, and nearly all other responses were positive, the majority being highly positive. These results suggest fathers taking children to work positively influences nearly half of CM students. The results of a *t*-test indicate that the level of positive influence was significantly different between male and female students regarding the influence of a father taking their child to work (p = .02). Inspection of the two group means indicates that the average score for female students (M = 1.27) is significantly lower than the

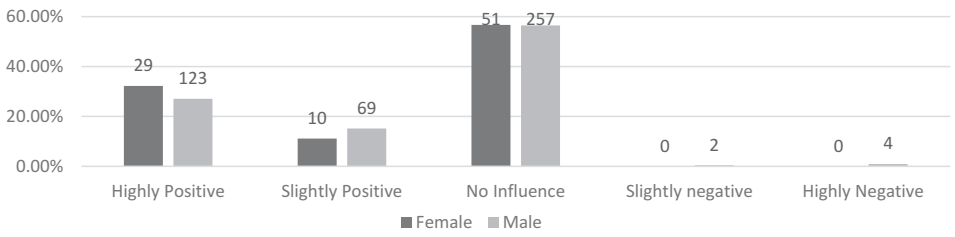

Figure 9. Father in the industry.

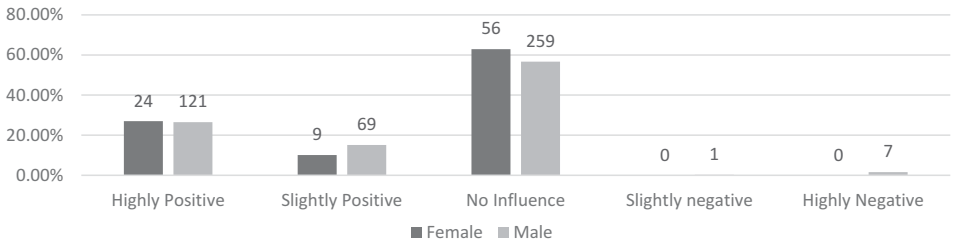

Figure 10. Father taking to work.

score (1.50) for males. The difference between the means is .23 on a 5-point scale. The effect size was medium for this factor. So again while this factor is positively influential for both male and female students, the level of influence a father has on a daughter appears to be greater than on a son.

Male role model (non-parent)

A seen in Figure 11, response rates were similar for both male and female students regarding a male role model. With 51% female students and 57% male students indicating it was a positive factor for them. These results suggest that men (parents or not) speaking to young people (both male and female) about CM, positively influences a large portion of the CM student population to pursue a CM degree. Results of a *t*-test indicated no significant difference between male and female students.

Mother in the industry

Women make up a small percentage of the construction industry, less than 10% (Bilbo, Bigelow, Rybkowski, & Kamranzadeh, 2014), and the responses to this factor reflect that. As seen in figure 12, 82% of female students and 89% of male students indicated that their mother working in the industry had no influence on them, suggesting only about 18% or female students and 11% of male student's mother's work in the construction industry. A *t*-test indicated there is no significant difference between male and female students on this factor, suggesting it is equally effective for both male and female students. However, its ability to have a broad scale impact is hindered by the overall small number of women in the construction industry.

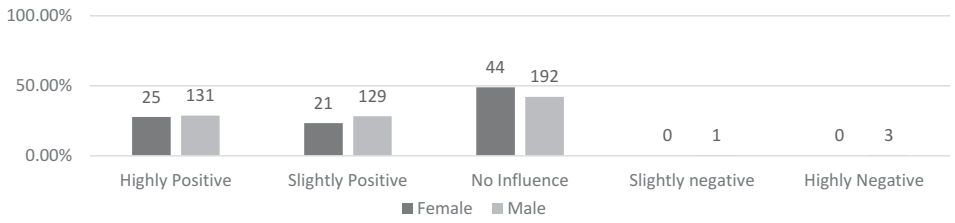

Figure 11. A male role model.

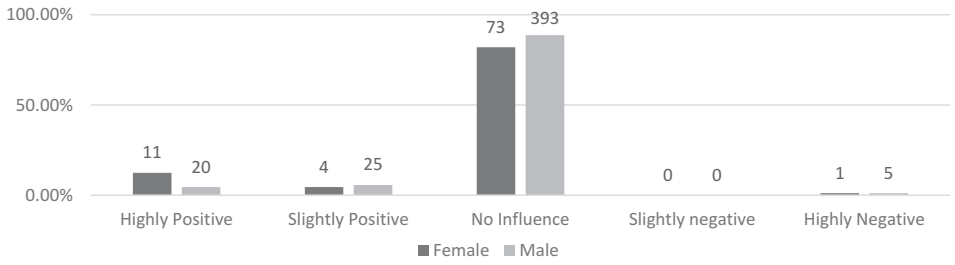

Figure 12. Mother in the industry.

Mother taking to work

As seen in Figure 13, more female participants (20%) found this to have a positive influence, than male participants (10%). However, the results of *t*-test indicated there was no significant difference between male and female students on this factor. The researchers however point to the practical significance seen in the descriptive statistics that seem to indicate a stronger influence on female students. Ultimately, just like having a mother in the industry or a female role model, with so few women in the CM industry, this factor's influence is limited by the small number of women in the construction industry.

Female role model (non-parent)

Similar to a mother in the industry, it was expected that having a female role model would net a relatively small number of responses because of the small percentage of women in construction. As seen in Figure 14, about 27% of female participants and 16% of male participants reported that a female role model was a positive influence in attracting them to a CM degree program. Despite the *t*-test results indicating no significant difference, this factor does appear to have practical significance showing stronger positive influence on female students.

Mentoring programs

Mentoring has been shown to have a positive influence on students (Thevenin, Elliot, Bigelow, 2016), but the data suggest that mentoring reaches only a very small percentage

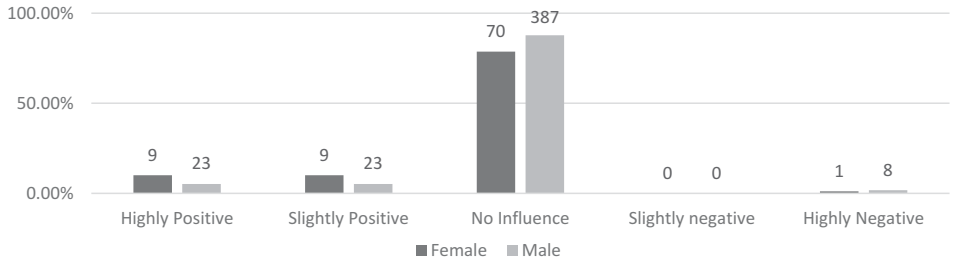

Figure 13. Mother taking to work.

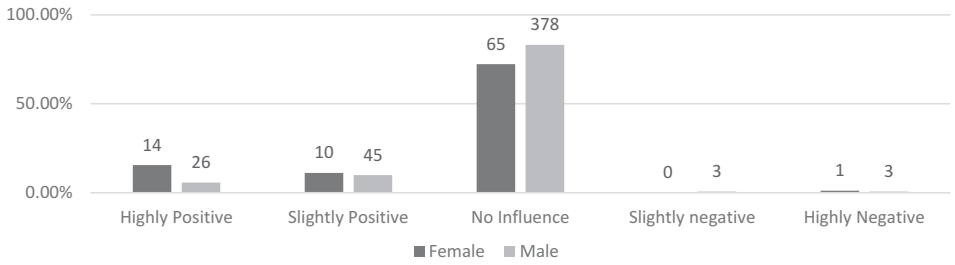

Figure 14. A female role-model.

of students and is not always positive, (Figure 15). Among the responses, 2 of 13 responses in the case of female students, and 5 out of 41 responses in the case of male students were negative. Given the amount of work and resources required to facilitate a structured mentorship program, these results suggest that mentoring programs impact only a small number of students, and about 12% are negatively influential. A *t*-test indicated there was no significant difference between male and female students regarding this factor.

High school counselor

Despite Bilbo and colleagues' (2009) findings that high school counselors generally deter students from CM programs because of their lack of knowledge, more recent literature reported that high school counselors were a means to attract students (Lopez del Puerto, Guggemos, & Shane 2011; Yates, 2013). Among female students, 14% of participants indicated a positive influence, but 7% indicated that it had a negative influence. In comparison, it had a positive influence on 18% of male students and negative influence on only 1% of them (Figure 16). These results confirm those reported by Francis and Prosser (2013). They suggest that high school counselors have little effect, but may be steering female students away from construction degree programs. Results of a *t*-test indicated there was no significant difference in influence between male and female students.

College advisor

While college advisors had a positive influence on female students with 59% reporting a positive influence, only 40% of male participants reported a positive influence (see Figure 17).

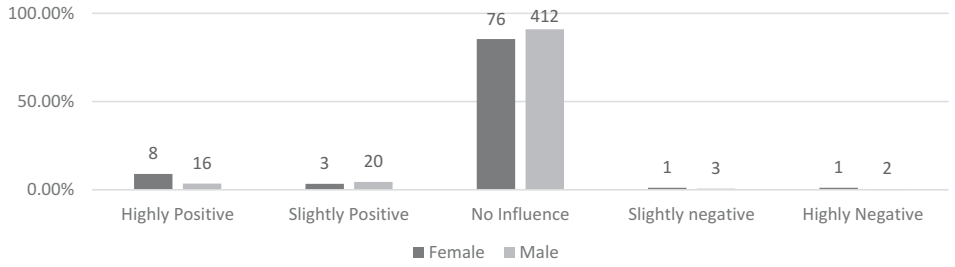

Figure 15. Mentoring program.

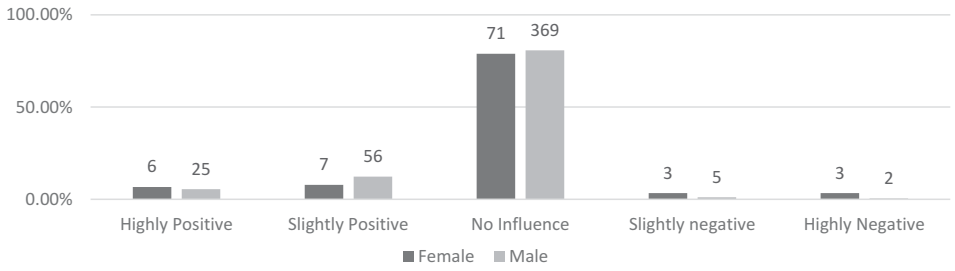

Figure 16. High school counselor.

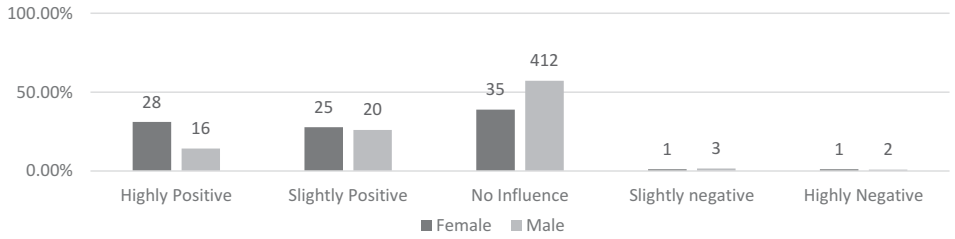

Figure 17. College advisor.

Further far more male students reported no influence compared to female students. These results suggest that while advisors are effective for attracting female students they appear to be less so for male students. The results of a *t*-test indicated that male and female students were not significantly different. However, it was close (t (90) = 1.99, p = .06). Inspection of the two group means indicates that average influence for female students (M = 1.58) is lower than the score (M = 1.80) for males, with a difference of .22 on a 5-point scale. The effect size (d = .28) was smaller than typical. Further, evaluation of both the descriptive and analytic statistics suggests a practical significance showing greater positive influence on female students.

Additional exploration of transfer and change of major numbers reported, provide deeper context to this finding. The number of "no influence" responses were very close to the total number of non-transfer students in the sample for both male and female participants. These similarities are empirically unsupported; however, anecdotally it appears that a college advisor could have positively influenced nearly every student that transferred or changed major for both male and female students.

Community service

Roughly half of the sample (46% male and 58% female) reported that community service had a positive influence on their decision to pursue a CM degree (see Figure 18). While community service positively influences students to select CM, the results of a *t*-test indicate that male and female students were significantly different regarding the influence of community service (p = .03). Inspection of the two group means indicates that the average score for female students (M = 1.51) is significantly lower than the score (1.69) for males. The difference between the means is .18 on a 5-point scale. The effect size was

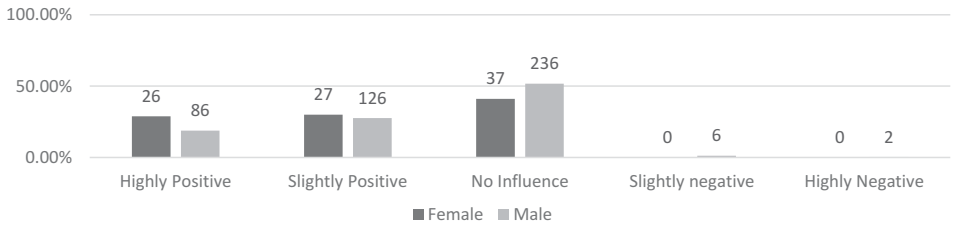

Figure 18. Community service,

medium for this factor. So while good for recruiting both sexes, community service is more effective in recruiting female students.

Funding

The responses regarding the effect of funding or scholarships opportunities in attracting students to CM programs represents the first factor where a distinct difference between male and female students is seen in the descriptive statistics. As shown in Figure 19, 58% of female students, but only 37% of male students indicated funding was a positive influence. However the results of a *t*-test indicated there was no significant difference between the male and female groups regarding funding. Despite the results of the *t*-test, the descriptive results suggest a practical significance in the difference between male and female students.

Advertising

The results (shown in Figure 20) show that, currently advertising is an ineffective method for attracting students. It did not reach most current student and is frequently a negative influence when it does, and there was no significant difference between the two groups. These results suggest that any radio or television advertising needs to change in order to be a positive influence in attracting male or female CM students.

These results suggest that while some factors have a stronger positive influence on female students, the same factors that are most effective in attracting female students to construction degree programs are also positively influential on male students. This result is positive in the context that these recruiting efforts will be effective for all students,

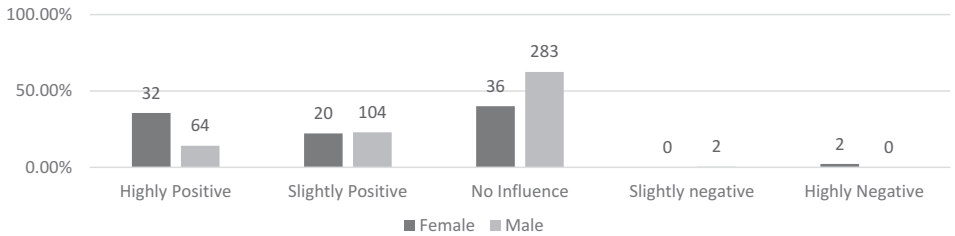

Figure 19. Funding.

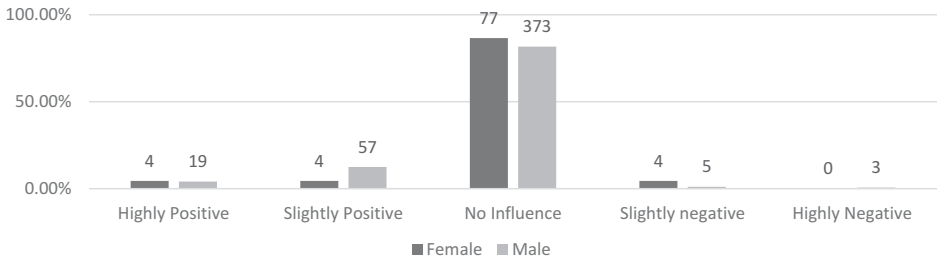

Figure 20. Advertising.

however they suggest that efforts to recruit more female students are likely to inadvertently attract more male students too.

Transfer versus non-transfer students

To address the second research question: What are the differences in the factors that influence a transfer or change of major student compared to students who have remained at the same school in the same program for males and females? The results indicated that for male and female students there are only two factors that are significantly different between the transfer and non-transfer student groups. However, the factors are not consistent between males and females. For male students a significant difference was found with field trips to job sites, which indicates male transfer students are more positively influenced by them. For female students a significant difference was found with funding, where female transfer students were more positively influenced by funding.

Because the dependent variables were ordinal and the variances unequal, Mann-Whitney U-tests were performed on the male and female student responses. The tests indicated; field trips to job sites was the only factor that was significantly different for male students. The 102 male non-transfer students had significantly higher mean ranks (M = 162.76) than the 196 male transfer students (M = 142.60) on field trips to job sites, U = 8643, p = .03, r = .11, which according to Cohen (1988) is a smaller than typical effect size. This indicates that field trips to job sites is more influential for male transfer or change of major students than non-transfer students. However there was no significant difference for female students on this factor. For female students Mann-Whitney U-tests indicated funding was significantly different. The 31 female non transfer students had significantly higher mean ranks (M = 28.52) than the 51 female transfer students (M = 21.33) on funding, U = 217, p = .04, r = .24, which according to Cohen (1988) is a small effect size. There was no difference for male students on this factor. These results suggest that based on a student's transfer status, no specific factors need to be emphasized. Recruiting efforts in this regard should focus simply on those that are the most positively influential overall.

Upper- versus lower-level students

The third research question asked: What are the differences in the factors that influence lower-level (freshman & sophomores) students and upper level (junior and seniors) students between males and females? As with research Question 3 because the dependent

variables were ordinal and the variances unequal, Mann-Whitney U-tests were performed. However, none of the factors were significantly different between upper and lower level students for male or female students. These results suggest that student classification should not be a concern in customizing student recruiting.

New factors

The 16 factors used in the study were identified using previous research. However, to explore the possibility that additional, not yet identified, factors exist this study included an open-ended question asking participants for any other factors that influenced them to choose a CM degree. In total 362 of 468 male students and 62 out of 95 female students responded to this question, resulting in 501 responses. Following filtering of the responses, eight themes/factors emerged. Four of these themes were well supported by the number of responses. However only one should be considered a new factor for positively influencing students to pursue a CM degree. The remaining themes, fall under already identified factors or require additional research to support them as factors for attracting students to CM programs. The authors emphasize the lack of responses needed to report most of these as factors for attraction of students to CM programs; Figure 21 displays the six themes/factors with the most responses.

The factor that the most male and female participants identified to have a positive influence in their decision to pursue a CM degree was enjoyment/passion for construction. The next three; job/career opportunities, work environment/previous work experience, and friend/family testimonials could all be included in factors that have already been identified. These results indicate that enjoyment/passion for construction and building has a remarkable positive influence on students of both genders. Unfortunately, this factor is not one that can readily be managed by a CM department to recruit students. Further study could reveal more tangible opportunities for its use in attracting students.

Career opportunities in CM and work environment/previous work experience were already identified as student attraction factors. These themes emerging from open-ended

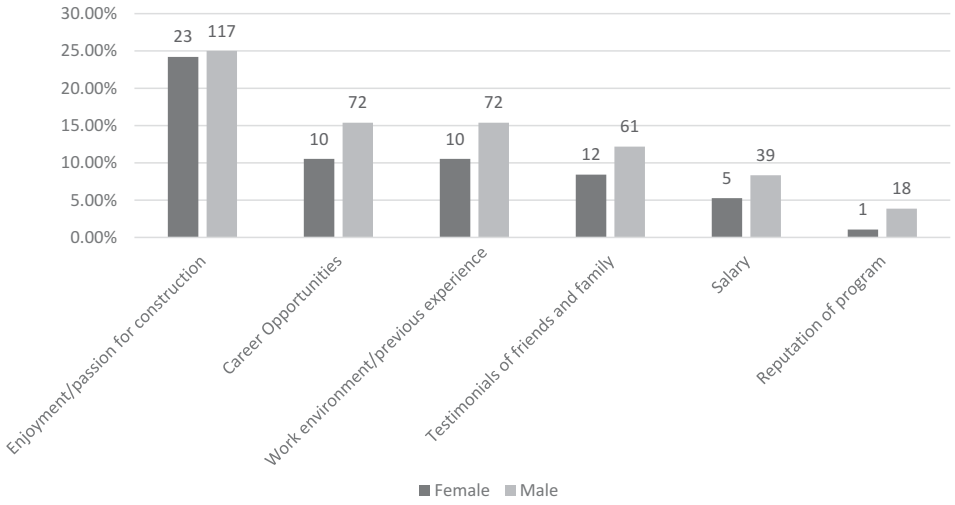

Figure 21. New factors.

responses was intriguing as students had been asked about them in the survey, so its repetition as an open-ended attraction factor underscores their influence. The researchers assert the influence of these factors may be stronger than the survey suggests.

Conclusions

The results of this research indicate that there are not many differences between male and female students in the factors that attracted them to a CM program, and that all of the factors previously identified were, in fact, positively influential. However, some factors are more influential than others in attracting students.

No factors were more influential on male students, but some were more influential on female students. Internships, father in the industry, father taking to work, and community service were all positively influential in attracting students to CM, however these factors were significantly more positively influential for female students. As a result CM programs trying to increase female enrollment should consider emphasizing these factors in their recruiting efforts, as they are positively influential for male students, just more so for female students. The authors point out that in particular, the parental connection of fathers to daughters may prove to be the "silver bullet" in attracting more female students to the construction industry. While this research does not provide direction regarding how to get fathers to engage their daughters in construction, CM educators need to serve as a voice to construction professionals of the potential influence they can have in taking their daughters to work with them and engaging them in conversation about their career.

The results suggest that a number of factors are ineffective in recruiting students of both genders. Those factors include: advertising, high-school counselors, mentoring programs, female role models, mother taking to work, and mother in the industry. These factors are considered ineffective primarily because the results indicate that they reach only very small numbers of students of either gender. In addition to a small number of students who reported an influence from these factors, the authors make particular note of: advertising, high school counselors, and mentoring programs, as those factors, while still positive, received the highest levels of negative responses. As a result, the authors recommend that CM programs not exhaust resources on these factors in their current efforts to recruit new students of either gender.

On the other hand, the authors recommend recruiting efforts of CM programs should emphasize and focus in on certain factors, based on their reported positive influenced, they include: career opportunities, internships, Non-internship work experience, and field trips to job sites. These factors of a CM program are likely to resonate with prospective students and help attract them to CM programs, so they should be emphasized in recruiting efforts. Further programs that do not have these factors in their program should consider their addition.

Career opportunities are of particular note because they represented perhaps the most positively influential factor and it also emerged in the open-ended question. It can be inferred from this that a robust relationship between CM programs and the construction industry, which contributes to graduate job placement, should be considered perhaps the most powerful recruiting strategy a CM program can have.

The researchers recommend that future research on this topic be conducted. Specifically the authors recommend replication of this study as factors that influence students (male and female) are likely to change and these results may only be relevant for a few years. Future research is also recommended to encompass a large sample with great geographic diversity for male students.

References

About PWC. (2013). In *National Association of Professional Women in Construction*. Retrieved October 20, 2013 from http://www.pwcusa.org/v2/about.php?chapter=USA1.

Agapiou, A. (2002). Perceptions of gender roles and attitudes toward work among male and female operatives in the Scottish construction industry. *Construction Management & Economics*, *20*(8), 697–705.

Alberta Innovation and Advanced Education. (n.d.). *A Workforce Strategy for Alberta's Construction Industry*. Retrieved from http://eae.alberta.ca/documents/WIA/WIA-BETW_construction_strategy.pdf.

Amaratunga, D., Haigh, R., Lee, A., Shanmugam, M., & Elvitigala, G. (2006, April). Construction industry and women: A review of the barriers. *Proceedings of the 3rd International SCRI Research Symposium*, April 3–7, 2006 Delft, the Netherlands.

Arditi, D., & Balci, G. (2009). Managerial competencies of female and male construction managers. *Journal of Construction Engineering & Management*, *135*(11), 1275–1278.

Ball, M. (2014). *Rebuilding construction (Routledge Revivals): Economic change in the British construction cndustry*. London: Routledge.

Bennett, J.F., Davidson, M.J., & Galeand A.W. (1999). Women in construction: A comparative investigation into the expectations and experiences of female and male construction undergraduates and employees. *Women in Management Review*, *14*(*7*), 273–292.

Bigelow, B.F., Bilbo, D., Mathew, M., Ritter, L., & Elliott, J.W. (2015). Identifying the most effective factors in attracting female undergraduate students to construction management. *International Journal of Construction Education and Research*, *11*(3), 179–195.

Bigelow, B.F., Bilbo, D., Ritter, L., Mathew, M., & Elliott, J.W. (2016). An evaluation of factors for retaining female students in construction management programs. *International Journal of Construction Education and Research*, *12*(1). 18–36.

Bilbo, D., Bigelow, B. F., Rybkowski, Z., & Kamranzadeh, A. (2014). Effects of family-related factors on female project managers' salaries in the construction industry in the United States. *International Journal of Construction Education and Research*, *10*(4). 255–267.

Bureau of Labor Statistics (BLS). (2016). *Construction Managers*. Retrieved from http://www.bls.gov/ooh/management/construction-managers.htm

Cohen, J. (1988). *Statistical power and analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Dainty, A. R., Bagilhole, B. M., & Neale, R. H. (2000). A grounded theory of women's career underachievement in large UK construction companies. *Construction Management & Economics*, *18*(2), 239–250.

Davey, F. H., & Stoppard, J. M. (1993). Some factors affecting the occupational expectations of female adolescents. *Journal of Vocational Behavior*, *43*, 235–250.

Fielden, S. L., Davidson, M. J., Gale, A. W., and Davey, C. L. (2000). Women in construction: The untapped resource. *Construction Management & Economics*, *18*(1), 113–121.

Francis, V., Prosser, A. (2013). Does Vocational Guidance Become Gendered When Discussing Construction? *Australasian Journal of Construction Economics and Building. 1*(1), 73–83.

Gale, A. W. (1994). Women in non-traditional occupations: The construction industry. *Women in Management Review*, *9*(2), 3–14.

Gale, A., & Cartwright, S. (1995). Women in project management: entry into a male domain? A discussion on gender and organizational culture-part 1. *Leadership & Organization Development Journal*, *16*(2), 3–8.

Lopez del Puerto, C., Guggemos, A. A., & Shane, J. (2011). Exploration of strategies for attracting and retaining female construction management students. *Proceedings of the 47th ASC Annual International Conference*.

Lingard, H., & Francis, V. (2005). The decline of the 'traditional' family: work-life benefits as a means of promoting a diverse workforce in the construction industry of Australia. *Construction Management and Economics*, *23*(10), 1045–1057.

Lingard, H., & Lin, J. (2004). Career, family and work environment determinants of organizational commitment among women in the Australian construction industry. *Construction Management and Economics*, *22*(4), 409–420.

Loosemore, M., & Waters, T. (2004). Gender differences in occupational stress among professionals in the construction industry. *Journal of Management in Engineering*. 20(3) 126–132.

Menches, C. L., & Abraham, D. M. (2007). Women in construction—tapping the untapped resource to meet future demands. *Journal of Construction Engineering & Management*, *133*(9), 701–707.

Moore, J.D. (2006). Women in construction management: creating a theory of career choice and development. (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses.

Moore, J.D. & Gloeckner, G.W. (2007). A theory of women's career choice in construction management: Rrecommendations for academia. *International Journal of Construction Education and Research*, *3*, 123–139.

National Center for Construction Education and Research. (2013). Craft workforce development 2013 and beyond: A case for greater stakeholder commitment. Retrieved July 10, 2016, fromhttp://www.nccer.org/uploads/fileLibrary/Craft_WFD_2013_And_Beyond.pdf

Thevenin, M. K., Elliot, J. W., & Bigelow, B. F. (2016). Mentors, role models, and observed differences in students' construction education self-efficacy and motivation. *International Journal of Construction Education and Research*, *12*(3), 1–17.

Yates, J. (2013). Engineering careers case study: K–12 recruitment initiative. *Leadership and Management in Engineering*, *13*(1), 3–10.