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Incivility as a Barrier to Embeddedness Among Engineering Students: Does Gender Matter?

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INCIVILITY AS A BARRIER TO EMBEDDEDNESS AMONG ENGINEERING STUDENTS: DOES GENDER MATTER?

by

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ABSTRACT

INCIVILITY AS A BARRIER TO EMBEDDEDNESS AMONG ENGINEERING STUDENTS: DOES GENDER MATTER?

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To meet the current demand for engineers, research has focused on how to attract and retain qualified candidates in the field, especially those that are underrepresented (e.g., women; NSB, 2016). The present study investigates incivility and embeddedness, which have been found to be antecedents of retention in both the workplace (Cortina, Magley, Williams, & Langhout, 2001; Mitchell, Holtom, Lee, Sablynski, & Erez, 2001) and the collegiate setting (Caza & Cortina, 2007; Major et al., 2015). To extend previous research, both constructs were examined simultaneously among undergraduate engineering students. Undergraduate, first-year engineers completed an online survey indicating the extent to which they experienced incivility in engineering, the primary source of the uncivil treatment, and their level of embeddedness in engineering. A comparison of means and three hierarchical moderated regressions were used to test the proposed hypotheses. Results indicated that men and women experienced similar levels of incivility in engineering. In addition, incivility significantly predicted two of the three dimensions of embeddedness: fit and links. Gender moderated the relationship between incivility and engineering fit such that men who experienced incivility experienced lower engineering fit while incivility did not influence engineering fit for women. Gender did not moderate the relationship between incivility and engineering links or sacrifice. Future research should examine persistence in relation to these variables to determine if embeddedness mediates the relationship between incivility and persistence in one's engineering major.

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CHAPTER I

INTRODUCTION

For the United States to remain globally competitive in science, technology, engineering, and math (STEM), a substantial increase in STEM graduates is needed (PCAST, 2012). In addition, a report issued by the President's Council of Advisors on Science and Technology indicated that STEM bachelor's degrees have been declining since 2001 (PCAST, 2012). One way to improve STEM graduation rates is to increase the number of students in STEM programs, particularly focusing on those underrepresented in STEM. Despite increasing numbers of women pursuing educational and employment opportunities in male-dominated fields, women remain underrepresented in STEM (NSF, 2015; Walton, Logel, Peach, Spencer, & Zanna, 2015).

Gender disparities vary among STEM fields, however. For example, in 2013, women earned 77 percent of bachelor's degrees awarded in psychology and comprised 67 percent of those employed in the field of psychology, while women earned 39 percent of bachelor's degrees in the physical sciences and accounted for 31 percent of physical scientists (NSB, 2016). Women are particularly underrepresented in the field of engineering. In 2013, women earned 19 percent of bachelor's degrees awarded in engineering and comprised a mere 15 percent of those in the engineering workforce (NSB, 2016; NSF, 2015). Over the past decade, women's share of bachelor's degrees earned in engineering has remained relatively stable, while employment in the engineering industry has increased only slightly (NSB, 2016; NSF, 2015). As such, efforts to understand and curb this persistent trend are not lacking (Society of Women Engineers, 2013).

Existing literature on women in engineering focuses on: (a) what garners women's interest in engineering, such as what drives them to seek educational or occupational opportunities in engineering (Hammack & High, 2014; Valian, 2014); (b) why women choose to stay in engineering programs and careers (Gayles & Ampaw, 2014; Kamphorst, Hofman, Jansen, & Terlouw, 2015; Walton et al., 2015); and (c) why women choose to leave the engineering field altogether (Beddoes & Pawley, 2014; Cheryan, Master, & Meltzoff, 2015; Fouad, 2014; Saucerman & Vasquez, 2014). Each perspective on underrepresentation (i.e., attraction, persistence, and attrition) can be investigated independently, although they are interrelated to some extent (Thomas, Poole, & Herbers, 2015). For example, efforts to increase women's interest in engineering such that more women pursue engineering education and careers may be futile if they leave the field once enrolled or hired. While understanding the relative impact of each perspective is important, examining how they converge to influence underrepresentation may prove to be a worthwhile endeavor.

The current study investigates two of the perspectives by examining what drives individuals to *leave* engineering (e.g., incivility) and whether this influences what drives them to *stay* (e.g., embeddedness). Incivility, which refers to behaviors that are subtle, rude, and unclear in intent to harm their target, is one reason that an individual may choose to leave. Past research has found that individuals who experience more incivility have higher intentions to leave their jobs (Cortina et al., 2001; Ghosh, Reio, & Bang, 2013). Though seminal theoretical and empirical work on incivility took place in workplace literature, incivility has also been studied in academic contexts (Caza & Cortina, 2007; Clark, Olender, Kenski, & Cardoni, 2013; Frey Knepp, 2012). On the other hand, embeddedness describes why individuals stay. In organizational science, embeddedness refers to how enmeshed, or connected, one is to a particular job, organization, or occupation (Mitchell et al., 2001). For example, an individual highly embedded in an organization is more compatible with the organizational culture, has more connections with people and activities within the organization, and would find it more difficult to give up the benefits and connections associated with being a part of the organization. As such, individuals with high organizational embeddedness are more likely to stay in that organization than those less embedded in the organization (Mitchell et al., 2001). Embeddedness theory has recently been validated as a lens with which to understand the experience of undergraduate students majoring in STEM, meaning that embeddedness can describe how enmeshed, or anchored, a student is in a particular STEM major or college/university (Major et al., 2015; Morganson, Major, Streets, Litano, & Myers, 2015). Moreover, embeddedness predicts persistence in STEM majors over time (Major et al., 2015).

The purpose of the current study is to examine the relationship between experienced incivility and embeddedness among undergraduate engineering students, in particular, whether uncivil treatment influences engineering embeddedness. Embeddedness in the context of engineering refers to how enmeshed one is within engineering. The proposed relationship has important implications for students and the field of engineering in terms of further understanding retention, as embeddedness and incivility both predict turnover or turnover intentions (Cortina, Kabat-Farr, Leskinen, Huerta, & Magley, 2013; Major et al., 2015). Understanding the role of incivility as a potential barrier to developing embeddedness in engineering simultaneously addresses two common perspectives on what contributes to women's underrepresentation in engineering (i.e., why students *stay* and why students *leave*).

Given the underrepresentation of women in engineering, investigating the role of gender as a moderator of the incivility and engineering embeddedness relationship may provide meaningful insight into the differential experiences of men and women in engineering. Figure 1 represents a model depicting the role of gender as a moderator of the relationship between incivility and the dimensions of engineering embeddedness. Findings may inform future research and aid the development of preventative interventions that can be implemented to reduce incivility and potentially foster embeddedness among engineering students.

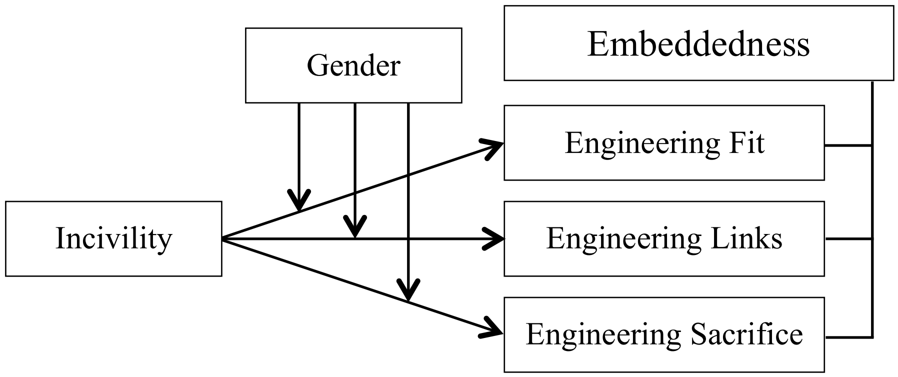

Figure 1. Overall Conceptual Model for the Current Study

This study contributes to extant literature in two ways. First, the relationship between experienced incivility and embeddedness has not been examined previously. Subsequently, gender has not been examined as a moderator of this relationship. As women and men typically have different experiences within engineering (Bix, 2014; Gayles & Ampaw, 2014), it is possible that the incivility-embeddedness relationship will differ depending on gender. Second, neither incivility nor embeddedness have been assessed exclusively with undergraduate engineering students. Uncivil treatment has been studied in academic settings, but studies tend to be descriptive in nature (i.e., perceptions of uncivil behaviors; Frey Knepp, 2012) and do not often examine incivility within an academic engineering context (Summers, Bergin, & Cole, 2009). Given its utility in understanding women's satisfaction and turnover intentions in the engineering workforce (Fouad, 2014; Fouad & Singh, 2011), assessing incivility among engineering students may prove insightful when examining why women are underrepresented in engineering. While embeddedness theory has been successfully applied in STEM at the college level (Major et al., 2015; Morganson et al., 2015), utility in engineering, independent of STEM, should be examined as women are particularly underrepresented in this field.

Workplace and Academic Incivility

Incivility has most commonly been studied in the workplace where it is defined as "low-intensity deviant behavior with ambiguous intent to harm the target, in violation of workplace norms for mutual respect. Uncivil behaviors are characteristically rude and discourteous, displaying a lack of regard for others" (Andersson & Pearson, 1999, p. 457). Intentions to harm the target are ambiguous, as perceived by targets, instigators, and/or observers of incivility; however, the intentions can be present (Andersson & Pearson, 1999). Instigators, as well as targets and observers, may also explain perceptions of purposeful intent to harm the target as misconstrued. For example, they may suggest that the instigator was having a bad day or did not intend to be rude to the target. Some examples of uncivil treatment include making insulting or disrespectful comments, using sarcasm, and interrupting or talking over others. Although these behaviors may seem minor, they can be influential and are not limited to face-to-face interactions (Giumetti et al., 2013; Giumetti, McKibben, Hatfield, Schroeder, & Kowalski, 2012). In fact, Pearson and Porath (2009) estimate that each year incivility costs organizations $14,000 per employee due to project delays and employee distraction from work.

Meta-analytic findings suggest that targets of uncivil treatment experience reduced job satisfaction (r = -.40), psychological well-being (r = -.33) and physical well-being (r = -.17; Hershcovis, 2011). Experienced incivility has also been positively associated with turnover intentions (one of the most robust predictors of actual turnover; Griffeth, Hom, & Gaertner, 2000; Tett & Meyer, 1993) in the workplace (Cortina et al., 2013; Cortina et al., 2001; Ghosh et al., 2013), a conclusion further supported by meta-analytic findings (r = .40; Hershcovis, 2011). Incivility has also been studied in the engineering workforce. Findings show that experienced incivility is associated with reduced satisfaction with engineering and increased intentions to leave engineering fields for women (Fouad, 2014; Fouad & Singh, 2011).

In terms of occurrence, uncivil treatment is not uncommon within the workplace. Cortina et al. (2001) reported that, over the past five years, 71 percent of participants in her research had experienced uncivil treatment in the workplace, a number that can reach as high as 91percent (Lim & Lee, 2011). Moreover, some findings point to gender differences in incivility, with women facing more uncivil treatment than men (Cortina et al., 2013; Lim, Cortina, & Magley, 2008; Miner, Pesonen, Smittick, Seigel, & Clark, 2014; Sliter, Sliter, Withrow, & Jex, 2012; Woodford, Krentzman, & Gattis, 2012). Such findings lend support to a theory of selective incivility developed by Cortina (2008), which posits that uncivil acts can actually be manifestations of subtle sexism or discrimination that disproportionately target undervalued individuals (e.g., women; Cortina, 2008). Further understanding of incivility is important, not only because of the negative outcomes associated with experiencing incivility (e.g., increased turnover intentions), but also because of the ubiquitousness of uncivil treatment. The current study seeks to understand how uncivil treatment influences embeddedness in engineering, which has been shown to predict persistence in engineering and other STEM fields (Major, 2016).

In an academic context, research on incivility tends to focus on faculty and student perceptions of uncivil behaviors in the classroom (Rehling & Bjorklund, 2010), antecedents to instigated incivility (Nordstrom, Bartels, & Bucy, 2009), and strategies to prevent academic incivility (Alberts, Hazen, & Theobald, 2010). Although many studies have focused on faculty perspectives of uncivil behaviors (Clark et al., 2013), research has emerged including student perspectives as well (Bjorklund & Rehling, 2010; Clark, 2008a; Clark & Springer, 2007; Marchiondo, Marchiondo, & Lasiter, 2010).

Contrary to the operationalization in workplace literature, academic incivility is not typically defined as low intensity behaviors that violate contextual norms. Some studies utilize Andersson and Pearson's (1999) definition (Caza & Cortina, 2007; Marchiondo et al., 2010) while others use a much more inclusive definition of incivility, such as "any speech or action that disrupts the harmony of the teaching-learning environment" (Clark & Springer, 2007, p. 93). Some examples of incivility in an academic setting include making negative, disrespectful, or condescending remarks and verbally discrediting others (Clark & Springer, 2007). To facilitate the merging of incivility literature in the workplace and academic contexts, the current study utilizes Andersson and Pearson's (1999) more conservative definition of incivility, as this operationalization is most commonly used in the workplace literature and has been used to some extent in the academic context.

Caza and Cortina (2007) suggest that findings between academic and organizational contexts are generalizable due to similar settings and features (e.g., highly organized and having expectations of member commitment and performance), and although uncivil behaviors may take different forms depending on the context, incivility typically negatively impacts targets in academic contexts similar to the workplace. For example, Clark (2008b) found that nursing students experienced feelings of trauma, helplessness, and anger (with themselves and with instigators of incivility), when they experienced uncivil treatment instigated by faculty. As a result, students either (a) remained in the nursing program and conformed as expected, (b) remained in the program and attempted to change patterns of incivility, or (c) left the program entirely. Additional findings support a positive relationship between incivility perceptions of social ostracism (i.e., feeling like one does not belong), anxiety and depression, perceptions of unfairness, and dissatisfaction with the institution (Caza & Cortina, 2007). Satisfaction with college has been shown to be positively associated with persistence intentions (Strahan & Credé, 2015).

The source of the incivility may differentially impact the negative outcomes associated with uncivil treatment. Incivility can come from someone of the same status as the target, such as peers or coworkers (*lateral incivility*) or from someone who is of higher status, such as faculty, staff, or supervisors (*top-down incivility*). In the workplace, Ghosh et al. (2013) found that incivility from a supervisor was directly related to the target employee's turnover intentions. Pearson and Porath (2009) state that 60% of the uncivil treatment experienced in the workplace is top-down and a study by Lim and Lee (2011) found that employees received the most uncivil treatment from their supervisors, relative to their coworkers and subordinates. In addition, Caza and Cortina (2007) examined experienced incivility from different sources in an academic context and found that perceptions of social ostracism and perceptions of the academic institution as unfair or unjust were associated with both lateral and top-down incivility. However, top-down incivility was much more strongly related to perceptions of an unfair or unjust institution than lateral incivility.

Caza and Cortina (2007) assert that educational and professional institutions are similar in nature, including in hierarchical power structures, such that students hold less power than staff, administration, and faculty as employees hold less power than supervisors. For example, faculty are expected to guide students' performance through instruction and feedback (Hattie, 2003), much like how supervisors guide subordinates' performance. Moreover, employees and students interact with their coworkers and peers more frequently than supervisors or faculty and staff. Although Caza and Cortina (2007) argue that academic and professional contexts are similar in nature and thus findings are generalizable between the two contexts, there may be reason to disagree when it comes to the primary source of incivility. One reason is that some workplace literature finds that employees experience more top-down incivility (i.e., from supervisors) than lateral incivility (i.e., from coworkers; (Lim & Lee, 2011; Pearson & Porath, 2009), while Caza and Cortina (2007) found that students reported experiencing more uncivil treatment from other students ($M = 1.26$, $SD = 0.68$), compared with that from faculty, staff, or administrators ($M = 0.98$, $SD = 0.57$). Given the lack of research on source of uncivil treatment and divergent findings in workplace and academic incivility literature, it is important to further extend this line of research.

Research Question: Do students experience more lateral or top-down incivility in an engineering academic setting?

Embeddedness Theory

Embeddedness theory, originally established in the context of the workplace, provides a unique framework that examines why individuals *stay* in their jobs (Mitchell et al., 2001). It was developed in response to traditional models of turnover that only explained modest amounts of variance using predictors such as organizational commitment, job satisfaction, and job involvement (Mitchell et al., 2001). Embeddedness theory has been shown to predict employee turnover above and beyond these predictors (Jiang, Liu, McKay, Lee, & Mitchell, 2012) and also offers a new perspective on turnover that examines why employees stay, rather than why employees leave their job. Similarly, embeddedness theory applied to STEM fields allows researchers to shift focus from why individuals *leave* STEM to why they *stay* (Major et al., 2015; Morganson et al., 2015).

Embeddedness consists of three dimensions that influence employee persistence: fit, links, and sacrifice. Individually, the dimensions reflect how compatible one is with their job and organization (*fit*), the connections they have to people and activities within the organization (*links*), and what one would give up upon leaving their job (*sacrifice*). As a whole, the three dimensions represent how strongly one is attached to or rooted in their job and the larger organization (Mitchell et al., 2001). Prior research suggests that those who are more embedded are more likely to stay in their jobs (Jiang et al., 2012; Lee, Burch, & Mitchell, 2014; Mitchell et al., 2001).

Although most commonly studied in the workplace, embeddedness theory has been successfully applied in an academic context. A study utilizing focus groups demonstrated that embeddedness (fit, links, and sacrifice) was an appropriate lens for describing the STEM student experience (Morganson et al., 2015). As such, Morganson et al. (2015) indicated that embeddedness theory can be used as a framework to understand and promote retention of STEM students. Morganson et al. (2015) assessed major embeddedness, the extent to which an individual is embedded in their undergraduate STEM major, using the same three dimensions used to assess job embeddedness in the workplace (e.g., fit, links, and sacrifice). Findings revealed that embeddedness theory is applicable in a college context (i.e., major embeddedness) similar to application in an organizational context (i.e., job embeddedness). For major embeddedness, *fit* included passion, compatibility between the skills one's major requires and the skills one has, and thriving in the face of challenge brought about by a STEM major. *Links* were characterized by connections with one's major, for example having or being a role model, having family members with a history in STEM, or camaraderie among STEM peers (Morganson et al., 2015). Finally, *sacrifice* included sunk costs (i.e., loss of investments including tuition or credits) and the prestige accompanying STEM majors that one would give up upon leaving. Embedded individuals perceived themselves to have the skills necessary for their STEM major; felt closely connected to the students, faculty, and staff they encountered in the context of their major; and felt they would give up a great deal if they left their major. In further support for the utility of embeddedness theory in the STEM college context are findings that embeddedness predicts retention for STEM majors above and beyond major satisfaction and commitment (Major et al., 2015).

Incivility and Embeddedness

Experiencing incivility has the potential to undermine embeddedness for engineering students, perhaps leading students to reevaluate how well they fit with engineering, weakening connections students have with those in engineering (e.g., peers, faculty), and leading students to feel like they would sacrifice less if they left engineering.

Incivility and engineering fit. Experiencing incivility will likely affect one's passion for and perceptions of compatibility with engineering (*engineering fit*), especially when that uncivil treatment stems from those within engineering. Students who are talked over or ignored (i.e., uncivil treatment) when attempting to contribute to a class discussion may not feel particularly passionate about engaging in future discussions, especially if this occurs repeatedly. Similarly, a student accused of incompetence (i.e., uncivil treatment) by someone within engineering, such as a peer or professor, may question if the skills they have are a good match for their major. It is a reasonable speculation that experiencing rude and discourteous behaviors such as these will negatively affect students' passion for engineering and perceptions of compatibility with the field.

Hypothesis 1a: Incivility will be negatively related to engineering fit.

Incivility and engineering links. Students' ties to engineering (i.e., *engineering links*) may also be jeopardized upon experiencing incivility. If someone pays little attention to or shows little interest in a student's statements or opinions, the student is unlikely to forge a positive attachment with that person. A student's connections with those in engineering may also be weakened in response to incivilities such as someone making insulting or disrespectful comments about a student or making jokes at the student's expense. Not only would students be unlikely to desire a connection with individuals who perform these rude and discourteous behaviors, these negative comments may damage the reputation of the target student, possibly leading others in engineering to avoid connecting with that student (Wilson, Wilczynski, Wells, & Weiser, 2000). Furthermore, experienced incivility has been linked with negative outcomes such as social isolation (Lim et al., 2008; Pearson, Andersson, & Wegner, 2001) and social ostracism (Caza & Cortina, 2007). As such, it is reasonable to propose that incivility will negatively influence connections students have with others in engineering (e.g., peers, faculty).

Hypothesis 1b: Incivility will be negatively related to engineering links.

Incivility and engineering sacrifice. Finally, students who experience incivility may be less invested in engineering (*engineering sacrifice*), especially given the positive association between incivility and psychological distress (i.e., anxiety and depression; Caza & Cortina, 2007; Lim & Lee, 2011; Miner et al., 2014). Upon experiencing uncivil treatment in engineering, students may rethink what they would be giving up upon leaving their engineering major. Students may even decide that leaving their engineering major would not require much of a sacrifice. For example, students on the receiving end of anger outbursts or hostile looks may not consider leaving engineering as a big sacrifice, especially if leaving engineering was associated with cessation of uncivil treatment. In fact, students may find staying in engineering to be more detrimental, given that they are experiencing incivility within engineering. Thus, it is expected that students who experience more uncivil treatment will be less invested in their engineering major.

Hypothesis 1c: Incivility will be negatively related to engineering sacrifice.

Incivility, Embeddedness, and Gender

Cortina (2008) introduced the theory of *selective incivility*, suggesting that incivility is a subtle manifestation of bias and discrimination (e.g., gender) in the workplace. As blatant, or "old-fashioned," discrimination and sexism decline, partly because of anti-discrimination laws and policies, Cortina (2008) posited that subtle discrimination, or "modern discrimination," has risen to take its place. Incivility facilitates modern discriminatory behaviors because of its ambiguous nature, meaning instigators can mask biased or discriminatory acts under the guise of more acceptable premises, whether intentionally or not (Cortina, 2008). Cortina (2008) suggests that individuals in socially undervalued roles (i.e., women in engineering) are more at risk to be targeted with uncivil behaviors, a theory that has been supported by several research findings (Cortina et al., 2013; Lim et al., 2008; Miner et al., 2014). Thus, it is hypothesized that:

Hypothesis 2: Among students majoring in engineering, women will experience more incivility than men.

Considering that men and women often experience a different environment within engineering, it is likely that gender may affect how one reacts to experiencing incivility. While incivility may lead both men and women to question how well they fit with engineering

(*engineering fit*), uncivil treatment may prove especially harmful for women in terms of engineering fit. Being a woman in engineering may exacerbate the negative impact of uncivil treatment (e.g., being accused of incompetence) on engineering fit by reinforcing stereotypes that women are not skilled in engineering and math (Bell, Spencer, Iserman, & Logel, 2003). Oftentimes, these stereotypes can negatively influence perceptions of women's competency in the field in that women must prove their competence while men's competency is often assumed (Gill et al., 2008). These stereotypes can also hinder women's performance in engineering through stereotype threat, a performance detriment that arises when individuals belonging to a negatively stereotyped group (i.e., women in engineering) are anxious that they will judged by or will confirm negative stereotypes held of their group (Dickhäuser & Meyer, 2006; Saucerman & Vasquez, 2014). For example, women have been shown to perform worse than men on an engineering exam when instructions indicated that the test was to assess good and bad engineers. However, when instructions asserted that the test was gender-fair or that it was not intended to assess engineering ability, women and men performed equally (Bell et al., 2003). Moreover, women have been found to have lower self-efficacy in engineering, or confidence in their ability to succeed in engineering, relative to men (Flores, Lee, Luna, & Navarro, 2013). In fact, gender may lessen the negative impact of incivility on engineering fit for men given positive stereotypes that men are better at engineering and math than women.

> *Hypothesis 3a:* Gender will moderate the relationship between incivility and engineering fit such that the negative effects of incivility on engineering fit will be stronger for women than men.

Incivility may threaten the ties men and women have to those in engineering (*engineering links*); however, women may experience this to a greater degree than men. Being a woman in engineering may exacerbate the negative impact of uncivil treatment (e.g., ignored or given the "silent treatment") on engineering links by reinforcing feelings of being unwelcome and undervalued in a predominantly male (NSB, 2016; NSF, 2015) and stereotypically masculine field. Women in male-dominated fields such as engineering may feel as if they do not belong and become less involved in the field (Murphy, Steele, & Gross, 2007; Valian, 2014). In fact, undergraduate women felt less threatened, more challenged, and participated more when solving an engineering problem when assigned to a group comprised mostly of women, compared to a male-dominated group (Dasgupta, Scircle, & Hunsinger, 2015). In addition, some individuals have a difficult time accepting and valuing women as engineers (Gill, Sharp, Mills, & Franzway, 2008) and may isolate, exclude, or even target women entering the engineering field with hostile behaviors (Wyer, Barbercheck, Cookmeyer, Ozturk, & Wayne, 2013).

Women may also encounter a “chilly climate” in which they feel unwelcomed and undervalued as a result of a perceived incompatibility of being a woman in a stereotypically masculine field such as engineering (Blickenstaff, 2005; Gill et al., 2008). Stereotypes of engineering as a masculine field can also negatively influence perceptions of women’s competency in the field (Gill et al., 2008; Saucerman & Vasquez, 2014) in that women’s competency must be proven while men’s competency is often assumed (Gill et al., 2008). Moreover, women who do assert their competency are often perceived to be less warm, and thus, less likeable (Heilman, Wallen, Fuchs, & Tamkins, 2004). Whereas women in engineering may already feel alienated, unwelcome, and undervalued due to a chilly climate and negative stereotypes of women in a stereotypically masculine field, men likely do not have this same experience. Men are likely to fit in engineering as their gender matches with the dominant gender in the field, and as a result, there is also a perceived match between being male in engineering and the masculine stereotypes associated with the engineering field. For men, gender may lessen the negative impact of uncivil treatment on engineering links by conveying that they belong and are valued in engineering given that engineering is male-dominated and a stereotypically masculine field.

Hypothesis 3b: Gender will moderate the relationship between incivility and engineering links such that the negative effects of incivility on engineering links will be stronger for women than men.

Although incivility will likely influence engineering sacrifice negatively for all students, gender may affect the magnitude of this negative relationship. For women, gender may exacerbate the negative relationship between incivility and engineering sacrifice by reinforcing stereotypes of engineering as a masculine field and that women are not skilled at math or engineering as well as reinforce feelings of being unwelcome and undervalued. Women who enter the field of engineering often deal with barriers to success that men typically do not, including overcoming negative stereotypes, stereotype threat, lower self-efficacy, feelings of isolation and alienation, and "chilly climates." Experiencing uncivil treatment may lead women to question what they would really be giving up if they left the field. On the other hand, men tend to have a more positive experience in engineering where they are positively stereotyped, accepted, and valued. As such, gender may lessen the negative impact of incivility on engineering sacrifice for men by conveying subtle messages of engineering and math ability as well as a general sense of belonging.

Hypothesis 3c: Gender will moderate the relationship between incivility and engineering sacrifice such that the negative effects of incivility on engineering sacrifice will be stronger for women than men.

CHAPTER II

METHOD

Participants

Students were recruited from an engineering program at a large, southwestern university in the United States. The program from which participants were drawn was similar to other engineering programs in that it was male-dominated and a majority of the students were White. From 2011 to 2015, the program had an average male enrollment of 77 percent and about 63 percent of students were White. The current sample was comprised of first-year students enrolled in the engineering program in Fall 2016 was demographically similar to first-year students enrolled in the engineering program in previous years (75 percent of the participants were male and 60 percent were White). In addition, 22 percent of the current sample identified as Hispanic or Latinx, 10 percent as Asian, 3 percent as African American, and less than 1 percent identified as American Indian. On average, participants in the sample were 19 years old (SD = 1.74) with an average Fall 2016 GPA of 3.17 (SD = 0.69). Participants were recruited from a fall semester engineering course common to all first-year engineering students. A majority of participants completed the survey at the end of the fall 2016 semester (60 percent); the remainder completed the survey at the beginning of Spring 2017. The final sample for this study included a total of 1033 participants, roughly one-third of the approximately 3000 students who were enrolled in the engineering program in 2016.

Procedure

Data were collected via an online survey as part of a larger project examining engineering identity and embeddedness. For the current study, the researchers sent individualized emails to first-year students enrolled in the common engineering course offered in Fall 2016. Students were invited to participate in the survey using a unique link provided in the email. This sampling process enabled collaborators at the research site to provide Old Dominion University researchers with password-protected demographic data that could be linked to survey responses. Students could access the survey near the end of the Fall 2016 semester and were given class time to complete the survey if they decided to participate. Due to an underwhelming response rate, the researchers re-released the survey to students at the beginning of Spring 2017. Professors allotted time for students to complete this survey during class as well. Prior to participating, students were informed of the risks and benefits of participation, the confidential nature of the study, the voluntary nature of the study, and that declining to participate would not impact class grades or academic standing with the university or engineering college.

Measures

Engineering incivility. Incivility was assessed using Caza and Cortina's (2007) 12-item Workplace Incivility Scale (WIS) adapted for use in an engineering academic context. Participants rated how often they experienced the listed uncivil behaviors over the past semester involving fellow students, staff, or professors in the *College of Engineering* using a 5-point Likert scale ranging from 1 (*never*) to 5 (*many times*). One item was modified to better fit the academic context (i.e., 'Doubted your judgment on a matter' instead of 'Doubted your judgment on a matter over which you had responsibility'). Sample items include, "Paid little attention to your statements or showed little interest in your opinions" and "Interrupted or 'spoke over' you." Appendix B contains a full list of items for this measure.

The 12-item WIS has high internal consistency ($\alpha = .92$; Cortina et al., 2013). The original WIS (comprised of 7 items) has demonstrated high reliability ($\alpha = .89$) and convergent validity, as it is highly negatively correlated with the Perceptions of Fair Interpersonal Treatment

Scale (PFIT; Donovan, Drasgow, & Munson, 1998), a measure of fair or civil behaviors in the workplace. Engineering incivility was measured at the end of the 2016 fall semester and at the beginning of the 2017 spring semester. In the current study, the engineering incivility measure demonstrated acceptable internal consistency with a Cronbach's alpha of .83. To explore from whom students experienced uncivil treatment most, participants were asked to identify the primary instigator (i.e., student, faculty, staff) of each incivility item to which they chose a response option greater than 1 (*never*). A lateral incivility score was calculated for each participant by counting each instance when they indicated that other *students* primarily instigated the uncivil treatment. A top-down incivility score was calculated for each participant by summing each instance when they indicated that *faculty* or *staff* primarily instigated the uncivil treatment. Both the lateral and top-down incivility scores could range from 0 to 12 instances.

Engineering embeddedness. A 14-item measure was used to assess the three dimensions of embeddedness: fit (5 items), links (5 items), and sacrifice (4 items; Major, 2016; Major et al., 2015; Myers, Reynoldson, Major, & Litano, 2017). Participants rated each item on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include: "The way I think fits well with my major" (fit), "I like that people in engineering think the same way I do" (links), and "Because I'm in engineering, I am likely to have a good career" (sacrifice). Appendix A contains a full list of items for this measure. Cronbach's alpha for the three dimensions assessed in this measure in Major et al. (2015) were .88, .83, and .78 for fit, links, and sacrifice, respectively. Reliability of this measure was similar in the current study, with Cronbach's alpha of .86, .79, and .73, respectively for fit, links, and sacrifice. These are all within acceptable levels for reliability ($\alpha \geq .70$; Nunnally & Bernstein, 1994). The 14-item embeddedness measure has demonstrated three types of validity: concurrent criterion-related validity, through positive correlations with major satisfaction and major commitment; convergent validity, through positive correlations with a measure of global job embeddedness adapted for use within a university context (Crossley, Bennett, Jex, & Burnfield, 2007); and predictive criterion-related validity, through major embeddedness predicting actual persistence in one's major one year later (Litano et al., 2015). Engineering embeddedness was assessed at the end of the 2016 fall semester and at the beginning of the 2017 spring semester.

Gender. Participants' gender was acquired through an anonymized database. Gender data were coded 0 (*male*) or 1 (*female*).

Control variables. Grade point average (GPA) and race/ethnicity data were controlled for in the current study. These data were acquired through the same anonymized database as gender data. GPA were ranked on a 4-point scale and were controlled for given the influence it may have on variables of interest in the current study. For example, a student with a high GPA may be more likely to rate engineering embeddedness items in a certain way because they may feel that they have the necessary skills and abilities to succeed in engineering (fit), have more positive connections with other students and professors in engineering (links), and have more to sacrifice if they decided to leave engineering, such as a hard-earned GPA. On the other hand, someone with a low GPA may be more likely to report higher levels of incivility as they may be more likely to experience engineering professors and students who doubt their judgment on matters, accuse them of incompetence, or rate them lower than they deserved on an evaluation. GPA was significantly positively related to engineering fit ($r = .17$, $p < .001$) and engineering links ($r = .08$, $p = .016$) in the current sample. The relationship between GPA and engineering sacrifice was non-significant ($r = .01$, $p = .730$).

Race/ethnicity categories included American Indian only, Asian only, African-American only and Multi-racial including African-American, Hispanic or Latinx of any race, International, Multi-racial excluding African-American, Native Hawaiian only, unknown or not reported, and Caucasian only. Ethnicity data were also dummy coded with Caucasians and Asians as the reference group (coded 0) since neither is underrepresented in engineering (NSF, 2013); African-Americans, Hispanics, and American Indians were coded as the group of interest (coded 1) because they are underrepresented racial minorities in engineering (NSF, 2013). Race/ethnicity was controlled for in the analyses given the role it may play in experience of engineering. Intersectionality research suggests that two or more dimensions of identity (i.e., race, gender, class) can combine to create a powerful intersecting identity rich with unique experiences that cannot be understood by examining each dimension in isolation (Crenshaw, 1991; Kabat-Farr & Cortina, 2012). Cortina et al. (2013) found a significant positive relationship between a target's experienced incivility and a target's race (dummy coded 0 = *White*, 1 = *minority*; $r = .11$, $p < .01$). There was a non-significant relationship between race and experienced incivility in the current study ($r = -.03$, $p = .371$).

CHAPTER III

RESULTS

Data Analyses

Prior to conducting analyses, data were cleaned and assessed for outliers; none were found. Missing data were not imputed as less than 5 percent of data were missing for any of the study variables. Next, the assumptions of regression were assessed. The relationships between incivility and each dimension of embeddedness were linear and the reliability of these measures exceeded minimum acceptable levels (≥ .70; Nunnally & Bernstein, 1994). Although some measurement error is unavoidable, the resulting consequence of this error is that parameter estimates are more conservative. The model was limited to include one relevant predictor, incivility, for three reasons: 1) incivility was the only predictor included in the hypotheses, 2) survey space was limited as the current study was part of a larger research project and 2) to establish relationships between variables that had not been examined previously. The homoscedasticity assumption was violated for each of the embeddedness outcomes; however, the consequence for violating this assumption is that the standard error is inflated, thus making it more difficult to discover an existing significant effect. The data were not transformed to address this issue as parameter estimates were not biased and there were significant results despite the inflated standard error. Finally, the residuals were independent and normally distributed. Descriptive statistics, reliability estimates, and intercorrelations were estimated for each variable using IBM SPSS Statistics Version 24 and are located in Table 1. For a more comprehensive view of each study variable, see Table 5 in Appendix C.

Table 1

Means, Standard Deviations, and Intercorrelations of Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. Incivility	1.32	.38	(.83)								
2. Engineering Fit	3.97	.61	-.08	(.86)							
3. Engineering Links	3.64	.65	-.17	.60	(.79)						
4. Engineering Sacrifice	4.03	.62	-.06	.52	.49	(.73)					
5. Gender	.26	.44	.00	-.11	-.01	.04					
6. Race/Ethnicity	.26	.44	-.03	-.02	.04	.06	.04				
7. GPA	3.19	.69	.02	.17	.08	.01	.05	-.18			
8. Wave	.41	.49	-.02	.02	.03	-.02	-.15	-.01	-.03		
9. Lateral Incivility	1.76	1.98	.76	-.02	-.09	-.04	.01	-.04	.06	.01	
10. Top-Down Incivility	.68	1.26	.41	-.03	-.09	.03	.01	-.03	-.02	-.08	-.04

Note. N = 1033 (267 = women, 766 = men). Values in parentheses are coefficient alphas. Response scale for Incivility ranged from 1 (*never*) to 5 (*many times*). Response scale for Engineering Fit, Links, and Sacrifice ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Gender coded 0 = men, 1 = women; Race/Ethnicity coded 0 = Caucasian or Asian students, 1 = underrepresented minorities; GPA = Fall semester grade point average on a 4-point scale; Wave coded 0 = Fall 2016, 1 = Spring 2017. Lateral and Top-Down Incivility composite scores could range from 0 to 12. Significance levels for correlations: $r \geq .08$ ($p < .05$); $r \geq .09$ ($p < .01$); $r \geq .11$ ($p < .001$).

To prepare for data analyses, composite variables were created for incivility and each dimension of embeddedness. The incivility composite variable was mean centered (i.e., the mean incivility composite score for all participants was subtracted from each participants' individual composite incivility score), and an incivility by gender interaction term was created using the centered incivility variable. Mean centering facilitates interpretation of interaction terms because parameter estimates for which the influence of incivility is to be controlled for can be interpreted as when incivility is held at its mean value rather than when incivility is zero (Robinson & Schumacker, 2009). The centered incivility variable was used when conducting the hierarchical moderated regressions. The mean lateral and top-down incivility values in Table 1 were calculated by averaging over the individual-level lateral and top-down incivility scores. Gender data were dummy coded with men as the reference group (coded 0) and women as the group of interest (coded 1). Ethnicity data were also dummy coded with Caucasians and Asians as the reference group (coded 0) and African-Americans, Hispanics, and American Indians coded as the group of interest (coded 1).

Comparing Means

Prior to conducting planned analyses, an independent samples *t*-test was used to examine if participants responded differently depending on whether they completed the survey at the end of Fall 2016 or at the beginning of Spring 2017. Although more men completed the survey in Fall 2016 than women and this gender disparity was significantly bigger in Spring 2017, participant responses generally did not differ depending on survey timing. One significant difference found was that participants reported more top-down incivility in Fall 2016 than in Spring 2017. Table 2 contains descriptive statistics and *t*-test results for the constructs in the current study by wave.

Table 2

Means, Standard Deviations, and T-Test Results for Measured Variables by Wave

	Fall 2016			Spring 2017					95% CI	
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*t*	df	Lower	Upper
Incivility	1.33	.40	592	1.31	.36	405	.65	995	-.03	.06
Engineering Fit	3.96	.64	609	3.98	.55	423	-.55	982.47	-.10	.05
Engineering Links	3.62	.66	609	3.66	.62	423	-.91	1030	-.11	.04
Engineering Sacrifice	4.04	.64	609	4.01	.59	423	.53	1030	-.06	.10
Gender	.31	.46	610	.18	.38	423	5.04**	999.06	.08	.20
Race/Ethnicity	.26	.44	574	.25	.43	409	.42	981	-.04	.07
GPA	3.21	.70	610	3.16	.66	423	1.09	1031	-.04	.13
Lateral Incivility	1.74	1.95	610	1.79	2.04	423	-.37	1031	-.29	.20
Top-Down Incivility	.76	1.37	610	.56	1.08	423	2.67*	1013.03	.05	.36

Note. Response scale for Incivility ranged from 1 (*never*) to 5 (*many times*). Response scale for Engineering Fit, Links, and Sacrifice ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Gender coded 0 = men, 1 = women; Race/Ethnicity coded 0 = Caucasian or Asian students, 1 = underrepresented minorities; GPA = Fall semester grade point average on a 4-point scale. Lateral and Top-Down Incivility scores could range from 0 to 12. *$p < .01$ **$p < .001$

Descriptive statistics were examined to explore primary source differences in first-year engineering students (research question). In line with previous findings by Caza and Cortina (2007), uncivil treatment primarily came from other engineering students (i.e., lateral incivility, *M* = 1.76, *SD* = 1.98), rather than from professors or staff (i.e., top-down incivility, *M* = .65, *SD* = 1.26). Additional analyses were conducted to further explore lateral and top-down incivility in engineering. Three paired samples *t*-tests were used to determine if students experienced more incivility from a particular source and whether this was the same for men and women. As shown in Table 3, both men and women experienced significantly more lateral than top-down incivility. In addition, independent samples *t*-tests were used to explore gender differences in the primary source of incivility. Results, displayed in Table 3, indicated that men and women experienced similar levels of lateral and top-down incivility.

To examine gender differences in experienced incivility overall, an independent samples *t*-test was used. Findings indicated that, on average, men and women experienced similar levels of incivility in engineering (*M* = 1.32, *SD* = .39 and *M* = 1.32, *SD* = .36, respectively), $t(995) = -.02$, $p = .985$. As such, hypothesis 2 was not supported. A power analysis completed prior to data analyses indicated that a sample of 589 men and 211 women was needed to have adequate power (.80) to detect a small effect. The current study had an adequate sample size and gender ratio indicating that the statistical test was sufficiently powered.

Table 3

Means, Standard Deviations, and T-Test Results for Primary Source of Incivility

						95% CI	
Variable	*N*	*M*	*SD*	*t*	df	Lower	Upper
Source				14.55*	1032	.94	1.23
Lateral Incivility	1033	1.76	1.98				
Top-Down Incivility	1033	.68	1.26				
Source - For Men				12.66*	765	.92	1.25
Lateral Incivility	766	1.75	2.01				
Top-Down Incivility	766	.67	1.21				
Source - For Women				7.18*	266	.79	1.38
Lateral Incivility	267	1.79	1.90				
Top-Down Incivility	267	.71	1.41				
Lateral Incivility				-.27	1031	-.32	.24
Men	766	1.75	2.01				
Women	267	1.79	1.90				
Top-Down Incivility				-.44	1031	-.22	.14
Men	766	.67	1.21				
Women	267	.71	1.41				

Note. Lateral and Top-Down Incivility composite scores could range from 0 to 12. $*p < .001$

Hierarchical Moderated Regressions

Three hierarchical moderated regressions were used to assess the relationships between experienced incivility and each dimension of embeddedness (hypotheses 1a, 1b, and 1c), as well as gender as a moderator for each of these relationships (hypotheses 3a, 3b, and 3c). Race/ethnicity and GPA data were included as controls in each moderated regression. Control variables were entered in the first step of each regression followed by centered incivility and gender in the second step. Finally, the incivility by gender interaction term (IncivilityXGender) was entered in the third step. This process was completed three times, once for each dimension of embeddedness (e.g., engineering fit, links, and sacrifice) as the criterion variable. As hierarchical moderated regression analyses are often underpowered, it is beneficial to consider sample size estimates prior to data collection to ensure adequate power and avoid Type II errors (Aguinis, Boik, & Pierce, 2001). A power analysis conducted for these regressions indicated that a sample of 980 men and 350 women was needed ($N = 1330$) to reach adequate power. As such, the hierarchical moderated regressions were underpowered with 766 men and 267 women for a total sample size of 1033.

Engineering fit. The first hierarchical moderated regression was conducted with engineering fit as the criterion. Incivility significantly predicted engineering fit while controlling for GPA and race/ethnicity. In addition, gender moderated the relationship between incivility and engineering fit, $\beta = .07$, $p = .045$, such that men felt less compatible with engineering as they experienced more incivility, $\beta = -.12$, $p = .002$, whereas incivility did not significantly predict engineering fit for women, $\beta = .05$, $p = .481$. These findings support hypothesis 1a but not hypothesis 3a. Although the interaction was significant, gender did not moderate the relationship between incivility and engineering fit as predicted. Figure 2 contains a graph representing this interaction and regression results can be found in Table 4.

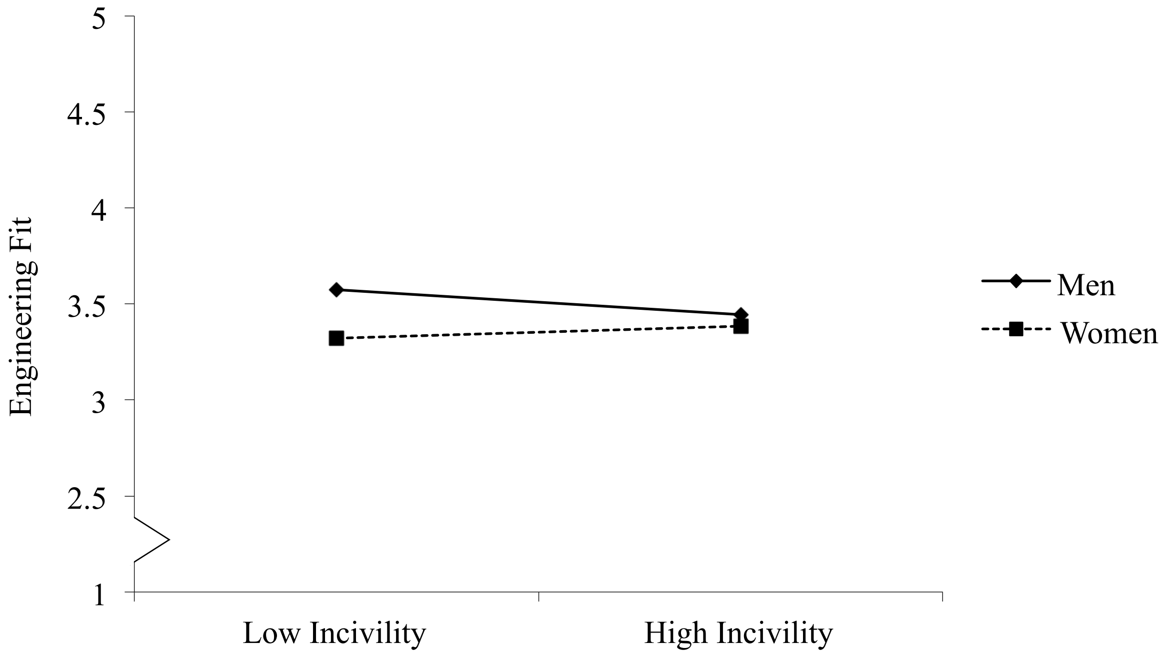

Figure 2. Gender as a Moderator of the Relationship Between Experienced Incivility and Engineering Fit

Engineering links. The second hierarchical moderated regression was conducted with Engineering Links as the criterion. As hypothesized (1b), incivility significantly predicted engineering links such that the connections one had with others and activities in engineering decreased as experienced incivility increased when controlling for GPA and race/ethnicity, $\beta = -.18$, $p < .001$. Hypothesis 3b was not supported, as gender did not moderate the relationship between incivility and engineering links, $\beta = .04$, $p = .306$. Regression results are in Table 4.

Engineering sacrifice. The final hierarchical moderated regression was conducted with Engineering Sacrifice as the criterion. Results showed that incivility was not a significant predictor of engineering sacrifice, $\beta = -.04$, $p = .266$, and gender did not moderate this relationship, β = .02, *p* = .579. Thus, hypotheses 1c and 3c were not supported. Table 4 contains the regression statistics for engineering sacrifice.

Table 4

Hierarchical Moderated Regression Results for Engineering Fit, Links, and Sacrifice

	Engineering Fit				Engineering Links				Engineering Sacrifice			
Predictor Variable	β	*t*	R^2	ΔR^2	β	*t*	R^2	ΔR^2	β	*t*	R^2	ΔR^2
Step 1			.03				.01				.01	
Race/Ethnicity	.02	.60			.05	1.46			.07	1.96		
GPA	.17	5.28**			.08	2.50*			.04	1.24		
Step 2			.05	.02			.04	.03			.01	.00
Race/Ethnicity	.02	.68			.04	1.34			.06	1.87		
GPA	.18	5.48**			.08	2.57*			.04	1.19		
Incivility	-.08	-2.48*			-.17	-5.23**			-.03	-.97		
Gender	-.11	-3.52**			.00	-.03			.05	1.57		
Step 3			.05	.00			.04	.00			.01	.00
Race/Ethnicity	.02	.71			.04	1.36			.06	1.88		
GPA	.18	5.58**			.09	2.62**			.04	1.22		
Incivility	-.11	-3.11**			-.18	-5.16**			-.04	-1.11		
Gender	-.11	-3.50**			.02	-.01			.05	1.58		
IncivilityXGender	.07	2.01*			.04	1.02			.02	.56		

Note. *$p < .05$, **$p < .01$

CHAPTER IV

DISCUSSION

The current study extended previous research by examining novel relationships between incivility, embeddedness, and gender in an undergraduate engineering context. While incivility has been studied previously in an academic setting, there is limited research on incivility within STEM, or more specifically, within engineering (Summers et al., 2009). Further, though embeddedness theory has been applied in a STEM academic context as well (Major et al., 2015; Morganson et al., 2015; Myers et al., 2017), extent literature is limited. This study is the first to examine the incivility-embeddedness relationship with gender as a moderator. These relationships are meaningful given the increasing need for STEM graduates and women's underrepresentation in many STEM fields, particularly engineering (NSF, 2015). The present study combined two of the three typical approaches to attrition research in academia: why students stay (i.e., embeddedness) and why students leave (i.e., incivility). Results demonstrated that women and men experienced similar levels of uncivil treatment and that incivility was a barrier for developing embeddedness in one's engineering major for two of the three dimensions of embeddedness (i.e., engineering fit and links). Moreover, gender significantly moderated the relationship between incivility and engineering fit, though not as hypothesized. Finally, incivility was a non-significant barrier for engineering sacrifice and gender was not a moderator of the incivility-engineering sacrifice relationship.

Similar to Caza and Cortina's (2007) research on incivility experienced from different sources, the data showed that students reported more lateral (i.e., uncivil treatment from peers) than top-down incivility (i.e., uncivil treatment from faculty or staff), on average. Additional exploratory analyses demonstrated that this difference was statistically significant for both men and women undergraduate engineers. However, these findings are not in line with existing, though limited, research on uncivil treatment in the workplace in which top-down incivility occurs more often (Lim & Lee, 2011; Pearson & Porath, 2009). Perhaps the workplace and academic contexts, although similar, are not interchangeable as Caza and Cortina (2007) have suggested, hence contradictory findings regarding primary source of uncivil treatment in an academic setting. Exploratory findings also indicated that women and men reported similar levels of uncivil treatment from other students (i.e., lateral incivility) and from faculty or staff (i.e., top-down incivility). In the current study, women and men reported experiencing similar levels of uncivil treatment in engineering, a finding that diverges from previous theory (i.e., selective incivility; Cortina, 2008) and past research in a workplace context (Cortina et al., 2013; Miner et al., 2014). This research was conducted in an academic setting, perhaps offering a potential explanation for results that differ from theory and findings based in a workplace context.

Given the chilly and sometimes hostile environment that women can experience in engineering (Blickenstaff, 2005; Gill et al., 2008; Wyer et al., 2013), another possible explanation for the finding that women and men reported experiencing similar levels of uncivil treatment could be that women may be desensitized to subtle, rude behaviors experienced in a predominantly male field that is stereotyped as masculine (NSF, 2015; Saucerman & Vasquez, 2014). Women may expect to experience some uncivil treatment in engineering given their minority status and stereotypes about their belonging (Blickenstaff, 2005) and competency in the field (Gill et al., 2008), whereas men may not. In addition, women could experience more uncivil treatment in engineering than men, yet could still report experiencing similar levels of incivility as men due to differing perceptions of what constitutes as uncivil treatment and what does not.

Results indicated that incivility influenced engineering fit differently for men and women. Unexpectedly, men's perceptions of the compatibility of their engineering knowledge and skills held and the knowledge and skills needed as an engineering major (i.e., engineering fit) were negatively impacted when they experienced uncivil treatment, whereas incivility did not influence women's engineering fit. Men may not expect to experience incivility and may not be prepared for this behavior in a male-dominated and masculine-typed field in which men's competency is often assumed (Gill et al., 2008). On the other hand, women may be more resilient when it comes to uncivil treatment in a field in which they could expect to experience some incivility or have already experienced uncivil treatment in engineering prior to entering the engineering program (Blickenstaff, 2005).

As expected, uncivil treatment served as a barrier to developing connections with others (e.g., faculty, peers) and activities in engineering (i.e., engineering links) for both men and women. Findings did not support the hypothesized gender moderation, however, as incivility was equally detrimental to engineering links for both men and women. Thus, it appears that women's interpersonal relationships and connections with engineering activities were not incrementally negatively impacted by rude behaviors in a predominantly male field in which women may already feel isolated and excluded (Wyer et al., 2013). On the other hand, participants were first-year students and presumably have few connections upon entering the program. As such, developing friendships and connecting with activities in engineering may be more important at the start of the college career than in later years, regardless of rude encounters students may experience in engineering.

Finally, incivility did not significantly impact engineering sacrifice for men or for women. As these students had only completed one semester of college at the time of the survey, it is likely that freshman students have limited sunk costs and inadequate time to invest in their engineering majors (e.g., class time, tuition). Further, the prestige associated with an engineering major (i.e., engineering sacrifice) may not be as important for first-semester students as it is for more tenured students. Beneficial outcomes of being an engineering major such as having a career in a prestigious field are also potentially less tangible for first-semester engineering students as they have several years in the program before these outcomes can be realized. In addition, first-semester students may not experience enough subtle, rude behaviors to counteract the amount of time, effort, and finances they have invested in their engineering majors.

Limitations

Several limitations existed in the current study. First, according to power analyses conducted prior to data collection, there was not enough power to detect small, existing effects with the hierarchical moderated regressions due to a limited sample size, an issue commonly experienced with moderated regression analyses (Aguinis et al., 2001). Although gender significantly moderated the relationship between incivility and engineering fit, it is important to note that power to detect other small, potential effects was limited. Second, the sample was comprised of first-semester engineering students. As such, students had a limited amount of time to encounter uncivil treatment as well as develop embeddedness in engineering. Third, generalizability of results may also be limited to other male-dominated, male-stereotyped undergraduate majors, if not solely undergraduate engineering majors, due to a very specific sample. Fourth, this project was part of a larger project in which variables of interest were previously determined. Therefore, the current study had a limited amount of space in the survey such that some common variables of interest in incivility research, such as well-being (Caza &

Cortina, 2007; Clark, 2008b), could not be examined. Finally, given the time frame of the larger project, retention data were not available to examine in conjunction with the current model.

Future Research Directions

The current study began to explore incivility as a barrier to engineering embeddedness and examined how gender influenced this relationship. Thus, future research can go in several directions. First, exploratory results regarding whether students experience more lateral or top-down incivility were preliminary. Future research can expand on whether engineering students experience significantly more lateral incivility, relative to top-down incivility, and how the source of incivility influences engineering embeddedness. Research examining the primary source of uncivil treatment is limited (Schilpzand, De Pater, & Erez, 2016) and efforts should be made to further understand how the primary source of incivility can impact variables commonly studied in relation to incivility (i.e., well-being, satisfaction, turnover/turnover intentions; Schilpzand et al., 2016; Summers et al., 2009). Second, given the relatively surprising result that women and men experienced similar levels of uncivil treatment in engineering, future research should attempt to replicate this finding and explore the specific conditions for which this is the case. For example, targets of incivility may be different in an academic context, compared to a workplace environment. Future research can also examine gender differences in experienced incivility in other predominantly male and male-stereotyped fields to see if the current findings hold in similar contexts.

Third, a considerable amount of research has yet to be completed on incivility over time, especially within an engineering context (Summers et al., 2009). As first-semester engineering students have had a limited span of time in which they may have encountered uncivil treatment during college, the relationships examined may change as students progress through the program, are exposed to more incivility, and become more embedded in their majors. The amount of experienced incivility reported may change at different points along the program (i.e., as sophomores, juniors, or seniors). Gender differences in experienced incivility could also change over the course of the program. Furthermore, as students advance through the engineering program, their levels of embeddedness may change in addition to incivility. As such, future research should examine if incivility serves as a barrier for developing engineering embeddedness among students at different times in the engineering program. For example, engineering sacrifice will likely increase later on in the engineering program when students have spent more time, energy, and resources on their engineering major, compared to first-semester students. As incivility did not influence first-semester students' engineering sacrifice in the current study, it would be interesting to see if this relationship was replicated among students with higher levels of sacrifice farther along in the engineering program. Finally, as both incivility and embeddedness are predictors of persistence (Clark, 2008b; Major et al., 2015), future research should examine whether embeddedness mediates the relationship between incivility and persistence in one's engineering major.

Conclusion

Overall, the current study contributes to the STEM literature by examining novel relationships between factors that may impact persistence in engineering. Overall, embeddedness theory was successfully applied to an undergraduate engineering context, and incivility was shown to influence fit and connections with one's engineering major. Results demonstrated that uncivil treatment served as a barrier to developing first-semester engineering embeddedness in terms of fit and links. Although men and women were found to experience similar levels of incivility in engineering, the current study identifies some gender similarities and differences in whether incivility serves as a barrier to developing embeddedness. For men, incivility negatively impacted both engineering fit and links, while incivility negatively impacted only engineering links for women in their first semester of an engineering program. Future research should build on this foundational research to examine embeddedness as a potential mediator between incivility and persistence in one's engineering major.

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APPENDIX A

ENGINEERING EMBEDDEDNESS

Engineering Fit

1. The way I think fits well with engineering.
2. I have the right skills and abilities for engineering.
3. I am well suited for engineering.
4. I thrive on the challenge engineering offers.
5. Engineering is my passion.

Engineering Links

1. I like that people in engineering think the same way I do.
2. My professors make me feel more connected to engineering.
3. I feel well understood by other engineering students.
4. I try to bring other people into the engineering community.
5. I enjoy being around other students in engineering.

Engineering Sacrifice

1. Because I'm in engineering, I am likely to have a good career.
2. I take a great deal of pride in being an engineering student.
3. I've invested a great deal in my engineering major.
4. I stand out from others because I'm in engineering.

Note. From Major et al. (2015). Response scale ranges from 1 (*strongly disagree*) to 5 (*strongly agree*).

APPENDIX B

ENGINEERING INCIVILITY

1. Paid little attention to your statements or showed little interest in your opinions.
2. Doubted your judgment on a matter.[a]
3. Gave you hostile looks, stares, or sneers.
4. Addressed you in unprofessional terms, either publicly or privately.
5. Interrupted or "spoke over" you.
6. Rated you lower than you deserved on an evaluation.
7. Yelled, shouted, or swore at you.
8. Made insulting or disrespectful remarks about you.
9. Ignored you or failed to speak to you (e.g., gave you "the silent treatment").
10. Accused you of incompetence.
11. Targeted you with anger outbursts or "temper tantrums."
12. Made jokes at your expense.

Note. Adapted from (Cortina et al., 2001). Response scale ranges from 1 (*never*) to 5 (*many times*). [a] Item changed for this study. Participants who responded with any response other than *never* were asked to indicate the status of the primary instigator of each uncivil behavior (e.g., students, staff, or professors).

APPENDIX C

VARIABLE FREQUENCIES

Table 5

Frequency of Participant Responses for all Study Variables

Variable	Frequency of Participant Responses (in percentages)			
	0	1		
Gender	74.2	25.8		
Race/Ethnicity	70.8	24.4		
Wave	59.1	40.9		
	0 to .99	1 to 1.99	2 to 2.99	3 to 4
GPA	.2	4.5	27.8	67.6
	1 to 1.99	2 to 2.99	3 to 3.99	4 to 5
Incivility	90.7	5.1	.6	.1
Engineering Fit	1.1	3.3	34.9	60.6
Engineering Links	1.1	10.2	52.4	36.3
Engineering Sacrifice	.6	2.5	35.0	61.8
	0 to 2	3 to 5	6 to 8	9 to 12
Lateral Incivility	71.2	23.7	3.8	1.3
Top-Down Incivility	91.7	7.0	1.3	.1

Note. *N* = 1033 (267 = women, 766 = men). Gender coded 0 = men, 1 = women; Race/Ethnicity coded 0 = Caucasian or Asian students, 1 = underrepresented minorities; Wave coded 0 = Fall 2016, 1 = Spring 2017. GPA = Fall semester grade point average on a 4-point scale. Response scale for Incivility ranged from 1 (*never*) to 5 (*many times*). Response scale for Engineering Fit, Links, and Sacrifice ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Lateral and Top-Down Incivility scores could range from 0 to 12.

VITA

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Katelyn R. Reynoldson received her Bachelor of Arts degree in Psychology from the University of St. Thomas, St. Paul, MN, in 2015. There, she managed research labs for two of her psychology professors, presented multiple projects at national research conferences, and received the Dr. Ward M. Winton Outstanding Psychology Major Award. In 2015, she received the Dominion Graduate Scholar Award upon acceptance into the Industrial and Organizational Psychology Doctoral Program at Old Dominion University. She has presented her research at professional conferences and continues to work on applied research projects during her classes. Her research team received the 2018 Organization Hero Within Award from the Combat Wounded Coalition for completing a training needs assessment and evaluation of an intensive leadership training program meant to facilitate the successful transition of wounded veterans from military to civilian life.