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ORIGINAL ARTICLE

Professors' Behaviors and Attributes that Promote U.S. Women's Success in Male-Dominated Academic Majors: Results from a Mixed Methods Study

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Abstract High rates of attrition of women from male-dominated academic majors may stem from both individual-level personal attributes (e.g., lower confidence in skills; Sax et al. 2015) and non-supportive environmental factors (e.g., chilly climate; Blickenstaff 2005; Hill et al. 2010). Grounded in social cognitive career theory (Lent et al. 1994), the present study utilized a mixed methods approach to identify faculty behaviors and attributes that support women in male-dominated majors and help to prevent attrition. In Study 1, data from eight focus groups involving 23 senior women in male-dominated majors at a mid-sized U.S. Midwestern university were coded to identify common themes exploring why certain professors' behaviors/attributes are useful to women in male-dominated majors. Results indicated that professors' behaviors led to learning experiences that helped women create personal connections within departments and provided them with department or career-related information as well as opportunities to gauge/demonstrate their skills to combat the idea that they fit the incompetent-woman stereotype. In Study 2, survey data (n = 65) examined professors' support, academic advising time, and percentage of female faculty within a department as buffers against the negative effects of sexism on women's academic achievement, physical health, and social belongingness. Sexist events in the department were associated with women's reduced sense of belonging, but academic advising time served as a buffer of this association. Overall, our results indicated that proximal environments are important and that professors' behaviors that support women without singling them out were most helpful.

Keywords Women in male-dominated majors · Professor behaviors · Career development · Sexism · Women's achievement · Mixed methods

Despite efforts to increase young women's interests in male-dominated fields such as science, technology, engineering, and math (STEM), there continues to be a dearth of women entering these fields and high rates of attrition experienced by women who do enter (Hill et al. 2010; Smith 2011). Diversity in these fields is crucial because diversity experiences have been demonstrated to contribute to more positive learning experiences within universities (Bowman 2010) and cognitive growth and increased complex thought for all students (Pascarella et al. 2014). In addition, diversity is needed for societal-level reasons: Gendered occupational segregation is economically inefficient and is a large contributor to the gender wage gap (Hegewisch et al. 2010). Thus, increasing women's participation in male-dominated fields (fields with higher pay, on average) has the potential to reduce this gap (Hill et al. 2010).

Researchers have identified possible individual-level contributors (e.g., women may have lower confidence in skills required in male-dominated careers; Sax et al. 2015) and non-supportive environmental contributors (e.g., women often report a "chilly climate," including experiences of sexist events; Blickenstaff 2005) to the low numbers of women pursuing these fields and high rates of women's attrition. However, less research has examined components of environments that *support* women in these fields and help to *prevent*

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attrition from occurring. Therefore, the present study utilized both qualitative and quantitative methods to better understand departmental experiences—particularly those associated with faculty behaviors and attributes—that may serve as protective factors and help women persevere throughout their college education in a male-dominated major.

Why are Women Dropping Out?

Social cognitive career theory (SCCT) describes how personal attributes, external environmental factors, and overt behaviors interact to influence career development, which includes academic interests, choices, and performances. Personal attributes include cognitive and affective states and physical characteristics, including self-efficacy (i.e., beliefs about personal capabilities), outcome expectations (i.e., beliefs about outcomes after performing particular behaviors), and personal goals (Lent et al. 1994, 2002). Supporting this theory, personal attributes have been found to predict individuals' career interests, persistence, and performances, including among women in male-dominated fields (see Lent et al. 2002, for a review). For example, Lent et al. (2005) found that self-efficacy and outcome expectations predicted women's interest in engineering among students enrolled in introductory engineering classes.

Although personal attributes are important to consider when researching ways to help increase the rates of women in male-dominated fields, SCCT also acknowledges that environmental factors play an important role in career development. As Byrne (1993) argued, if a plant does not grow in a garden, we investigate the soil, water, sun, and fertilizer as the culprits rather than first blaming the plant. Proximal external factors include components of the environment, such as professors in male-dominated majors, that are salient during the career development process. According to SCCT, professors may be particularly important because they are socializing agents who have the potential to indirectly influence two important components of personal attributes—self-efficacy and outcome expectations—through their behaviors and the learning experiences they provide for students (Lent et al. 2002).

Research has found that teachers/professors may play a role in women's attrition from male-dominated fields by providing women fewer opportunities and/or less encouragement, which ultimately has negative implications for self-efficacy development (Lent et al. 2002). For example, there is evidence that young women and men are treated differently by teachers in high school math classrooms, such that male adolescents often receive more support and interact with teachers more than female adolescents do (even when there are no differences in efforts by students to initiate interactions; Ceci et al. 2009). Other experimental research has found that science professors may discriminate against female applicants applying to work as a laboratory manager, with faculty offering more career mentoring to the male applicant and rating the male applicant as more competent and hireable, compared to the female applicant (Moss-Racusin et al. 2012). With less support and fewer opportunities to interact with teachers/professors, women may be at a disadvantage when developing important personal attributes in the career development process, such as self-efficacy.

Professors in the proximal environment have implications for other cognitive-person variables beyond self-efficacy, such as the feeling of belongingness. Professors in male-dominated departments may include structural components and materials in their lectures, classrooms, or offices that may inadvertently send women the message they do not fit in the environment, thus leading to a lower sense of belonging in the field. For example, Cheryan et al.'s (2009) work on ambient belonging found that a relatively simple change in a computer science classroom's appearance (changing a Star Trek poster and video games to a nature poster and phone books) boosted women's identification with computer science and interest in the major.

Factors Supporting Women in Male-Dominated Fields

Although research has identified environmental components that may lead to attrition, less research has focused on supportive contexts that help to *prevent* attrition from occurring. SCCT also asserts that supportive components of the proximal environment, such as supportive and engaged faculty within departments, may influence the career choices and development of women in male-dominated fields, either directly or indirectly through personal attributes (Lent et al. 1994, 2000).

The studies that have focused on positive environmental factors as contributors to women's career choices have primarily utilized qualitative methods of inquiry and intervention research (Bilimoria and Lord 2014; Fisher and Margolis 2002; Mathis 2008; Tsui 2010; Walton et al. 2015). For example, Tsui (2010) conducted 110 interviews and 25 focus groups from six universities that have a high retention rate of women in engineering to examine department-level aspects that have promoted positive attitudes, behaviors, and motivation for women. Results from Tsui's research have shown that professors' behaviors, such as demonstrating encouragement, support, and reaching out to students, had positive implications for personal attributes—particularly feelings of belongingness in the department. Women also reported that professors' choices in types of learning experiences, both inside and outside the classroom, had implications for feelings of social belongingness. Women in engineering reported that group

projects and lab work increase cohesion for people in the major and create peer friendships through collaboration (Tsui 2010). Moreover, other qualitative research conducted using computer science majors has found that professors' use of inclusive class examples that included ideas outside the stereotype for these majors made women feel more included because it allowed women to see themselves as fitting in (Fisher and Margolis 2002).

Current Studies

To test the tenets of SCCT, which assert that personal attributes, external environments, and overt behaviors are all interconnected and have implications for career-related interests, choices, and performances of women in male-dominated majors (Lent et al. 2000), the current set of two studies includes both qualitative (Study 1) and quantitative (Study 2) research methodologies. More specifically, Study 1 aims to better understand the connections between professors' behaviors and attributes with women's personal attributes. Our goal in Study 1 is to analyze focus group data from U.S. women in male-dominated majors to identify how professors' behaviors and attributes may have positive implications for women's personal attributes and career-related interests, choices, and performances.

Our second study aims to better understand the interconnections between components of the proximal environment, particularly both non-supportive and supportive components, and how these interconnections may influence personal attributes and performance in male-dominated majors. In particular, professors' behaviors have the potential to buffer women in male-dominated majors from one commonly reported negative proximal environment factor: sexism (Steele et al. 2002). These female students' experiences of sexism may have negative implications for women's personal attributes and career-related decisions given the research illustrating sexism's far-reaching effects. Specifically, sexism has been associated with women's decreased academic performance (Dardenne et al. 2007; Koch et al. 2014; Steele 1997), physical health (Fitz and Zucker 2015; Pavalko et al. 2003; Salomon et al. 2015; Townsend et al. 2011; Zucker and Landry 2007), and social belongingness (Fischer and Holtz 2010; Swim et al. 2001). Thus, as supported by SCCT, supportive professors' behaviors and attributes may be able to help buffer the negative effects of sexism on women's personal attributes and performance. Our goal in Study 2 was to utilize survey data to quantitatively examine whether faculty behaviors and attributes (namely professors' support, academic advising time, and the percentage of female faculty within a department) act as buffers against the negative effects of sexism on the academic achievement, physical health, and social belongingness of U.S. women pursuing male-dominated majors.

Study 1

Grounded in SCCT (Lent et al. 1994), the goal of our first study is to better understand If (and how) professors' behaviors and attributes may have positive implications for women's personal attributes and career-related interests, choices, and performances, ultimately helping these women make it to their senior year in college. As previously described, past research has found that professors' behaviors have implications for women's feelings of social belongingness in STEM majors such as engineering and computer science (Fisher and Margolis 2002; Tsui 2010). In Study 1, we utilize focus group data to build upon past research by including women from multiple male-dominated majors, including majors that have not been considered in past research.

Specific professor behaviors and attributes that women across majors find helpful are likely to differ due to variations in their day-to-day experiences and expectations (e.g., writing code in Computer Science vs. shadowing an Athletic Director in Sports Administration). The reasoning behind *why* these professor behaviors and attributes are helpful, however, may be similar—especially in terms of how they are perceived to impact specific components of SCCT: personal attributes, career-related interests, choices, and performances. For example, if we find that women across majors identify professors' behavior and attributes that influence a specific personal attribute (e.g., social belongingness), we have more confidence that this personal attribute may have important implications for women in a range of male-dominated majors, not just STEM-related majors (the most commonly researched). This information has the potential to provide insight into ways that a variety of male-dominated academic departments may be able to help foster the development and success of women.

Method

Participants and Procedure

Participants included 23 female seniors in male-dominated majors at a mid-sized, Midwestern university in the United States. Majors were considered to be male-dominated if at least two-thirds of students nationally and within the department at the university were men (National Center for Education Statistics 2014). Majors included computer science (number of people in sample from this major = 6, 26.1% of the sample), computer technology (1, 4.3%), economics (3, 13.0%), finance (6, 26.1%), music media production (4, 17.4%), and sports administration (3, 13.0%). Researchers sent targeted, weekly recruitment emails to seniors for 7 months (66 names and emails provided by the Office of Institutional Effectiveness) because the researchers felt they would be best equipped to provide rich data to answer the question: "What environmental factors helped prevent

attrition from a male-dominated major?" Women less advanced in their undergraduate career were less likely to have environmental experiences upon which they could draw, and women who had few positive experiences were more likely to drop out by senior year, allowing us to focus on what works as opposed to what does not work.

Women interested in participating replied to the email to schedule a time to meet for the focus group. A total of eight focus groups were conducted with 23 people (2 to 4 participants per group). Researchers have recommended differing sample sizes for phenomenological qualitative research. For example, Creswell (2013) recommends between 5 and 25 participants for phenomenological research, and Morse (1994) recommends at least 6 participants. Other researchers argue that sample size should be informed by coding saturation (i.e., the "point in data collection and analysis when new information produces little or no change to the codebook"; Guest et al. 2006, p. 65). Results of research by Guest et al. (2006) found that data saturation occurred after coding 12 interviews, with further coding resulting in very few modifications to themes. Therefore, coding 23 people is expected to be adequate to identify the main themes associated with our research question.

Interviews lasted between 40 and 75 min (with a majority of focus groups approximately one hour long). After completing the focus group, participants completed an online survey that contained demographic items along with items regarding departmental contexts, everyday experiences, health, achievement, and career aspirations. (These data were utilized in Study 2.) Participants were compensated $30 for study participation. On average, participants were in college for 3.85 (*SD* = .75, range = 3–6) years and were 21.14 (*SD* = .57, range = 20–22) years-old. A majority of participants was also completing at least one minor (15, 65.2%). A total of 18 (78.3%) identified as White, 3 (13.0%) identified as Black, 2 (8.7%) identified as Asian, and 1 (4.3%) didn't report race/ethnicity. Seven (30.4%) reported having double-majors, and 9 women (39.1%) reported switching majors.

Focus Group Questions

The focus group consisted of a semi-structured interview. Items were developed to better understand experiences, particularly departmental experiences, that have helped women succeed in male-dominated majors. (The full interview items can be found in an online supplement.) Prior to starting the interview, participants were told that we were interested in learning more about experiences that have helped them succeed in their major (defined as making it all the way to their senior year). They were also encouraged to think specifically about what helped them as a female student in a major dominated by men. Participants were then asked a number of open-ended, general questions to start the conversation (e.g., "Can you describe any experiences, events, or overall thoughts about how professors in your department have helped you, as a woman, succeed in your major?") and more specific questions grounded in past research. For example, we specifically asked participants about their experiences with female professors (e.g., "Do you believe that having more female professors in your department would help female students? Why or why not?") because past research has identified female mentorship as possibly being beneficial for women in male-dominated majors. We also included an open-ended question allowing participants to voice their opinions on adjustments they feel would be helpful for future women (e.g., "Are there changes in the class atmosphere that you believe would help women in your major?").

Coding and Interpretation

The present phenomenological research study (Creswell 2013) was designed to describe commonalities among the experiences of women in male-dominated majors in college, with a focus on underlying reasons why experiences are viewed by these women as beneficial to their success in their programs. In order to examine common themes among the women, two researchers analyzed transcribed interviews for significant statements and meaning units. This process unfolded in several steps, based on recommendations by Creswell (2013). The researchers independently read through the transcripts several times to obtain a general feel of the interviews and to identify statements (phrases or sentences) that reflected the overall experience of being a woman in a male-dominated major with an emphasis on factors and experiences that these women felt helped them make it all the way to their senior year of college.

To reduce a large amount of data to meaningful units, recommendations by Miles and Huberman (1984) were followed. Significant statements were highlighted, allowing the researchers to group common experiences to reduce data (which was aided with a coding sheet). For example, the researchers noticed that many women reported that one-on-one, academically-related experiences and when professors reached out on a personal level were helpful. Significant statements, sentences, and tallies of participants discussing these common experiences were entered into the coding sheet separately by two researchers for the first focus group and then were discussed together. After reducing the data, researchers were able to identify and code for themes about why these common experiences were helpful. The two researchers coded all transcripts independently and discussed.

Results

Additional information about each woman quoted can be found in Table 1, and an overview of themes and their descriptions can be found in Table 2. It is important to note that when

Table 1 Participants' information, study 1

			Professors' behavior and attributes			Female faculty		Classroom techniques		
Pseudonym	Major	Focus group	Form personal connections	Resource of info	Seek help outside of class	Female faculty views[a]	Engaged in Backlash	Form personal connections	Career experience	Skills
Alexis	Music Media Productions	5	Yes	No	Yes	Yes	No	Yes	Yes	Yes
Ann	Computer Science	1	No	Yes	No	Yes	No	No	No	No
Anna	Finance	2	No	No	No	Yes	No	Yes	No	No
Ashley	Economics	3	Yes	No	Yes	Yes	Yes	Yes	No	No
Brooke	Sports Administration	1	No	Yes	No	Yes	No	Yes	Yes	Yes
Elena	Finance	8	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Emma	Computer Science	5	Yes	Yes	No	No	No	Yes	Yes	Yes
Grace	Sports Administration	7	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Haley	Finance	4	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Janelle	Music Media Productions	7	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Jordan	Computer Science	4	Yes	No	No	Yes	No	Yes	No	Yes
Kate	Music Media Productions	5	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Kelly	Sports Administration	2	Yes	Yes	Yes	Depends	Yes	Yes	Yes	Yes
Keri	Economics	6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kiwi	Finance	4	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Liz	Finance	3	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Madison	Music Media Productions	2	No	Yes	No	Depends	No	No	No	No
Maggie	Computer Science	1	Yes	Yes	Yes	Yes	No	No	No	No
Sarah	Finance	8	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Shirley	Computer Technology	4	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Sophie1	Computer Science	2	Yes	Yes	Yes	Depends		Yes	No	No
Sophie2	Computer Science	7	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Susan	Economics	6	Yes	Yes	Yes	Depends	Yes	Yes	Yes	Yes

Whether or not each participant discussed/agreed with one of the themes (see Table 2) are indicated in the table

[a] Participants were asked whether or not having more female faculty would benefit female students. Elaborations were given in the focus group afterwards. Participants picked their own pseudonym

women described positive experiences, there were two recurrent overall themes in all focus groups: women feared that others might feel that they were getting special privileges due to gender and worried about fitting the stereotype of the "incompetent woman." As one participant, Brooke, succinctly stated: "I have to be smart because the stereotype is that I'm not." These prominent themes will be discussed and illustrated in the following sections.

Professors' Behaviors and Attributes

Overall, women were quite positive about some of the professors in their departments, noting that it was clear that they valued diversity and were dedicated to and enthusiastic about their jobs. In fact, all of the women reported that the faculty they felt were most approachable helped them make it all the way to their senior year. A majority of the helpful behaviors of professors served one of three purposes, described in the following.

Personal Connections Many women placed importance on getting to know professors on a more personal level, stating that it allowed them to realize that "They're not just these doctors with PhDs, they're actually real people" (Grace) and to feel more connected to and respected by their majors. Shirley stated: "I think when they're more personable, it does make a difference. You're not just a number anymore. You're a person and they know that and they treat you like that, and that helps a lot."

Table 2 Emergent themes, study 1

Theme purpose or views	Description
Professor behaviors & attributes—purposes:	
Forming personal connections with professors	Participants described professors' behaviors and attributes that allowed them to form more personal connections with professors (e.g., saying "Hi" on campus), which helped them feel more connected to their major and comfortable asking questions.
Resource of department or career- related information & networking	Participants viewed professors as knowledgeable about both the major and careers in the field, and they found it helpful when professors shared this information (e.g., forwarding emails about graduate school programs).
Provided opportunity to seek help outside of classes	Participants reported that professors' behaviors that provided opportunities to ask questions outside the classroom (e.g., office hours) helped them comprehend material. Many women found that asking questions in class was particularly anxiety-provoking because they feared playing into the "incompetent woman" stereotype.
Views on female faculty in their department:	
Positive views on hiring new faculty	Participants described reasons they felt it would be beneficial to women in the major to hire more female faculty.
Negative views on hiring new faculty	Participants described reasons they felt it would *not* be beneficial to women in the major to hire more female faculty.
Backlash	Participants reported negative views of the female faculty in their department (either their own views or the views of their peers).
Classroom techniques: Preference for hands-on and interactive activities—purposes:	
Form connection with peers and professors	Participants described how hands-on and interactive activities served as an "ice-breaker" with male peers and an opportunity to learn how to communicate effectively with them, provided a safe space to ask questions, increased their sense of social belonging, and connected them to peers who were often later used as informational resources (e.g., texting about upcoming exam). Participants also described how interactive activities allowed them to interact more with professors (e.g., back-and-forth dialogue about project), which often led to higher levels of comfort with them.
Obtain career-related experience	Participants stated projects helped them learn more about jobs in the field and increased their interest in the field.
Opportunity to gauge and demonstrate skills	Participants described how hands-on activities allowed them to prove to both themselves and their peers that they do not fit the "incompetent woman" stereotype.

Although many of the professors' behaviors participants described seem inconsequential, participants felt that these behaviors had a major impact on their level of comfort in approaching professors with questions related to the major or the field in general. Example behaviors reported included saying "Hi" and recognizing students around campus, making jokes during class, remembering something about a student's personal life from a previous class (which illustrated the professor was paying attention), starting small conversations prior to class that may interest students in the major (e.g., football in a sports administration major), and using the first day of class to get to know the students (e.g., asking why students chose the major). In addition, several students mentioned how much they appreciated it when professors tried to learn students' names, citing several benefits:

> I appreciate the professors who get to know you by name. I have had specific econ professors who have made a conscious effort to know everybody's name in the class or almost everybody's name in the class, that makes it much more of a discussion even if it's a class of 35, 40 people. And right now I'm in a class that only has like 10 but the professor knows everybody's last names. He calls us by our last names, and that has made it easier I think to just get to know everybody else and then feel like you are being called out as an individual. (Susan)

> He [the professor] made a conscious effort to, like, get to know everybody's names so when he called you out in class, everybody else knew who you were so it was one of those things like you're not only building the

> relationship with them and I don't think they realize it too that when they are getting to know you interactively in class you're getting to know everybody else in class which is nice because in the future you might have class with them again. And that's always helpful when you don't know anybody in the class and it's like well we had that one class together so just building those relationships and networks with the other students. (Keri)

Resource of Department or Career Information and Networks Many women reported that they really appreciated when professors relayed information to them about the department and/or career field in general, such as briefly relaying information in the hallway about clubs and meeting times. Forwarding emails about graduate school programs, internship opportunities, scholarships, and job positions were commonly reported (and appreciated) by the women, with many noting that forwarding more personalized information (e.g., a job the professor felt fit well with her interests) illustrated that many of the faculty got to know the students at a more personal level. Many women recognized the importance of networking and were very appreciative when professors provided opportunities for these experiences. For example, one student (Kelly) reported going on a trip to a job conference with several other students and a professor. The professor initiated conversations between potential employers and the students, and all of them were offered either an internship or job afterwards. This networking opportunity may be particularly important for women, as noted by Kelly: "I think they [the professors] kind of understand that it's harder for us, you know, women to be able to get into the industry and so they have always given us connections or anything like that and helped."

Providing Opportunities for Students to Seek Help Outside Class Many women feared playing into the "incompetent women" stereotype and thus reported that asking questions in class was quite intimidating.

> I hate asking questions, I feel like I have to try so hard to like, never make—let them think that I'm dumb in any way—like I feel like I'm always like super stressed. Like If I have to go write something on the board… way more stressed in my computer science classes that I have to make sure it's right than any other class. Normally I wouldn't care, but I'm like the woman that has to. I have to be smart because the stereotype is that I'm not. (Brooke)

Across majors, many women reported that having opportunities to ask for help outside of class was extremely helpful and often led to improved comprehension of materials and reduced anxiety. Where this opportunity occurred, however, differed depending on the unique demands of each major. For example, in economics and finance majors, office hours were commonly reported as being extremely beneficial for women, particularly when they were working through homework assignments. Students in computer science and music media production, however, reported that having communal spaces such as lab spaces where students worked and faculty would sometimes be available was extremely helpful and allowed for additional opportunities to clarify difficult material, without fear of others judging a question as "stupid." Other opportunities such as tutoring/study sessions and open-door policies of faculty were also noted by women.

Views on Female Faculty

Students were quite mixed in their views on female faculty, with only 15 (65.2%) agreeing that having more female professors in the department would benefit female students. Women for this initiative cited that female faculty would serve as models and it would be encouraging for women in the major to know that they can also succeed and obtain a prominent/leadership position.

> Well it's nice to see someone else in your field and they have succeeded so, and now they're teaching it, that they know the subject so well that now they can teach it to a university level. That's more encouragement I think for females to say "Hey she's up here, in a mostly male dominated area, and she seems to be standing on her own two feet just fine." And I see when the other male instructors come in and talk to her it's always with respect, I mean you can see the camaraderie, it's not like "Oh she's a female we need to alienate her." They seem to come and talk to her all the time wanting advice and this is how we should do this. They're always wanting her opinion on something. So I guess seeing her success in the area gives us a little more encouragement to know that we're gonna be accepted, too. (Shirley)

Women also mentioned that it may be beneficial for individuals outside the major to see female faculty in the department.

> …but for the incoming students, especially the ones that take a school tour of the studios. I see a lot of people taking a tour of the studios and sometimes they see ongoing classes, and of those students, I see like a few females in there. But whenever I see them, it's typically myself and maybe one other person, some other woman in that class. And I think maybe subconsciously, it affects them. (Janelle)

Some women noted that it may be more comfortable to talk to and form a connection with someone who has gone through a

similar experience (i.e., being a numerical minority). Women reported that female professors may be more likely to recognize the needs of female students and less likely to bring up discouraging information, such as high rates of women's attrition from the major in an Introductory class, and may be more likely to keep the classroom environment in check because at times male peers can (sometimes unknowingly) say uncomfortable things in class. Another student noted that she took a career development class with a female professor and felt she got much more out of it, compared to men in the class, due in part to the fact that the professor was more knowledgeable about women's issues (e.g., what to wear to an interview).

Finally, women reported that having a female faculty member may benefit their male peers, too, and help to defy the stereotype of female incompetence.

> I think that it would [help having more female faculty] because um you know the male students that will be going into the field will already get used to having a female that is in a higher authority position than they are… (Kate)

Importantly, many women supportive of having more female faculty also mentioned that it is important to consider social identities outside of gender, specifically noting that having more Women of Color as professors is important.

> So I think it would help. Especially if–Especially if we had a Woman of Color, I think that would help sooo much. With the encouragement. Because when I came to the program, there were maybe three Black women. Now there's two. That I know personally. [It] has made it harder for me, mentally, to make it through this program. (Janelle)

Several arguments, however, were also made against the inclusion of more female faculty. Five students felt that there was no need to recruit more female faculty given their positive experiences or lack of issues with male professors, or they argued that the knowledge and skills of the instructor were more important than gender. Four students reported the importance of hiring competent women, not just any woman, because they feared that an incompetent woman would fit the stereotype and have the potential to negatively impact students' views of women in the field. Interestingly, one student reported that she feared female faculty would not get the same respect as men, whereas seven women openly expressed their own negative views of female faculty, and five women reported that other students expressed negative views of female faculty, illustrating "backlash" literature that describes how women in male-dominated fields are often disliked and viewed in negative terms (Rudman and Phelan 2008).

In the current study, participants described female faculty less likable, less considerate, colder, overly strict, too detail-oriented, more uptight, jealous of other successful women, lacked clear grading structures, more judgmental, and less knowledgeable. Elena stated: "I've had female professors who are there because they needed to fill their quota for how many females are in the department… they were probably some of the worst professors I've had because they weren't as knowledgeable." Some female professors were described as hard to connect with and less supportive, compared to male faculty. Kelly stated: "I almost kind of think that sometimes it's hard for them to know another female is kind of encroaching on them, who may have more experience or something like that, even it's just a student." Even though women engaged in backlash, some acknowledged that this may be due to societal norms. As Elena wisely noted, "Successful women, at least in my view, are very—society is afraid of them in almost a way."

Classroom Techniques: Preference for Hands-on and Interactive Activities

During focus groups, a general theme emerged across majors noting that women enjoyed hands-on and interactive activities, such as group/applied projects, which many reported were easier to do in smaller classes. Women cited three main reasons for this preference.

Form Connections with Peers and Professors Women described interactive and hands-on activities as the ice-breaker that allowed them to form connections with their peers. They reported that hands-on activities requiring students to interact led to peers asking general questions about the women as individuals, inviting them to get together on the weekend, bonding through (sometimes) difficult projects and remaining friends after the class, and exchanging phone numbers and text messages about classes. Participants also reported that these experiences helped them learn to be outspoken and communicate with male peers. As stated by Keri: "It's definitely helped my communication skills with males and almost kind of like figuring out icebreakers for them and how to kind of get to know them and just figuring out like how they work."

These peer connections were described as being extremely important to the women because they increased women's sense of social belonging, and they were often cited as informational resources (e.g., discussing how to study for an exam). This seemed to be particularly important for women, given that many reported feeling uncomfortable asking questions in large groups and because it provided a "safe place" to ask questions without worrying that their male colleague will believe that a woman is making romantic advances.

The women reported that interactive and hands-on activities, particularly those in smaller classes, also provided opportunities to form closer connections with professors. For example, assigning handouts where there is a back-and-forth interaction between students and professors (i.e., student works on

the handout, gets feedback, and tries again), discussing paper ideas with professors, and discussion-based classes where professors use students' names were reported as activities that led more women to feel comfortable to ask questions in class. Participants attributed this increased comfort to feelings of a more personal, less intimidating connection with professors.

Obtain Career-Related Experience Many of the helpful classroom-related experiences that women reported were also likely to benefit all students. For example, women reported that assignments that helped them learn about more jobs in the field (e.g., having to attend a career fair, volunteer requirements, job shadowing a professional in the field, immersive learning projects, and/or applied projects that were highly connected to the "real world") allowed them to gain a better understanding of the types of jobs available after graduation and increased their interest in the field. For instance, Elena reported that a company analysis assignment resulted in a professor emailing the company the students' results. The CEO of the company responded, and Elena reported the project increased her interest in the field. These activities at times also had some benefits unique to women. For example, Haley reported that because a class required students to shadow someone in the field, she was able to find a woman to shadow. She reported it was very useful to see how she worked and interacted with others.

Opportunity to Gauge and Demonstrate Skills Women were highly concerned about fitting the "incompetent woman" stereotype in their male-dominated fields, and a theme emerged that these women felt short group projects and presentations gave them the opportunity to prove to peers or professors that they did not fit the stereotype.

> Where, like even if you are the only female in the group, you get one-on-one time with males in the major, and so they actually hear what you're saying. Whereas in a classroom setting, you might not talk or whatever. So you can kind of see like, "Oh, well she's really good at this," or like, "She knows what she's doing." And so it kind of puts you on a level playing field, where you're all working together towards the same thing. (Grace)

These projects also gave the women the opportunity to prove to themselves that they had the skills necessary to be successful:

> Well, yeah they're [the group projects] kind of a pain because they're so much work, but it's also so you gain confidence from it. So you know when you're in the real world like that, when you're in a conference room, and they say, "Okay this is what we need to design." You have that confidence to know, "This is how we can go in there and do this," or "This is one way we have done it before to see how it works." So I think with the group project it gives you more confidence in the real world. (Shirley)

Male peers' behaviors during group projects were often reported as a confidence booster, particularly when men recognized that women were skilled in the field and looked to them for approval, opinions, to take leadership of the projects and/or keep the group organized, sought after them to be in groups, and pointed out their strengths.

> That's what I've noticed too, is that we're more sought out for group projects honestly. There's one other woman who's in the same class I am and after class we were approached by another guy, "Can we form a group?" Because he's noticed that the work was done and so he wanted to come into our group. And another group of guys asked us to be in their group together. So we're more sought after, I think, to be in group projects because they know we'll actually do the work and get it done. (Shirley)

> Definitely if you have males in your group it shows that you're just as good. Like, you could be a leader... they [males] kind of look to me to organize it a little bit. So, that definitely made me feel like I was part of the group. When I was kind of in charge. That and, like, winning your approval and things. Like [males would ask her], "Hey, if I do this, is that okay?" I mean…it's kinda cool, them wanting your approval. And like, you know [asking her] like, "Do you like this?" Like, they want your input, which is nice. (Liz)

Discussion

Overall, the results support SCCT (Lent et al. 1994), indicating that supportive behaviors from professors (i.e., the proximal environment) have positive implications for women's personal attributes, such as social belongingness and self-efficacy. Women described valuing opportunities to create more personal connections with professors and peers; prove to themselves, peers, and professors that they were competent and skilled (despite negative stereotypes); and learn more about the wide range of careers available in the major, which ultimately increased their interest in their fields.

Participants reported that professors' behaviors and attributes had both direct and indirect influences on these personal attributes. Behaviors, such as being personable (e.g., saying "Hi" on campus), were reported to directly influence personal attributes, particularly sense of belongingness, by making women feel as if they were more than just "a number" in the department. Participants also commonly reported that professors' behaviors indirectly impacted their own personal

attributes through learning experiences. For example, providing opportunities to ask questions outside the classroom, hands-on activities, and group projects were reported as contributors to increased feelings of self-efficacy. In addition, our results indicated that social belongingness and self-efficacy were interconnected. For example, women reported that forming connections with their peers (often via group projects) often led to increased feelings of self-efficacy, particularly if they received positive feedback from their peers about their abilities.

Overall, many of the findings were similar to the results of past qualitative research examining positive departmental contexts within certain fields, such as engineering and computer science (Fisher and Margolis 2002; Tsui 2010). For example, similar to past research, the present study found that professors are viewed as crucial to the success of women in male-dominated programs, group projects were viewed by these women as avenues to promote friendships within majors, and women often viewed these friendships as a valuable resource of support and information. Some of the results, however, were inconsistent with past research. For example, women surprisingly expressed very mixed views about female faculty, which differed from the work of Tsui (2010) on engineer majors, suggesting that some initiatives to promote women's success may not be uniformly applied across departments.

Study 2

Study 1 provided evidence that professors' behaviors have direct implications for women's personal attributes (e.g., by increasing social belongingness) and indirect implications through learning experiences (e.g., providing opportunities to ask questions outside of class, ultimately increasing women's self-efficacy). We aim in Study 2 to extend this research by examining how the interconnections between components of the proximal environment, particularly sexist experiences and supportive behaviors from professors, may be associated with women's personal attributes and performance in male-dominated majors.

As previously noted, past research indicates that sexism has been associated with women's decreased academic performance (Dardenne et al. 2007; Koch et al. 2014; Steele 1997), decreased physical health (Fitz and Zucker 2015; Pavalko et al. 2003; Salomon et al. 2015; Townsend et al. 2011), and decreased psychosocial wellbeing (Fischer and Holtz 2010; Swim et al. 2001). Therefore, we predicted that more frequent experiences of sexist events would be negatively correlated with academic achievement, physical health, and social belongingness (Hypothesis 1).

Although research has found that proximal environmental supports may have positive implications for personal attributes (Lent et al. 2005), less research has been devoted to how proximal environments may interact to influence women's career development. The cognitive-behavioral model of stress asserts that the interaction among a stressful event, cognitive appraisal of the event, resources available for coping, and coping responses ultimately influence distress experienced in response to the stressful event (Lazarus and Folkman 1984; Taylor 1990). According to this model, individuals who experience the same stressful event may react differently to the stressor depending on the amount of resources available to them, which includes department-level resources. This model has been supported using a variety of stressors in different contexts. For example, supervisor support has been found to buffer employees from the negative effects of work-family conflict on negative affect (i.e., mental health) and cortisol regulation (i.e., physical health; Almeida et al. 2016).

The sexism women experience in male-dominated majors is a significant social stressor. The present study sought to explore department-level resources related to faculty, including perceived faculty support, academic advising time, and higher percentages of female faculty, as buffers of the negative effects of sexism on achievement, health, and belongingness. Based on the cognitive-behavioral model of stress, we predicted that female students from male-dominated departments with more perceived faculty support, where faculty/staff engage in more academic advising, and departments with higher percentages of female faculty relative to male faculty would be less likely to experience deleterious effects of departmental sexism on their academic achievement, physical health, and social belongingness (Hypothesis 2).

Method

Participants, Procedure, and Measures

The present study includes survey data completed by female seniors immediately after completing the focus group described in Study 1. In addition, data collected from sophomores and juniors were also included. Inclusion criteria and recruitment procedures for juniors and sophomores were identical to Study 1. Students listed as sophomores (n = 218) and juniors (n = 62) were sent emails weekly (for 7 months for juniors, 4 months for sophomores) that included a link to access a survey containing items regarding everyday experiences (including sexist events), departmental contexts, physical health, social belongingness, academic achievement, and career aspirations. Sophomores and juniors were entered into a raffle to win one of four $25 gift cards to the university bookstore. Seniors, sophomores, and juniors all completed the same survey. Because of the possibility that participating in the focus group may have altered the responses of seniors, we completed t-tests to examine whether key study variables differed between those who completed the focus group (seniors) and those who did not (juniors and sophomores).

Results indicated that the two groups did not significantly differ on any study variables, with the exception of grade point average (GPA). Seniors (M = 3.44, SD = .39) in the focus group reported significantly higher GPAs compared to non-seniors (M = 3.20, SD = .47) who were recruited for the survey portion of the study only, $t(63) = -2.06$, $p < .04$, $d = .56$.

A total of 23 (35.8%) seniors, 29 (44.6%) juniors, and 33 (50.8%) sophomores were included in our original dataset (i.e., submitted their responses via Qualtrics). A total of five participants (1 senior, 2 juniors, and 2 sophomores) were deleted from the sample because they did not complete any of the survey, 1 junior was removed because she was in a non-male-dominated major, 1 junior was removed because she gave the same number response for every item, and 13 participants were excluded because they did not complete our sexism survey, resulting in an analysis sample size of 65 (final sample year distributions: seniors = 22, juniors = 23, sophomores = 20). On average, participants were in college for 2.78 years (SD = 1.19) and were 20.34 (SD = 1.08, range = 18–23) years-old. A total of 54 (83.1%) participants identified as White; 6 (9.2%), as Black; 3 (4.6%), as Asian; 1 (1.5%), as Hispanic; and 1 (1.5%), as Mixed Race. There were a total of 18 (27.7%) students majoring in Computer Science, 4 (6.2%) in Computer Technology, 5 (7.7%) in Construction Management, 5 (7.7%) in Economics, 14 (21.5%) in Finance, 5 (7.7%) in Music Media Production, 5 (7.7%) in Physics, and 9 (13.8%) in Sports Administration. A total of 42 (64.6%) individuals were completing at least one minor, 17 (26.2%) had two majors, and 27 (41.5%) reported switching majors.

Sexist Events The Schedule of Sexist Events (SSE; Klonoff and Landrine 1995) was used to measure women's self-reports of experiences with sexism. The SSE includes 15 items; for each item, women rated the frequency of a sexist event using a 6-point scale from 1 (*event has never happened*) to 6 (*the event happened almost all of the time – more than 70% of the time*). Example events include "being treated unfairly by professors because you are a woman and hearing people making sexist jokes." For the current study, we modified the SSE to focus specifically on participants' experiences with sexism in their academic department. Items were averaged to produce a total score (α = .89) wherein higher scores indicate more frequent experiences of sexist events. Analyses were conducted to ensure the variable was normally distributed. The variable was treated as a continuous variable in the present study because these analyses indicated that this was acceptable practice (skew = −.45, kurtosis = .71; Gravetter and Wallnau 2014).

Academic Achievement, Physical Health, and Social Belongingness *Academic achievement* was measured using participants' self-reported GPA. *Physical health* was measured using the Physical Symptoms Inventory (PSI; Spector and Jex 1998). Participants indicated the frequency, from 1 (*not at all*) to 5 (*most days*), with which they experienced 13 physical health symptoms over the previous 30 days (e.g., headache, trouble sleeping). Responses for each item were summed to produce a total score. Higher scores indicated more frequent physical symptoms. *Social belongingness* was measured using the Psychological Sense of School Membership Scale (PSSM; Goodenow 1993). Participants were asked to indicate their agreement with 18 statements using a 5-point scale from 1 (*not at all true*) to 5 (*completely true*). This scale was adapted to measure feelings of membership specific to an individual's academic department, as opposed to school in general (e.g., "I feel like a real part of my department"). Each participant's item responses were averaged (α = .93), with higher scores indicating a greater sense of department membership.

Department Context Moderators *Faculty support* within the department was measured using the Inventory of Socially Supportive Behaviors (ISSB; Barrera et al. 1981). Participants reported the frequency, from 1 (*not at all*) to 5 (*about every day*) with which support was provided in the department to the respondent in the past 30 days by faculty using 31 of the 40 items in the ISSB (e.g., "Talked with you about some interests of yours"). (Nine items were removed from the scale because they were not appropriate for the faculty-student relationship; e.g., "Gave you over $25.") Responses were averaged to produce an overall score. Higher scores indicated that the respondent received more frequent support from department faculty.

Academic advising was measured by the number of hours participants reported spending with their academic advisor during the previous academic year (Fall 2014–Spring 2015). Majors differed in whether or not a professor serves as an academic advisor or whether a non-professor individual was hired to advise students. For five of the eight majors (Computer Science, Computer Technology, Construction Management, Economics, and Sports Administration), students were assigned a professor as an academic advisor, one major included a non-professor advisor (Music Media Productions), and two majors had both professor and non-professor advisors (Physics and Finance). We set outliers to two standard deviations above the mean; one case was changed in this manner for academic advising time. *Female faculty* was assessed using the percentage of female faculty (lecturers and professors) of the total faculty within each department.

Covariates Student-life stressors, minority status (0 = *White,* 1 = *Black, Asian, Hispanic, Biracial*) and self-reported year in school (0 = *first year,* 1 = *sophomore,* 2 = *junior,* 3 = *senior*) were added as covariates in all models in order to examine the unique association between sexism (one specific type of stressor) with academic achievement, health, and social

belongingness, while controlling for potential confounds (Sanchez and Awad 2016). The Student-Life Stress Inventory (Gadzella and Baloglu 2001) requires participants to report how often 23 stressors occurred at the university using a 5-point scale from 1 (*never*) to 5 (*most of the time*); a sample item is: "I have experienced frustrations due to delays in reaching my goals." Item scores were averaged, with higher scores indicating that participants experienced more stressful events ($\alpha = .84$).

Statistical Analyses

Multi-level models (MLM) were conducted using SAS Proc Mixed to account for the nested structure of the data: individuals (Level 1) within majors (Level 2). To examine the research questions, sexist events were first added as predictors of academic achievement, physical health, and social belongingness (separate models for each outcome). Second, the department contextual measures—faculty support, academic advising time, and percent of female faculty—were added as moderators.

Based on recommendations by Enders and Tofighi (2007), centering procedures for each variable were determined prior to analyses based on our research questions. When conducting MLM, there are two approaches to centering Level 1 variables: grand-mean centering and group-mean centering (also referred to as centering within cluster). Grand-mean centering occurs when the overall grand mean of the variable is subtracted from an individual's score. It is used when the absolute value of a Level 1 (i.e., individual-level) predictor variable is of interest, not the deviation away from a group mean. Because the estimates obtained from variables centered at the grand mean contain both within- and between-group variation, it is recommended that the between-group mean of the variable (created by finding the average score of individuals within each major, then subtracting the overall sample mean) is also entered into the equation to control for this. After controlling for the between-group mean, the scores of a grand-mean centered variable can be interpreted as a pure estimate of Level 1 (i.e., at the individual-level) relationships between the predictor and outcome variables. For Hypothesis 1, we examine whether more frequent exposure to sexist events (at the individual level) is associated with poorer achievement, health, and social belongingness outcomes. Because we are interested in the absolute value of the individual sexism scores, we centered the sexism scores at the grand mean and added this variable, in addition to the between-group mean of sexism, into the models. Therefore, the estimates obtained for the "sexism" variable in our model indicates the pure individual-level associations between sexism and outcome variables (e.g., academic achievement), thus addressing our hypothesis.

Group-mean centering occurs when the group mean for a variable (i.e., major mean for the current study) is subtracted from an individual's score. It is used when researchers are interested in whether the deviation from the group mean is associated with an outcome variable, or whether a Level 2 (major mean) variable is expected to moderate the relationship between Level 1 (individual) variables. For Hypothesis 2, we were interested in examining department-level contextual factors (Level 2 estimates) as buffers of the negative association between sexist events and achievement/health/belongingness (Level 1 estimates). Therefore, we used the group-mean centering approach for all moderator variables, and the between-major variables were entered as the moderators in our models. Using two centering approaches within the same study is appropriate, because hypotheses should guide the centering choices. (For more information on centering practices in MLM, see Enders and Tofighi 2007.) The following equation illustrates the analyses conducted (*i* represents the individual, *j* represents the major):

$$
\begin{aligned}
Health_{ij} &= \beta_{0j} + \beta_{1j}(Sexist\ \ Events)_{ij} + \beta_{2j}(Within{-}Major\ \ Moderator)_{ij} + e_{ij} \\
\beta_{0j} &= \gamma_{00} + \gamma_{01}(Between{-}Major\ \ Sexist\ \ Events)_{j} + \gamma_{02}(Between{-}Major\ \ Moderator)_{j} + \mu_{0j} \\
\beta_{1j} &= \gamma_{10} + \gamma_{11}(Between{-}Major\ \ Moderator) + \mu_{1j} \\
\beta_{2j} &= \gamma_{20} + \mu_{2j}
\end{aligned}
$$

Covariates were added in all models (student-life stressors—grand-mean centered, minority status, year in school).

Results

Descriptive statistics were analyzed prior to conducting analyses (see Table 3). The intraclass correlation coefficient (ICC) was calculated by conducting unconditional means models, allowing for the examination of the relative amount of variance in the variables at the within-major and between-major level. For all predictor, moderator, and outcome variables, a majority of the variance was at the within-major level; less than 10% of the variance in these variables was at the between-major level. For example, 8.76% of the variance in social belongingness was at the between-major level (the

Table 3 Descriptive statistics and intra-class correlation coefficient for sexist events, department-level factors, achievement, health, and belongingness, study 2

	Predictor	Moderators			Outcomes		
	Sexist events *M* (*SD*)	Professor support *M* (*SD*)	Academic advising time (Hours) *M* (*SD*)	% Female faculty % or *M* (*SD*)	Academic achievement *M* (*SD*)	Physical health *M* (*SD*)	Social belongingness *M* (*SD*)
Overall – Individual Level (*n* = 65)	1.80 (.67)	1.84 (.66)	1.90 (3.82)	.	3.28 (.46)	27.25 (7.81)	3.66 (.56)
Overall – Major Level (*n* = 8)	1.73 (.37)	1.91 (.25)	1.77 (1.02)	16.93 (16.62)	3.30 (.22)	27.60 (2.95)	3.73 (.25)
Computer Science (*n* = 18)	1.85 (.68)	1.60 (.69)	1.08 (1.58)	12.5%	3.26 (.50)	24.94 (7.54)	3.60 (.66)
Computer Technology (*n* = 4)	1.22 (.15)	1.89 (.33)	1.38 (1.25)	28.6%	3.15 (.57)	25.50 (4.80)	3.79 (.24)
Construction Management (*n* = 5)	1.33 (.44)	1.99 (.75)	.77 (.60)	25.0%	3.44 (.36)	23.00 (5.74)	3.82 (.30)
Economics (*n* = 5)	1.48 (.20)	1.75 (.46)	2.80 (4.21)	5.6%	3.75 (.29)	29.20 (8.76)	3.88 (.36)
Finance (*n* = 14)	2.02 (.71)	1.87 (.82)	3.64 (7.29)	6.6%	3.31 (.50)	28.79 (8.92)	3.35 (.53)
Music Media Production (*n* = 5)	2.25 (.76)	2.16 (.49)	2.10 (1.67)	.0%	3.25 (.32)	29.80 (10.06)	4.03 (.29)
Physics (*n* = 5)	2.03 (.96)	2.35 (.45)	.75 (1.03)	7.1%	3.17 (.33)	32.00 (8.51)	3.42 (.77)
Sports Administration (*n* = 9)	1.70 (.55)	1.70 (.56)	1.68 (1.60)	50.0%	3.04 (.42)	27.57 (5.56)	3.94 (.47)
ICC	7.27%	2.49%	.98%	100.00%	1.71%	.79%	8.76%

ICC intraclass correlation coefficient (percent of variance at the between-major level). The percentage of female faculty relative to male faculty only differs at the between-major level

highest ICC), whereas .79% of variance in physical health was at the between-major level (the lowest ICC).

The average sexist event score (M = 1.80) indicates that sexism occurs a little less than every once in a while (less than 10% of the time). In addition, the average professor support score (M = 1.84) indicates that these supportive behaviors have occurred, on average, less than once or twice. In addition, departments vary greatly in the percentage of female faculty in the department (range = .0% in music media productions to 50.0% in sports administration).

Hypothesis 1 predicted that the frequency of experiences of sexist events would be negatively correlated with academic achievement (see Table 4), physical health (see Table 5), and social belongingness (see Table 6). Unexpectedly, sexist events (controlling for between-major variance) was only found to be associated with social belongingness, but not with academic achievement or physical health. Experiencing more sexist events was associated with a reduced sense of feelings of belongingness within the department.

Hypothesis 2 predicted that women from departments with more perceived faculty support, where faculty/staff engage in more academic advising, and departments with higher percentages of female faculty relative to male faculty would be less likely to experience deleterious effects of departmental sexism on their academic achievement, physical health, and social belongingness. Department-level professor support, academic advising time, and the percent of female faculty in a department were not found to be significant predictors of GPA or moderators of the expected association between sexist events and GPA.

Department-level professor support, academic advising time, and the percent of female faculty in a department were not found to be significant predictors of physical health symptoms or moderators of the expected association between sexist events and physical health symptoms. Controlling for the department-level mean of sexist events, experiencing more sexist events ($p < .001$) and less professor support ($p = .01$)—both at the individual level—were associated with lower feelings of belonging to the department. In addition, academic advising time was a buffer of the negative association between sexist events and belongingness: The negative association was stronger for individuals in departments where academic advisors spent less time advising students ($B = -.64$, SE = .13, $p < .001$) than in departments where advisors spent more time advising students ($B = -.30$, SE = .12 $p = .02$; see Fig. 1). Professors' support and percentage of female faculty in the department were not found to be significant moderators.

Discussion

Based on SCCT and the cognitive-behavioral model of stress (Lazarus and Folkman 1984), our second study examined the association between sexist events with academic achievement,

Table 4 Results of MLM analyses examining academic achievement, study 2

	Main effects *B* (*SE*)	Professor support moderator model *B* (*SE*)	Academic advising time (Hours) moderator model *B* (*SE*)	% Female faculty moderator model *B* (*SE*)
Fixed effects				
Intercept	3.09 (.13)***	3.06 (.13)***	3.14 (.13)***	3.10 (.13)***
Sexist events	−.11 (.09)	−.12 (.10)	−.09 (.09)	−.12 (.11)
BM sexist events	−.21 (.25)	−.24 (.26)	−.28 (.26)	−.41 (.26)
WM moderator	–	.03 (.09)	.02 (.01)	.
BM moderator	–	.19 (.26)	.06 (.05)	−.009 (.005)
BM moderator*Sexist events	–	−.26 (.33)	−.05 (.07)	.01 (.009)
Student-life stressors	−.24 (.12)	−.24 (.12)*	−.23 (.12)	−.22 (.11)
BM student-life stressors	.67 (.33)*	.73 (.33)*	.64 (.33)	.57 (.33)
Minority status	−.08 (.15)	−.05 (.15)	−.06 (.15)	−.13 (.14)
Year in school	.11 (.06)†	.13 (.06)*	.08 (.06)	.11 (.05)*
Random effects				
Intercept	.00 (.)	.00 (.)	.00 (.)	.00 (.)
Residual	.17 (.03)***	.17 (.03)***	.16 (.03)***	.16 (.03)***

BM between-major. All between-major variables were centered at the sample mean. Estimates for BM moderator variables indicate the association between the moderator and the outcome at the major level. Because sexist events and student-life stressors were centered using the grand-mean centering approach, the BM sexist events and stressor variables indicate the difference between the BM and WM estimates. *WM* within-major. All within-major variables were centered at the major mean. Estimates indicate the pure individual-level associations between the predictor and outcome variables. Minority status was coded as *0* = White, 1 = Black, Asian, Hispanic, Biracial. Year in school was coded as 0 = freshman, 1 = sophomore, 2 = junior, 3 = senior

*$p < .05$. **$p < .01$. ***$p < .001$

Table 5 Results of MLM analyses examining physical health, study 2

	Main effects *B* (*SE*)	Professor support moderator model *B* (*SE*)	Academic advising time (Hours) moderator model *B* (*SE*)	% Female faculty moderator model *B* (*SE*)
Fixed effects				
Intercept	31.03 (1.93)***	31.33 (1.94)***	31.02 (2.02)***	29.97 (2.05)***
Sexist events	−.91 (1.43)	−.55 (1.45)	−.89 (1.40)	2.16 (1.67)
BM sexist events	6.11 (3.80)	4.85 (3.90)	3.90 (3.96)	4.56 (4.08)
WM moderator	–	−.34 (1.36)	−.01 (.21)	.
BM moderator	–	2.61 (3.88)	1.02 (.83)	−.08 (.08)
BM moderator*Sexist events	–	6.69 (4.91)	1.17 (1.13)	−.20 (.14)
Student-life stressors	8.47 (1.82)***	8.45 (1.79)***	8.36 (1.78)***	8.19 (1.80)***
BM student-life stressors	−6.33 (4.97)	−6.29 (4.98)	−4.36 (5.07)	−4.28 (5.16)
Minority status	−4.66 (2.25)	−4.31 (2.26)	−3.84 (2.25)	−4.28 (2.26)
Year in school	−1.61 (.84)	−1.71 (.89)	−1.75 (.89)	−1.46 (.84)
Random effects				
Intercept	.00 (.)	.00 (.)	.00 (.)	.00 (.)
Residual	40.34 (7.19)***	38.60 (6.88)***	38.45 (6.85)***	39.11 (6.97)***

BM between-major. All between-major variables were centered at the sample mean. Estimates for BM moderator variables indicate the association between the moderator and the outcome at the major level. Because sexist events and student-life stressors were centered using the grand-mean centering approach, the BM sexist events and stressor variables indicate the difference between the BM and WM estimates. *WM* within-major. All within-major variables were centered at the major mean. Estimates indicate the pure individual-level associations between the predictor and outcome variables. Minority status was coded as 0 = White, *1* = Black, Asian, Hispanic, Biracial. Year in school was coded as 0 = freshman, 1 = sophomore, 2 = junior, 3 = senior

*$p < .05$. **$p < .01$. ***$p < .001$

Table 6 Results of MLM analyses examining social belongingness, study 2

	Main effects *B* (*SE*)	Professor support moderator model *B* (*SE*)	Academic advising time (Hours) moderator model *B* (*SE*)	% Female faculty moderator model *B* (*SE*)
Fixed effects				
Intercept	3.67 (.15)***	3.60 (.15)***	3.54 (.15)***	3.70 (.16)***
Sexist events	−.46 (.10)***	−.53 (.10)***	−.47 (.10)***	−.44 (.12)***
BM sexist events	.40 (.33)	.44 (.34)	.39 (.31)	.44 (.37)
WM moderator	–	.24 (.09)**	.02 (.01)	.
BM moderator	–	.09 (.38)	−.09 (.07)	.002 (.007)
BM moderator*Sexist events	–	−.34 (.33)	.17 (.08)*	.004 (.01)
Student-life stressors	−.15 (.13)	−.19 (.12)	−.19 (.12)	−.15 (.13)
BM student-life stressors	−.03 (.43)	.06 (.42)	.20 (.39)	−.08 (.45)
Minority status	−.44 (.16)**	−.39 (.15)*	−.38 (.16)*	−.45 (.16)**
Year in school	.03 (.06)	.06 (.06)	.08 (.06)	.02 (.06)
Random effects				
Intercept	.02 (.03)	.03 (.03)	.01 (.03)	.03 (.03)
Residual	.19 (.04)***	.17 (.03)***	.18 (.04)***	.19 (.04)***

BM between-major. All between-major variables were centered at the sample mean. Estimates for BM moderator variables indicate the association between the moderator and the outcome at the major level. Because sexist events and student-life stressors were centered using the grand-mean centering approach, the BM sexist events and stressor variables indicate the difference between the BM and WM estimates. *WM* within-major. All within-major variables were centered at the major mean. Estimates indicate the pure individual-level associations between the predictor and outcome variables. Minority status was coded as 0 = White, 1 = Black, Asian, Hispanic, Biracial. Year in school was coded as 0 = freshman, 1 = sophomore, 2 = junior, 3 = senior

*$p < .05$. **$p < .01$. ***$p < .001$

health, and social belongingness, as well as how professors' behaviors and attributes in male-dominated majors may serve as a resource for women and buffer the negative effects of sexism for women. The frequency of experiences of sexist events was found to be associated with social belongingness, but not with academic achievement or physical health. Our results also provide evidence that the interaction between proximal environmental factors may be associated with social belongingness. More specifically, academic advising may buffer women from the negative effects of sexism on social belongingness.

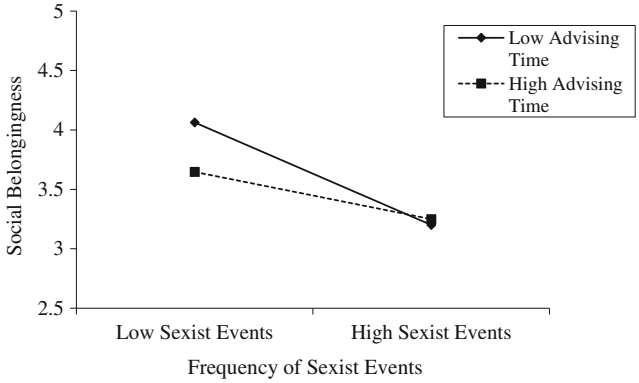

Fig. 1 Advising time as a moderator of sexist events and social belongingness. Low and high sexist events refers to one standard deviation below and above the mean, respectively

As expected and consistent with past research (Fischer and Holtz 2010; Swim et al. 2001), more frequent exposure to sexist events was associated with decreased social belongingness. Our results extend past research, however, by also indicating that this association is stronger in departments where less time is devoted to academic advising. These findings fit well within the cognitive-behavioral model of stress: In the face of more frequent sexist events, college women who are in departments where academic advisors spend more time with students may appraise the situation in a manner that buffers against the negative effects of sexism, resulting in higher levels of social belongingness. For example, these women may challenge their personal assumptions that sexist experiences indicate that they are not wanted or valued in the major, or that they do not "fit." Rather, academic advising time may provide these students with additional experiences with others in the department and realize that the behaviors of the individuals who behaved in a sexist way may not be representative of all individuals in the major. Future research that specifically examines the types of topics these individuals discuss with academic advisors (e.g., what classes to take, how to deal with sexism in the department) would allow for a better understanding of what particular factors about academic advising may be useful to women. In addition, it is important to obtain more objective department data about academic advising time (e.g., the average time spent with advisees in a department). It

is possible that these self-reports of time spent with advisors are actually an indicator of self-motivation, as opposed to the ways in which a department-level practice may help buffer women from the deleterious effects of sexism.

Unexpectedly, experiencing sexist events was not a significant overall predictor of academic achievement or physical health. Previous research suggested that sexism is associated with decreased physical health (Fitz and Zucker 2015; Salomon et al. 2015; Zucker and Landry 2007) and decreased academic achievement (Dardenne et al. 2007; Koch et al. 2014) outcomes. The lack of observed overall associations between sexist events and academic or physical health, controlling for between-major variance, may be the result of a floor effect. On average, women reported sexist events occurring slightly less than once in a while.

General Discussion

Grounded in the social cognitive career theory (Lent et al. 1994), the present multi-method study aimed to better understand professors' behavior and attributes that help women succeed in male-dominated majors. By extending past research and focusing on what helps (as opposed to what does not work) and by examining the reasons why certain professor behaviors and attributes may be useful, the findings from the present study have implications for male-dominated majors seeking to retain women.

Taken together, the two studies provide insight into the usefulness of professors' behaviors and attributes. In Study 1, we were pleased to find that students, overall, had many positive experiences with professors and were able to identify specific instances in which professors reached out to them on a personal level or interacted with them on a one-to-one basis. It is important to note, however, that in Study 2, the average score for professors' supportive behaviors was quite low (on a scale of 1 to 5, the average score was 1.84, with 1 indicating that professors had not engaged in the supportive behavior listed and 2 indicating that professors engaged in it at least once or twice). This difference is likely due in part to the fact that in Study 1, students may only be discussing the behaviors of one specific professor, whereas Study 2 asked students to think about professors in their department overall. These results indicate that supportive professor behaviors are important and that most women experience them from at least one professor within a department, but that exposure to these behaviors may be infrequent or inconsistent for some individuals. Behaviors such as getting to class a few minutes early and starting conversations with students may be one way to create more consistency in supportive behaviors experienced by women in male-dominated majors.

Interestingly, in Study 2 we found that academic advising buffered the association between sexism and lessened belongingness. Based on the findings of Study 1, this advising time may be effective because it provided an opportunity for professors to be a source of knowledge about the major and field in general, but it also may have allowed students the opportunity to get to know the professors on a more personal level (increasing feelings of social belongingness), particularly if the meeting was longer and allowed for more small talk. Because academic advising time was measured by students' self-reports, it is unclear if professors initiated the interaction (e.g., emailed advisees to set up a time to meet) or if students initiated the interaction. If students reached out to initiate the meeting, it is important to consider factors that may make the student feel more comfortable setting it up, which can also be informed by the results of Study 1. Again, professors' behaviors, such as greeting students on campus and remembering a student's name, may make women feel more comfortable to set up these meetings, which may serve as a buffer of the negative implications of sexism on social belongingness.

Even though literature that has found evidence that female role models are beneficial for women pursuing male-dominated majors (Beyer 2008), surprisingly, the results of both Studies 1 and 2 downplayed the importance of female faculty. In Study 1, we witnessed mixed views on the benefits of female faculty and noticed that many women either participated in or noticed backlash against female faculty. This could potentially explain why the proportion of female faculty in the department did not serve as a buffer of the negative implications of sexism. If these students do not view these female faculty as competent, likable, or approachable, it likely can hinder the positive implications of having them in the department. Given the empirical literature documenting that women in male-dominated occupations often face backlash whereas their male counterparts do not for engaging in the same behaviors (Rudman and Phelan 2008), this may be a particularly difficult phenomenon to address within male-dominated departments. Many of these departments report trying to recruit female faculty (Tsui 2010), but the positive implications of this may depend in part on how these women are received once in the department.

Practice Implications

Although many male-dominated departments across universities recognize the importance of recruiting and retaining women, many departments report difficulty doing so (Tsui 2010). Importantly, many of these suggestions and common positive experiences reported by women have the potential to create meaningful impacts in the lives of women. For example, learning the names of students, providing opportunities for students to ask questions outside of class, forwarding emails about internships and job opportunities, and greeting students around campus were viewed as extremely helpful behaviors. In fact, any behavior that allowed women to create more personal connections with others in the department and increase social belongingness or showcase their skills and competence to increase

self-efficacy were viewed in a highly positive manner, so long as the behavior cannot be viewed as a "special privilege" in front of their male peers. These findings suggest that even individual professors can make small changes with the potential to significantly improve female students' experiences.

Limitations and Future Research

There are limitations of the present study that should be addressed with future research, particularly in relation to our sample size. First, women from a variety of male-dominated majors were recruited in order to address the goal of the study: to better understand the reasoning behind why professor behaviors may be helpful. Although we believe the present research was a good start to this process, it is important to recognize that the number of participants in each major type was quite low in the current study, making it difficult to generalize to all male-dominated majors or make comparisons across majors. Future research is needed with more majors and, importantly, a larger number of women within each major. Because women are a numerical minority in the majors, researchers will likely need to collaborate across institutions in order to provide the proper sample size to ensure that results are generalizable across majors.

Second, researching a numerical minority can lead to challenges to get a diverse sample that is large enough for adequate power. At the majority-White institution where our participants were recruited, we experienced difficulty recruiting Women of Color. It is very likely that the experiences of women in male-dominated majors depends on, or interacts with, other social identities, such as race/ethnicity, sexual orientation, and age. In fact, there was evidence of this in the qualitative results, as Janelle (a woman of color) commented about how it can be difficult to relate to somebody when no one looks like her. It is important that future research includes more diverse samples in order to understand the unique experiences of individuals based on other social identities. Third, it is recommended that future research with larger samples is used to explore the associations between sexism and achievement/health in order to verify that associations in Study 2 were not missed due to inadequate power.

In addition, there was evidence that our sample consisted of very driven and ambitious women, and they may be the ones who are most likely to have positive experiences. For example, these women saw group projects as an opportunity to prove their skills and competence. For individuals less confident in their skills (or someone struggling with course material), these experiences could potentially be harmful, as noted by one woman in the study. If peers and professors see a woman struggling, they might see this as confirming the stereotype and also cause enormous pressure for the women to try to avoid adhering to the stereotype.

Conclusion

We found strong evidence that professors' behaviors and attributes within male-dominated majors have important implications for helping women succeed. Although past research has often examined individual-level factors within women associated with success and negative departmental contexts associated with failure, it is important that we broaden our perspective as a research community to explicitly examine positive proximal environments in order to capitalize on current strengths and provide support systems for women in male-dominated majors.

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Compliance with Ethical Standards

Conflict of Interest There are no potential conflicts of interest.

Human and Animals Rights Human participants were included in the study. Research was approved by the University's IRB prior to data collection.

Informed Consent Slightly different informed consents were used for senior, juniors, and sophomores (see below).

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