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College STEM Students' Perspectives on Sexism and Sexist Humor

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My interest in studying how college students perceive sexism stems from two specific experiences I have had as an undergraduate. In a class on "school and society" my classmates and I were supposed to bring in and discuss pictorial representations of different topics like racism and sexism. The girls who were responsible for sexism brought in a picture of several Hooters girls and a plainly dressed woman holding a sign with a feminist slogan. The picture was captioned, "Sexism: Only ugly bitches complain about it." The girls, and seemingly the majority of my classmates, found the picture to be simply funny—no one appeared interested in discussing it critically. The second incident occurred in a science class. During a lecture, my male professor informed the class that the female actresses on the television show CSI could not possibly be real scientists because they had "wonderful hair, huge hooters, and no glasses."

In both of these situations, I was silent. I did not know how to voice my concerns and criticisms without being seen as one of the "ugly bitches" or in a way that would make my professor take me seriously. This research project has enabled me to break this silence, and it is my hope that it will enable other students to do the same.

I would first like to acknowledge my committee, Isaac Reed, Jennifer Kugel, and Stefanie Mollborn, for taking time to work with me on this project. I would especially like to thank Stefanie Mollborn, my faculty advisor, for her support, feedback, advice, and encouragement through all aspects of this project; Isaac Reed, for feedback and especially writing-process advice; John Reid-Hresko, for providing feedback while I was initially conceptualizing this project in his Field Methods class; UROP for project funding; my parents and family for their support; and finally, all the students who took the time to share their insights and experiences as participants in my study.

ABSTRACT

Understanding and decreasing the underrepresentation of women in science, technology, engineering, and mathematics (STEM) fields have been the goals of significant research and policy (NSF 2010). While *institutional* and *individual* level factors are often implicated in explaining continued disparity in women's presence in STEM fields at undergraduate, graduate, and professional levels, important *interactional* level factors are often neglected. Qualitative, in-depth interviews and participant journals collected from juniors and seniors majoring in a STEM discipline at a large, public Western university were used to analyze the role informal interactions, like sexism and sexist humor, play in women's decisions to persevere in STEM as well as the coping strategies they use to succeed academically and socially. From these findings about college students' attitudes and experiences with sexism, I make recommendations for creating and improving interventions aimed at increasing diversity and inclusivity in STEM fields at the undergraduate level.

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"Just because I think it's funny, doesn't mean I think it's right."—Jeff[1]*, senior, Psychology*

Current college undergraduates exist, and often have grown up, in a culture that seems to project a status quo of gender equality: institutional barriers and discrimination have been eliminated; from a young age, women are told they "can do anything men can"; and for students, all have equal access to education and professional resources. However, despite, or perhaps because of, this perception of equality, there is significant distaste when "sexism" becomes a topic of discussion among this population. Because sexism is often masked or perceived by students to be a "non-issue" on college campuses, pointing it out can have harsh consequences. Fear of social consequences prevents women from speaking out when confronted with sexism, and speaking out against sexism holds harsher sanctions than speaking out against other offensive, but non-sexist behavior (Sheldon and Stewart 2004).

Included in recent efforts to increase gender equality is a push to increase the diversity of science, technology, engineering, and math (STEM) fields. This push has come not just from feminist scholars, but also from non-partisan governmental organizations like the National Science Foundation (NSF). NSF uses primarily economic and globalization rationalizations to justify this push for diversity: "for the United States…continuing technological leadership depends on the healthy development of the science and engineering talent of *all* its citizens" (CEOSE 2004:i). However, women have remained underrepresented in STEM disciplines, resisting diversity-increasing initiatives. These interventions have focused primarily on either supporting and encouraging *individuals*, or changing *institutions* to increase inclusivity (CEOSE 2004).

These interventions fail to address *interactional* factors that play significant roles in women's decisions about their field of study and their success in that field. Scholars

[1] All student names are pseudonyms.

acknowledge the importance of institutions and individuals in creating and reinforcing the gender system, but note that interactions also play an important, but oft-neglected role (Risman 1998; Correll and Ridgeway 2003). While research has been performed on gender and interactional factors, the majority of research on underrepresentation of women in STEM and interaction has focused on more formal interaction (for example, teaching and learning styles in classroom peer and teacher interactions). The role of sexism in everyday interactions has also been studied, but not specifically in relation to college STEM students. I focus on these everyday interactions here.

My study aims to further understand how informal interactions, such as those involving sexism and sexist humor, influence women and men's experiences in STEM fields at the undergraduate level. By studying how informal interactions are used to reinforce stereotypes and increase tolerance of sexism in peer interactions and student-instructor interactions, I illuminate previously neglected interactional level factors that may influence undergraduate students' decisions about persevering in STEM fields, future career choices, and pursuit of graduate education. In addition, I study how student's attitudes about sexism on college campuses influence their views on gender and equality in a university setting, and the implications of these attitudes in terms of developing coping mechanisms. These findings allow me to make policy recommendations in order to improve current initiatives to increase representation of women in STEM as well as suggest new methods.

BACKGROUND AND LITERATURE REVIEW

This section provides background on and a summary of prior research attempting to explain the continued underrepresentation of women in STEM. I also provide a theoretical background justifying the use of an interactional approach to study gender as well as an overview of interactional studies of gender that inform my research.

Underrepresentation of women in STEM

Identifying the problem

According to the National Science Foundation's 2009 report entitled *Women, Minorities, and People with Disabilities in Science and Engineering*, men and women have earned approximately the same number of bachelor's degrees in science and engineering fields since 2000. However, this trend does not continue into graduate school and postdoctoral fellowships: in 2009, women made up 43% of all graduate students and held only 33% of postdoctoral positions. In addition, there are gendered trends in terms of the STEM fields women actually end up in. In 2007, "in science and engineering occupations, women were 64% of psychologists, 41% of biological and life scientists, 26% of mathematical and computer scientists, and 11% of engineers" (NSF 2009:13). The *leaky pipeline* is a common metaphor used to describe how students leave STEM fields at different points in their academic careers. Significantly, women "leak out" more than men in addition to entering the pipeline in smaller numbers (Blickenstaff 2005). Therefore, it is important to consider not only factors that prevent women from entering STEM fields, but also how women are filtered out of STEM. In attempting to address causes of barriers that keep women from both entering and persevering in STEM, researchers in a variety of different disciplines have studied *institutional*, *interactional*, and *individual* level factors.

Individual level explanations: biology and interest

Biological differences between men and women have been cited as an individual level source of differential math and science ability. These biological explanations have ranged from differences in brain size to the role of hormones in mathematical ability, but several studies have found literature on biological explanations to be contradictory and insufficient in accounting for the magnitude of gender underrepresentation in STEM fields (Ceci, Williams and Barnett 2009; Blickenstaff 2005). As Blickenstaff (2005) notes, "there is a danger in continuing to emphasize biological differences between men and women because the tendency is to then argue that if unalterable biological differences exist, then no action need be taken to improve the situation for women" (p. 373). A second individual-level factor cited is difference in STEM interest levels between women and men. Morgan, Isaac, and Sansone (2001) found that finding science "interesting" was a better predictor of a woman choosing a science career than her "science GPA, participation in math and science activities, perceptions of friends' support for career choice, and parents' perceptions of students' science ability" (p. 297). Therefore, if women are less likely to find STEM fields "interesting," women are more likely to be underrepresented in STEM careers regardless of their abilities.

However, what is more revealing from Morgan and colleagues' study are the underlying factors that predict interest in science as a career. In the same study, it was found that women were more likely to cite being able to interact with and "help" people as a career goal. Men cited this reason, but also cited high pay and status as important for a future career goal more often than women. Both men and women identified mathematics and physical science careers as less likely to involve interpersonal interaction but more likely to involve high pay and status and identified the reverse for education and social service careers (Morgan et al. 2001). These

findings were echoed in a study of sixth grade students' perceptions of science and scientists. While both male and female students reported interest in "helping people," female students reported lower interest in science and male students viewed science as a "more appropriate" career for a man than for a woman (Jones, Howe, and Rua 2000). In addition, it was viewed as more acceptable for women to change from a STEM major to a non-STEM major in order to fulfill personal, altruistic goals (Seymour 1995).

Constructing "Science" and consequences for women

These views are partially explained by examining science as an institution. "Science" as an institution is viewed in popular discourse as an objective discipline, and therefore equally "open" to men and women. However, feminist scholars have argued that science is constructed as inherently masculine and that valued characteristics in science, like objectivity, rationality, logic, and independence are associated with men. Feminine-associated characteristics, like emotion, subjectivity, and passivity are viewed as "bad" for scientific inquiry (Gilbert 2001). Therefore, social constructions of women contradict constructions of "science" and create cultural barriers when women seek to be viewed as legitimate and competent scientists. The damage caused by this dynamic is evident in research on difficulties encountered by female STEM faculty. Callister (2006) found that departmental climate is an important factor in leaving an academic post for female faculty. When departmental climate reflected emphasis on science as masculine and proving competence through "toughness or self-promotion," women were more likely to feel alienated and indicate intention to quit.

Gender as structure

Gender is a key factor in not only whether or not students view STEM fields as interesting but also in whether or not students view STEM as appropriate and relevant to their

future careers and goals. While the construction and reinforcement of gender roles occurs on all levels of social organization, understanding gender as a social structure in particular sheds light on the continued underrepresentation of women in STEM. According to Risman (1998):

> Gender itself must be considered a structural property of society. It is not manifested just in our personalities, our cultural rules, or other institutions. Gender is deeply embedded as a basis for stratification, differentiating opportunities and constraints. This difference has consequences on three levels: (1) at the individual level, for the development of gendered selves; (2) at the interactional level, for men and women face different expectations even when they fill the identical structural position; and (3) at the institutional level, for rarely will women and men be given identical positions. (p. 28)

Although it appears that men and women have equal educational and professional opportunities to "get in" to STEM fields, gender as a structure constrains the choices individuals make. Rather than being based solely on an individual's desires, these choices are often a product of pressure in interactions to respond to cultural expectations about how one should behave based on one's gender (Risman 1998). However, "doing gender" in this manner results in reinforcing gender inequality and stratification. Therefore, pressure to fit into gendered social structures may act as a significant deterrent for women considering STEM, and interactional pressure to present gender correctly may hinder the success of women in these fields.

I and some other interaction-focused gender scholars would argue that the expectations regarding gender are reflected and crystallized by institutions into consequential structures. Therefore, research on interactions can shed significant light on these structures and the continued underrepresentation of women in STEM.

Taking an interactional approach

Expectation states theory

Several different theories from research focusing on interaction are relevant to studies of gender and STEM fields. *Expectation states theory* describes how groups of people, in trying to achieve a common goal, develop "performance expectations" that influence behavior and

interaction; based on their external characteristics, some people are expected to be more competent or powerful than others in an interaction. "The greater the performance expectation of one actor compared to another, the more likely the first actor will be given chances to perform in the group, the more likely he or she will be to speak up or offer task suggestions, the more likely his or her suggestions will be positively evaluated, and the less likely she or he will be to be influenced when there are disagreements" (Correll and Ridgeway 2003:29). Performance expectations are often developed on the basis of social status characteristics and stereotypes. In terms of gender and STEM fields, expectation states theory can provide an explanation for how stereotypes about women and science play out in classroom interactions. For example, due to stereotypes that portray women with better verbal skills than men, but worse math and technical skills, women often end up with clerical roles in STEM group projects and have to "prove" their intellectual capacity when discussing scientific or technical elements in a project in a way that men do not (see results in next section).

Stereotype threat

A key element in expectation states theory concerning social status beliefs is that *both* groups often accept a negative belief or stereotype (i.e. women are bad at math) as true. *Stereotype threat* is another example of how such negative stereotypes about one's own group affect performance and interactions. According to Spencer, Steele, and Quinn (1999) stereotype threat describes "a situational predicament—felt in situations where one can be judged by, treated in terms of, or self-fulfill negative stereotypes about one's group" (p. 6). When testing the role stereotype threat may play in women's math performance, researchers found that women only underperformed on a math test when explicitly told that there were gender differences in performance; scores were the same when participants were told there were no gender differences

(Spencer et al. 1999). Interestingly, another study on stereotype threat and math performance found that how much a woman is affected by stereotype threat is dependent on the role gender plays in her self-identification (Schmader 2001). In this study, Schmader found that women who consider gender to be an important part of their identity were susceptible to stereotype threat, while women who did not continued to perform as well as men even in conditions set to induce stereotype threat. Stereotype threat extends beyond math performance for women in STEM. Stereotype threat not only aids in the creation of "self-fulfilling prophecies" concerning women's performance in STEM fields, but also puts an added pressure on women to perform in order to prove stereotypes about women's lower competence in STEM fields wrong.

Tokenism

Tokenism is a challenge faced by women in STEM and other male-dominated fields. Kanter (1977) discusses gender, stereotypes, and tokenism in a large corporation in her book *Men and Women of the Corporation*. She notes that tokens are highly visible and scrutinized due to their scarcity in a certain climate, but are also heavily stereotyped and generalized as representative of their group. "In the men's informal conversations, women were often measured by two yardsticks: how *as women* they carried out the sales or management role; and how *as managers* they lived up to images of womanhood" (Kanter 1977:214). Like stereotype threat, tokenism in STEM fields increases pressure on women to perform not just as representative of their own ability, but as representative of "all" women in their field. However, women in STEM also face the challenge of balancing pressure to perform with social issues in terms of fitting in with the dominant group: in order to fit in to a group, tokens risk alienation if they do "too well" and thus upstage the dominant members of the group (Kanter 1977).

These three interactional concepts, expectation states theory, stereotype threat, and tokenism, provide underlying explanations for observed phenomena in relation to gender, sexism, and interactions both in and outside of the classroom.

Gender and interactional dynamics

An understanding of how sexism and gender play out in a range of *everyday interactions* is crucial in order to study the role interaction plays in underrepresentation of women in STEM. The term "everyday interactions" is used to refer primarily to informal, routine day-to-day interactions experienced by an individual.

Recognizing sexism

Swim et al. (2001) used daily journals kept by college students to study incidences of "everyday sexism." They found that women experience, on average, one or two sexist incidents per week, including, for example, stereotyping, derogatory language regarding women, and sexual objectification. The prevalence of "everyday sexism" was found to have negative psychological effects in terms of increasing anxiety and depression and decreasing self-esteem and comfort levels among both men and women, but more so for women as they were subject to a higher frequency of sexist incidents (Swim et al. 2001). Study participants noted that they "noticed more" sexism during and after participation in the study. This is particularly significant because it captures popular sentiment about sexism among college students: they tend to not notice or emphasize everyday sexism, despite its negative psychological effects. This connects to research on cognitive barriers to recognition of discrimination. Studies have shown that people who are aware of sex discrimination in society in general fail to perceive sex discrimination at play in their own lives, indicating cognitive blocks (Crosby 1984).

Stereotyping and everyday interactions

Stereotyping and prejudice are significant parts of everyday interactional sexism. Prentice and Carranaza (2002) studied gender stereotypes among undergraduate students at Princeton University. Students still viewed traditional gender traits as being desirable for their specific gender, but it was not necessarily viewed as negative for members of one gender to display traits of the other gender, as long as they still performed their traditional gender roles. For example, men can display feminine traits, like being kind or caring, as long as they remain decisive and ambitious. Interestingly, when asked about what traits a desirable Princeton student had, students identified the same traits that were viewed as desirable for males, but not traits that were desirable for females (Prentice and Carranza 2002). This study indicates that views about gender roles among college students are more complex than confining men and women to traditional roles and traits, but that the ideal college student is still very much masculine. However, when stereotypes are used as a form of prejudice, they often involve reinforcing women's inferiority to men by confining women "to the kitchen" and into otherwise stereotypic roles, utilizing double standards when evaluating acceptable behavior for men versus women, and making assumptions based on gender about women's interests or capabilities (Swim et al. 2001).

The role of humor

Sociological studies of humor have focused on the role humor plays in social interactions. Lynch (2002) notes that in social contexts, humor is primarily used for *identification* and *differentiation* or *control* and *resistance*. Humor as identification and differentiation reflects the use of humor to solidify in-group ties. Identification humor involves using humor and jokes to create bonds between group members, while differentiation excludes individuals who do not

understand the in-group jokes. When humor is utilized for control, humor and jokes are used to ridicule group members who deviate from norms, and thus reinforces desired behaviors. Humor as resistance refers to the use of humor to diffuse tension within a group (Lynch 2002).

These prejudicial stereotypes lay the foundation for much of the sexist humor prevalent in mainstream society today. Research on sexist humor has found that men who display "hostile sexism," or hostile attitudes toward women, (as opposed to benevolent or ambivalent sexist attitudes) are more likely to find sexist jokes about women funny and claim they would repeat them to friends (Thomas and Esses 2004). In addition, exposure to sexist humor was more likely to increase tolerance of other sexist incidents in men displaying hostile sexism (Ford, Wentzel, and Lorion 2001). Sexist humor also provides a "socially acceptable" outlet for prejudicial views, enabling the speaker to escape sanctions that normally accompany prejudicial statements (Ford et al. 2008). However, men who are classified as "benevolently sexist" can display similar reactions to sexist humor as hostile sexists. In studying men and women's perspectives on "dumb blonde" jokes, Greenwood and Isbell (2002) found

> Men low in hostile sexism but high in benevolent sexism, appear similar to men high in hostile sexism in their appreciation of sexist humor. Perhaps this is because benevolently sexist men have the luxury of outgroup subtyping when it comes to the dumb blonde. They may justify their amusement by reasoning that some women (e.g., their mothers, wives, daughters) deserve to be on a pedestal, while others do not. In contrast to women, then, benevolently sexist men may enjoy the derogation of certain "types" of women (e.g., dumb blondes) without experiencing attitudinal dissonance. (p. 347-348)

These findings shed light on how sexist humor influences interactions: individuals holding sexist beliefs may use sexist humor as a way to circumvent "political correctness," and thus escape repercussion that might come from displaying blatant sexism in an interaction. In addition, Bill and Naus (1992) found that when participants found an event to be humorous, they were more accepting of it and less likely to rate it as sexist. This was true for both men and women, though often dependent on the degree of sexist attitude for participants of both genders.

Studies on how women view sexist humor reveal further interesting perspectives. Moore, Griffiths, and Payne (1987) found that both men and women prefer female-disparaging sexist jokes to male-disparaging jokes, despite hypotheses that women would prefer male-disparaging jokes. However, the authors predicted that, "preferential bias for female-disparaging jokes will erode more quickly among females than males" (Moore, Griffiths, and Payne 1987:530). Interestingly, this does not appear to be the case. Levy (2010) describes an extreme version of a woman who "gets" female-disparaging (sexist/sexual) humor as a "Female Chauvinist Pig":

> The Female Chauvinist Pig (FCP) has risen to kind of an exalted status. She is post-feminist. She is funny. She *gets it*. She doesn't mind cartoonish stereotypes of female sexuality, and she doesn't mind a cartoonishly macho response to them…Women who've wanted to be perceived as powerful have long found it more efficient to identify with men than to try and elevate the entire female sex to their level (93-95).

Therefore, women who engage with sexist or sexual humor can further their aspirations by being viewed as "one of the boys." This strategic use of humor reflects a phenomenon Fine and De Soucey (2005) term a *joking culture*. A joking culture, essentially, is a set of "repeated humorous and joking references" that serve to increase group solidarity and regulate interaction within a particular group (Fine and De Soucey 2005:2). In the case of groups where women are underrepresented, joking cultures disparaging women are more likely to be present. Therefore, women may gain an interactional advantage, as Levy found, if they can defy their gender and fit into the dominant joking culture.

The role of physical appearance in interaction

As evidenced by the popularity of "dumb blonde" jokes, female physical appearance is often an aspect of sexist humor. However, physical appearance has been shown to play an important role in interaction in general. Webster and Driskell (1983) note that people who are viewed as physically attractive are often at a social advantage: they are seen as more competent and thus more successful, which further increases their attractiveness. However, there are more

stringent requirements for physical appearance for women than men. Mernissi (2003) acknowledges the differential power of this reality for women in all fields: "Even though access to education and professional opportunities seem wide open, the rules of the game are very different according to gender. Women enter the power game with so much of their energy deflected to their physical appearance that one hesitates to say the playing field is level."

Physical attractiveness becomes more complex when considering women in STEM fields. In her study of how women of color succeed in physics, Ong (2005) found that women often downplay their physical attractiveness and femininity in order to be viewed as legitimate scientists: "a woman who approximates the bodily appearance (i.e., product) of a typical man may not completely fool the eye, but she may gain wider acceptance in the scientific community than one who adheres to typically feminine body shape, hairstyle, or dress" (p. 601). However, being viewed as a scientist also has social repercussions for women. In an experimental psychology study on perceptions of women in science, researchers compared how male and female opinions of a female student changed when she claimed to be a chemistry major versus a humanities major: "Pursuit of chemistry…was perceived as negative, as people judged the woman as less sociable when she was committed to being a chemist, and women participants predicted she would have a less fulfilling career. Men participants said they would not want to date her" (Brownlow, Smith, and Ellis 2002:135). For female scientists, physical appearance becomes a double-edged sword, especially when negotiating within the scientific community.

Classroom interaction

Interaction within the classroom, starting in elementary school and continuing through higher education, has been used to explain underrepresentation of women in STEM. Teachers treat male and female students differently in the classroom. Starting in elementary school, male

students receive significantly more teacher attention during class time than female students. Male students are more likely to be praised for intellectual ideas, while female students are praised for neatness in their work, among a myriad of other incidences of subtle classroom sexism (Sadker and Sadker 1994). These interactions serve to decrease girls' self-esteem in the classroom and reinforce traditional gender roles of passivity. In addition, parents and teachers have differential expectations regarding performance in math and science for girls. A study of high school level geometry classes found that teachers tended to interact more frequently with boys and that male students received more than 70% of positive feedback in the classroom regarding mathematical ability. In this study, the author noted that teachers held stereotypical views of female students as less capable in mathematics than male students. Teachers reinforced these attitudes with increased levels of encouragement of boys while girls remained passive and quiet in the classroom (Becker 1981). Parents also reinforce these stereotypes: Sadker and Sadker (1994) found that if a child receives poor grades in science or math, parents are more likely to say girls are "not as smart" but say boys are "lazy and push them to work harder" (p. 256).

These trends continue into higher education. Women in college classrooms are less assertive with answers than their male peers and still received less attention and feedback from professors (Sadker and Sadker 1994). In addition, Seymour (1995) found that women were more likely than men to cite disappointment and difficulty forming relationships and receiving support from STEM faculty as a reason for switching out of a STEM major. Research has also shown that women in college are more likely to "downsize" their professional aspirations as they move through college, often switching from prestigious, male-dominated fields to fields characterized as more feminine (Sadker and Sadker 1994; Seymour 1995).

Research on coping mechanisms and ways to increase representation of women in STEM display several common themes. Stout et al. (2011) found that when women (and men, to a lesser extent) had female instructors in introductory calculus classes, they were more confident in their mathematical abilities and engaged in class material than when their instructors were male. These findings are attributed to ideas of role modeling and "stereotype inoculation": being exposed to successful women in STEM increases feelings of belonging and confidence in female students. In terms of mechanisms for coping and achieving success in STEM fields, it has been noted that in general, women must often demonstrate not just equal, but superior competence at a task in order to gain respect and influence with men in group work situations (Pugh and Wahrman 1983). Expectation states theory calls this phenomenon as a "double standard." In situations where a particular group is viewed as less competent, a higher "level" performance is necessary to be viewed as equally able at a task than the performance required of the dominant group; a double standard exists for evaluating work as indicative of ability (Correll and Ridgeway 2003). For STEM fields in particular, women's strategies for success emphasize proving intellectual competence and (carefully) displaying "masculine" traits correlated with success, like assertiveness and independence (Ong 2005; Seymour 1995).

METHODS

My research is based on 20 qualitative interviews and 4 participant journals collected from college undergraduates studying in a STEM discipline[2] at a large public university in the western United States. Participants were limited to individuals majoring in a STEM field to focus the study and connect it to the oft-noted phenomenon of the underrepresentation of women in science (NSF 2010). My goal in using qualitative methods in this study is not to make generalizations about this phenomenon, but to explore the underlying interactional processes that might contribute to continued differences in male and female achievements in these fields.

Qualitative research methods are important for this study due to their ability to probe in-depth into explanations that are difficult to quantify. Quantitative methods have described the problem in terms of statistics about women's representation in STEM and offered some potential explanations. Qualitative research methods are especially useful in attempting to correlate and connect personal narratives to explanations collected by survey methods as well as illuminating subtler, underlying explanations. While the results from this study reflect a small sample size and thus are not necessarily able to be generalized, my data offers a perspective that shares students' voices and experiences in a way that surveys or other methods cannot.

I employed *abductive reasoning* as a strategy for interacting with data, especially when performing concurrent data collection and analysis. Peirce's theory of abduction involves creating hypotheses that attempt to explain observations, as opposed to induction and deduction, which primarily make predictions (Frankfurt 1958). By starting to analyze themes that came up in interviews while still collecting data, I was able to modify interviews as the study progressed to ask about and thus test my explanatory hypotheses.

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[2] "STEM" disciplines include Engineering, Chemistry/Biochemistry, Mathematics, Physics, Molecular/Evolutionary Biology, and Physiology. At this university, Neuroscience is part of the Psychology department, so Psychology was included as a STEM discipline.

Recruitment

Participants were initially recruited for the study through a campus-wide email announcement that generated a pool of 81 respondents. While students self-selected to respond to the email bulletin, the message did go out to the entire student population. Of these respondents, 28 fit the criteria for an interview (undergraduates at least in their third year of college, majoring in a STEM discipline). As a central focus of my research is experiences in the college classroom, interview participants were limited to juniors and seniors in order to collect data from a population with more experience being a STEM major in college. This also served to ensure that interview participants had persevered in their STEM field and therefore were more likely to have relevant experiences, although it biased the study against STEM students who left the major early in their academic careers. All 28 of the students who qualified for the study were contacted to schedule an interview, and 15 of these students, 6 men and 9 women, were actually interviewed. Students were paid $10 for an interview. Of these initial 15 students, 10 were Engineering majors (chemical, environmental, architectural, mechanical, civil, applied math, or computer science); 2 were Chemistry or Biochemistry majors; 2 were Physiology majors; and 1 student was a Psychology major.

The 5 final interview participants were recruited by another email announcement (Appendix D). 48 students responded, and 37 fit the criteria for the study (the email text was modified to specifically recruit juniors and seniors, resulting in a lower proportion of non-eligible responses). I used purposive sampling in terms of gender for the final five students in order to bring the final interview count to 10 men and 10 women. The final five students included 3 Engineers, 1Mathematics major, and 1 Evolutionary Biology major. Several students

were double or triple majors, all in another STEM discipline with one exception (International Affairs).

Data collection

I conducted all the interviews and collected journals, both of which received institutional review board approval. My informed consent document can be found in Appendix F. Interviews ranged in length from 30 minutes to 1 hour and were recorded using an audio-recorded and transcribed by an outside transcription service. I did not take notes during the interviews, but created field notes following each interview. Participants were interviewed regarding their experiences in their STEM field, their feelings on sexism and sexist humor in particular, and their potential experiences with sexism within the classroom from both peers and instructors. The interview was semi-structured, and the interview schedule can be found in Appendix A. During a portion of the interview, I introduced multimedia examples as a way to spark discussion about sexist humor. These examples included a description and picture of Computer Engineer Barbie, a "demotivational" poster, a verbal scenario describing a joke in a classroom, and a Youtube video for the "Shii: Wii for Women" (Appendix B). A semi-structured interview format was used to allow for in-depth probes into responses.

I performed interviews in two phases. The interviews conducted with the 15 students from the first round of recruitment using the schedule in Appendix A make up Phase I. After these initial 15 interviews, I began to evaluate transcripts and modified the interview schedule to focus more in-depth on emerging themes (Appendix C). Phase II of the interviews were conducted with the 5 students from the second round of recruitment.

In addition, 4 interview participants, 2 men and 2 women, were asked to keep a journal for two weeks documenting incidences of sexism and/or gender-based humor in their day-to-day

lives. Of the initial 15 interview participants, 5 students were offered the opportunity to complete a journal for an additional $20. Because of funding constraints, I could not collect journals from all participants. Of the 5 journal offers, 4 were completed: 2 from women and 2 from men. I used theoretical sampling in selecting journal participants. Theoretical sampling involves selecting participants for a study based on their ability to "shed light on the emerging theory" (Charmaz, quoted in Glesne 2006:6). Therefore, journals were offered to students at the end of the interview on the basis of their willingness to talk and engage with the topics discussed during the interview, but not based on the content or direction of their beliefs about gender. These students were provided with a sheet of journaling instructions (Appendix E) and a verbal explanation. Journaling participants were asked to write once a day for two weeks, and to use pseudonyms when discussing others[3]. The purpose of including journals in the study was to gain an understanding of sexist humor and gender beyond the classroom and beyond the scope of the data collected in interviews. Therefore, instructions were left relatively open for participants; I asked them to write about what they found interesting in regard to gender and humor in their day-to-day lives.

Participant journals to document sexism and evidence of gender relations among college students were used to provide a different perspective from the retrospective data collected in the interviews. Swim et al. (2001) note that participants may not recall past incidences of prejudice for a variety of reasons, including uncertainty about whether or not an event was prejudicial, failure to remember an isolated event, or minimization of an event as "insignificant." Therefore, using journals to have students record daily and recent events is intended to capture events that may have been forgotten or gone unmentioned in an interview asking about the past.

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[3] I also changed names in quotes taken from journals to further ensure confidentiality.

Data analysis

Initially, I performed data analysis as an on-going process concurrently with data collection. As transcripts were received, I read through them and noted common themes that arose from the data, both expected and unexpected. I modified my interview script to probe into these themes further during Phase II of the interviews. After all interview data had been collected and transcribed, I coded each transcript as well as the participant journals with respect to these themes. Participants were assigned pseudonyms and identifying information was changed for participants and larger university programs.

Personal standpoint and social desirability bias

As a female undergraduate student double majoring in Biochemistry and Sociology, I am a member of my study population. I introduced myself to interview participants as such, noting that I was a senior, studying Biochemistry and Sociology, and that the research was for my senior honors thesis in the Sociology department. With some interviewees, this identity seemed to build my credibility by establishing myself as a part of their "in-group": someone with the capacity to understand their life and identity as a STEM student. However, my role as a white female researcher also inevitably influenced my interactions with participants. *Social desirability bias* refers to the tendency of people to give answers they perceive as being socially acceptable, especially when discussing sensitive topics like sexism (Fischer 1993). Due to my female gender identity in combination with the gendered nature of sexism as a research topic, subjects may have given biased responses in order to appear socially desirable or to attempt to produce what they felt were desired results. As all data was self-reported, it is difficult to control for bias by comparing interview and journal data with findings from participant observation. However, having an awareness of the potential for bias in my data adds an additional dimension

to taking an interactional approach, as bias is inherent in many of the everyday interactions studied.

RESULTS

During data analysis, I identified four main themes: stereotypes, definitions of sexism, reactions to sexist humor, sexism in the classroom, and coping mechanisms. In the next section, I provide details of my findings with respect to these themes as well as evidence for how they influence informal interactions and reinforce gender inequality in STEM fields.

Talk and deployment of stereotypes

General stereotypes and the "sorority girl"

As a "warm-up," I asked participants to describe stereotypes of college students in general and male and female scientists and engineers in particular at the beginning of the interview. This was intended to encourage interview participants to begin to think about how gender and social identity are constructed for college students. When asked to describe general stereotypes of college students, interviewees typically broke students into academic and social groups: engineers, fraternity and sorority members, business students, "druggies," and snowboarders/skiers were common categories. Of particular interest is the oft-named stereotype of the "sorority girl." According to interviewees, women who appear to be members of a sorority are perceived to be dumb, superficial, privileged, un-academic, "slutty," and especially overly concerned with physical appearances. When asked how he chose lab partners in a class, Glenn, a junior studying Physiology, noted, "the first person I look for is not someone who I assume is in a sorority." The sorority girl's physical appearance is directly correlated with her intelligence. Jeff, a senior Psychology major demonstrated this assumption:

> Say like I'm interviewing two girls [for a job]—one of them is the sorority girl that you know is all about perfection. And all about image. And the other one is kind of like a dorky girl that didn't put on her make up. She didn't fix her hair really. Then I'm probably automatically going to assume that that girl is smarter than the sorority girl, just because yeah it takes a lot of time, a lot of effort to be smart. And if you're spending two hours on your hair, that's like two hours that you missed out on in learning something.

Participation in a sorority was often viewed as a purposeful decision by women to prioritize socializing over academics, an assumption that opened them up for judgment and stereotyping. Sorority girls were also perceived as almost a non-entity in STEM fields—Natalie, a senior studying Biochemistry, Molecular Biology, and Neuroscience specifically said, "I guess I don't see a lot of blond, sorority girls in my fields." When compared to the sorority girl, "frat boys" were mentioned with less frequency, and while they were negatively stereotyped as partiers, being a man in a fraternity did not hold the same stigmas of dumbness and superficiality that were prominent for the sorority girl. This differential gender dynamic indicates that while men can experience sanctions based on group affiliation, they often have more freedom to merge different social and academic interests than women.

Only one of the 20 students interviewed was involved in Greek life at the university. Blaine, a junior studying Computer Science was conscious of the potential for stereotyping that came from both his fraternity and engineering associations, and noted that he makes a point to avoid mentioning his association with either group if he thinks it will be detrimental in social or academic situations. "[If] I'm around a bunch of people who aren't in fraternities, and then all of the sudden it comes out that I'm in a fraternity, their opinion of me may change for an arbitrary reason." However, Blain viewed his computer scientist identity to be more stigmatizing than his fraternity affiliation, especially in social situations: "Just from my personal experience, I don't usually bring up the fact I'm a computer scientist outside of [other] computer scientists because generally if I'm out socializing…and I bring up that I'm a computer science major, the conversation just kind of dies right there. It's like oh, you're a geek—go away."

Stereotypes of scientists

These primarily profoundly negative reactions to the sorority girl and her perceived superficiality shed an interesting light on the stereotypical female scientist and her physical appearance. "Nerdy" was a common word used to describe stereotypes of both male and female scientists and engineers. However, being "nerdy" was often a positive and desired identity for many students, both male and female: "I think to excel you need to fully embrace it. Be that nerd" (Glenn, junior, Physiology). However, there were limits on how nerdy a STEM student could be—stereotypes of (especially male) engineers as having lax hygienic habits, playing computer games, and lacking in social skills, while mentioned as part of the nerdy stereotype, were negative. Therefore, the ideal scientist, male or female, is both intelligent and invested in his or her field, but also personable.

In terms of physical appearance, the "typical scientist or engineer" that students described was male. Glasses and lab coats were commonly described "props" for scientists, used to physically represent, again, the nerd. "When you think of a scientist, you always think of like some dorky guy with the glasses sitting in there. You don't really think of a woman. And you see a lot of movies about people working in a lab, and scientists—and it's usually just a group of guys sitting there" (Jeff, senior, Psychology). When asked specifically about what a female scientist looked like, participants were more likely to comment on physical attractiveness than when asked the same question about a male scientist. "I think there are two kinds [of female scientists]…either the unattractive, bookworm, nerdy stereotype, or the remarkably attractive and their intelligence only added to that side" (Pete, senior, Engineering Physics). This dichotomy manifested itself in a kind of "unobtainable ideal" for male and especially female scientists—succeeding at being both physically and intellectually desirable.

In general, interviewees noted that a conventionally attractive female scientist or engineer would be viewed as less intelligent and competent than an unattractive woman in the same role.

> I feel like generally in the scientific community, a really attractive scientist would kind of be judged just like a not real scientist. I don't know if I can explain exactly why, but like you have got like the feeling of you know super-hot female scientist like there's no way she like really knows what she's doing, or is competent. She totally got there based on her looks. Yeah, I feel like I could definitely imagine that being you know judged about her, unless you know she's able to really wow people and is some…she'd have to like downplay her attractiveness almost to get you know her academic achievements to you know outweigh that. Because I guess yeah, back to the earlier stereotypes, scientists and engineers are not an attractive bunch. (Kyle, senior, Chemical Engineering)

Both male and female interviewees said that it was important for students in their fields of study to look "professional" and organized in their day-to-day interactions on campus. However, women also noted a consciousness toward not presenting a sorority-girl-like sexualized image, especially in interacting with others in their field of study.

> If I were to walk in [to a research lab] you know with cleavage and everything, they probably wouldn't take me very seriously 'cause they thought I was like, yeah…. I mean they might like have a good conversation and like flirty or something like that. But as far as like getting the job in a science lab, I don't think you'd be as likely. (Kristen, senior, Chemistry)

Kristen acknowledges the potential social benefits from presenting a sexualized feminine appearance but notes that they come at the expense of desired academic and professional benefits, like getting a laboratory job or being taken seriously by instructors and peers. Having a feminine appearance was both a source of pride and frustration for female students. By defying the conventional stereotype that women in STEM fields are unattractive, the women felt that they could encourage younger women to view science as a desirable field. Madeline, a senior Environmental Engineer said, "It was really cool to get to talk to young girls and be like look, I'm an engineer. Like there are a few of us that are normal and cool, so." However, at the same time Madeline expressed frustration at what she viewed as differential treatment based on her personality and appearance in professional situations:

> I had the worst time at the Career Fair. 'Cause it's like…'cause I'm talking to like professional engineers. Um and they're all men, and they're all men in their 40s and 50s…every time I end up talking to like the recruiters, it always ends up them being like, "oh, yeah my daughter used to do that." Or they like call me like "sweetie," and like it's like they see me as like their daughter. This little girl. They don't see me as like, "Oh I would want to hire her as an engineer"…You'd wait in line and they would have these long like talks about like what these guys want to do with their lives and stuff, and then I got up and liked talked to the guy for like a minute, and he was like, "Oh well that's good sweetie, ok." And he'd like put my resume down. And it was like I don't know. Sometimes it really feels like such a boy's club, and it's hard to…it's hard to convince like a male engineer, who's used to the boy's club kind of world, that this little girl is good at engineering. They don't even look at my resume most of the time so."

Madeline described herself as "passive." While she viewed herself as displaying this traditionally feminine quality, many of the women interviewed self-identified as "assertive," and being assertive was viewed by both men and women as necessary for a woman's success in a STEM field. Matt, a junior studying Civil Engineering, when asked what advice he would give a future engineering student, said, "For a female student, I think a good thing to do is be assertive, and show that you are as competent as your male peers. 'Cause that's where you know I gained the most respect for females who are in the classes." This quote illuminates a central issue for female students in STEM: they enter their field without the luxury of assumed competence and intelligence experienced by men—they have to "gain respect." This double standard establishes a baseline of a lack of respect for women, who then have to work harder to prove their competence.

Perspectives on sexism and humor

Defining sexism

Before beginning discussion on sexist humor, participants were first asked how they defined sexism. Many students' definitions were in line with that found in the 2011 *Oxford Dictionary*: "prejudice, stereotyping, or discrimination, typically against women, on the basis of sex." Most students viewed sexism as a negative phenomenon, and only recognized potential "positive sexism" upon probing and further questions about whether women could ever benefit

from sexism. In addition, while most students noted that sexism could be against both men and women, only two students mentioned transgendered individuals as targets of sexism. Students' relatively simplistic definitions and struggle to come up with examples of sexist behavior are indicative of the general attitude toward sexism among college students—that it does not really happen, or that it is not a pressing issue. In a journal entry, Carl, a senior studying Architectural Engineering, told a friend about his participation in this study:

> I told my friend Mark about it and he said "well she wouldn't want to interview me" I asked him why and he said "because I don't think sexism exists or is a problem, at least one worth discussing." He is also a 5th year senior and an electrical engineer.

Laura, a senior Environmental Engineering student, said of sexism on campus: "I kind of do wonder like if things happen and I haven't noticed or realized it…what was going on." Beth, a senior studying Chemical Engineering and Biochemistry, described sexism as, "more like third-world countries. Like the Taliban, wearing the burka…like forcing women to do that. Or like where [women] have to be escorted in public and they don't have the same rights and freedoms as a man does." Both of these cases illustrate women in science distancing themselves from the phenomenon of sexism.

Responses to multimedia examples of sexism and sexist humor

To frame discussion of sexism and sexist humor, I used four examples: two different images, a verbal scenario, and a Youtube video (described below, and in Appendix B). I chose these images based on their relation to humor and central themes in my research: the importance of women's physical attractiveness, women in science, and stereotypes of women. All of the images used feature white women of presumably middle to high socioeconomic status (SES). While these reflect the dominant discourse on sexism and women in science, they fail to capture the potential different usage of humor in regards to minority women and women of lower SES.

The first image was a printout of an online product description for "Computer Engineer

Barbie" (Appendix B). After interviews were completed, I learned that the Society of Women Engineers, a group dedicated to promoting women in engineering, endorsed and helped design Computer Engineer Barbie. According to a press release from Mattel (2010), Nora Lin, President of the Society of Women Engineers, said, "as a computer engineer, Barbie will show girls that women can design products that have an important and positive impact on people's everyday lives, such as inventing a technology to conserve home energy or programming a newborn monitoring device." Interestingly, in order to appeal to girls, Barbie's career as a computer engineer is framed in traditional women's roles—caring for the home and babies, as well as to the idea of connecting to and helping people as an important part of a woman's career.

Students' responses to Computer Engineer Barbie were mixed. Many students had difficulty reconciling Barbie's image as the epitome of traditional femininity to their idea of a computer engineer—Barbie has much more in common with the sorority girl stereotype. Thanh, a male first-generation Vietnamese-American junior studying Chemical Engineering, said, "I would think Barbie is more like…has a different job. Like maybe a nurse. Or a vet. Or some other job that's not really an engineer." Students also had mixed feelings on how effective using Barbie to "feminize" computer engineering would be in actually encouraging girls to pursue science and engineering fields. They questioned whether or not girls in the target age range for Barbie would really grasp the concept of being a computer engineer and if the continued emphasis on physical appearance would overwhelm the focus on engineering:

> I think it could be a good thing uh just to plant the idea in the head of being a computer engineer. I don't know if…if the physical aspect of it would take over the idea of being a computer engineer. Like well do I want to be a computer engineer, or do I want to be an attractive you know young blond walking around with hot pink accessories. (Matt, junior, Civil Engineering)

While Computer Engineer Barbie was not intended, nor found by participants to be humorous, she provides a concrete illustration of the tension and connection between physical

attractiveness and being "taken seriously" experienced by women in STEM.

The second image (Appendix B) featured a picture of several Hooters girls and a plainly dressed woman holding a sign stating: "Women are not for decoration." The picture itself is captioned, "SEXISM: Only ugly bitches complain about it." This type of picture is commonly referred to as a "de-motivational poster": a parody of corporate-type motivational posters meant to inspire employees (Ahrens 2001). This image is particularly disturbing because of its ability to strip women of their ability to protest it: complain, and you're an ugly bitch too. Reactions to this image ranged—some found it funny, but the majority of reactions were relatively neutral—it was not viewed as particularly funny or personally offensive. Erica, a senior studying Computer Science, noted that the humor in the image comes from the perceived ineffectiveness of the sign-holding woman's method of fighting what she perceives as sexism.

> The language is like "ugly bitches"…that's pretty rough you know? It's disturbing I guess. I don't know. Um and this girl's probably really smart. And if she maybe sat down and talked to them, she might be able to like help them identify something that they could be good at, other than just like wearing short shorts and serving hot wings. But she's maybe taking not quite the right avenue. People would laugh at that if that happened.

Many students felt that attractive women were just as likely as unattractive women to "complain" about sexism, but acknowledged the potential benefits of differential treatment. In reacting to the poster, Matt (junior, Civil Engineering) stated

> I do think that women who are more attractive benefit from sexism. Uh because I don't know, I guess they're not…. The fact that they put themselves in a situation where they are sort of decoration, uh you know sort of excuses the fact that you know that they are decorations. 'Cause they're doing it to themselves I guess. Um yeah I think that the fact that they put themselves in that situation makes it more acceptable.

Other students held similar views: like with judging sorority girls, humor about women who present a sexualized image is viewed as acceptable because they "choose" that image. This connects to rape culture and attitudes that women who look like they are "asking for it" are at fault in cases of rape (Boswell and Spade 1996). These attitudes further suppress women's

efforts to protest sexism and increases legitimacy of sanctioning women based on their physical appearance.

The third example was a verbal scenario in which a STEM professor makes a joke to a lecture hall of students, telling them, "the women on [the television show] CSI couldn't possibly be scientists in real life because they have huge knockers, good hair, and don't wear glasses." This example was intended to specifically identify a scenario in which a person in a position of authority over students uses sexist humor. Interestingly, students found this comment both funnier and more inappropriate than the previous examples. This seems to indicate that the inappropriateness stems primarily from the professor's position of authority rather than the content of the joke itself. Even though the majority of students viewed this comment as relatively inappropriate, they noted that they would not take action unless inappropriate comments were frequent. Some students justified the professor's remark by noting that there was a "grain of truth" to it: "I think that what sort of makes it funny is that it's…it's real. I guess people can kind of relate to it" (Matt, junior, Civil Engineering). Interestingly, one woman who viewed the comment as offensive self-described as passive and acknowledged that she presented a feminine appearance that was often viewed by others as at odds with her participation in a STEM field.

> I don't think any women in that class would have appreciated that comment. Especially since they are chemistry majors, so by saying that he's assuming that none of them fit that profile, which is kind of considered to be the attractive um stereotype for society. So basically he just called all the women in there unattractive. But um I think that kind of falls in with the Barbie picture. It's like you have to fit that [unattractive] role to have that type of intelligence, um which you don't. (Olivia, senior, Physiology)

This finding connects with research on stereotype threat, specifically findings that indicate that women who place importance on having a female gender identity are more vulnerable to

stereotype threat (Schmader 2001). These women seemed more aware of their physical appearance and sensitive to how it could impact their opportunities in an academic setting.

The final example shown to participants was a video posted to Youtube (link in Appendix B). The video is in German, but respondents easily understood it conceptually. In the video, which respondents often commented was similar to a *Saturday Night Live* skit, two men give their girlfriends a "Shii" or "Wii for women" after the women get bored watching their boyfriends play male-centric games on the Wii. The Shii games the women play include domestic "1950s housewife" stereotypes—cooking, cleaning, and ironing, as well as other stereotypical female behaviors: shaving legs and talking on the phone. The final game the women play takes a turn from sexist stereotypes to sexual ones: it involves simulating oral sex on the game controller while the women's boyfriends cheer. When discussing the video, most respondents picked up on the emphasis on women fulfilling stereotypical domestic roles. Kyle, a senior Chemical engineer, said, "I feel that you can call it funny because it was so…I mean almost because like women have moved past that and it was kind of past-women thing. You know like the old…the older stereotypes from maybe the '50s to not quite '70s." However, Madeline (senior, Environmental Engineering) viewed stereotypical humor differently:

> I can understand how it's funny to joke about stereotypes. Like I joke about it with my roommates, like how I'm a terrible woman because I don't cook and clean. That's not what I want to do with my life. But um I don't know, at the same time like it's not good to encourage it and say like this is what these women should be doing with their time. Or saying like that's what we enjoy to do. Like oh I'm giving her this video game so that she can iron, and like she'll really enjoy this. Like just 'cause we are forced to do it, like doesn't mean that we want to or…. So I don't know. I think it's pretty offensive, but stereotypes are kind of a mix of being funny and being offensive, I guess a lot of the time.

Because women, and especially female college students, were perceived as being released from pressure to conform to this domestic stereotype, most students found the first parts of the video to be funny. However, participants' reactions to the last part of the video indicated

that there is an important difference between sexist and sexual humor. "I felt like it kind of crossed the line maybe a little with the blowjob thing because that was just like…You wouldn't like show a video game of a guy like going down on a woman like that. It's not the same kind of…it's not viewed the same way" (Julie, senior, Applied Math). Other students also pointed to this depiction of a sexual act as "crossing the line." However, they often struggled to articulate what the difference was between a joke about ironing versus a joke about a blowjob: "Like I don't know. One's, like I said, more like pushing the envelope. You know it's something just more demeaning" (Ian, senior, Mechanical Engineering). Humor about sex was viewed as edgier and more likely to be personal. However, participants often did not view sexual humor as inherently sexist, and therefore it became more acceptable for both men and women to enjoy:

> I mean generally I don't think like sexist humor—like the poster or something like that—is that funny. I think—honestly I think like the reason why *The Hangover* or *Knocked Up* or those kind of movies are so popular, is that they…they take sexual humor, not necessarily sexism, but sexual humor to like another level. (Carl, senior, Architectural Engineering)

In fact, finding sexual humor funny, or at least going along with sexual humor, was viewed as a desirable social trait regardless of gender, but especially so for women. This connects back to Levy's (2010) concept of the Female Chauvinist Pig, and idea that women use sexual humor to be "more like" men, and then use these connections to gain both professional and social power.

When asked if there was a type of women who was more likely to be offended by sexist or sexual humor, or what characteristics predicted an offended reaction to sexist or sexual humor students identified several. Some of these differentiating factors identified include "uptightness," physical appearance or social standing (sorority or Hooters girls, for example), and how "feminist" a woman was. While it was noted that an individual's upbringing often played the biggest role in their response to humor, larger groups, like feminists and lesbians,

were noted as being particularly prone to being offended. Often, being offended was viewed as an unproductive emotional response: "Sometimes, I feel like feminism—feminists—they just, you know there almost isn't a…they don't have like a good reason. They just you know it's going on—like I'm told that it's going on. And so they'll be really offended" (Kyle, senior, Chemical Engineering).

On the opposite end of the spectrum, it was occasionally assumed that women who "benefit" from sexism or who fit into a sexualized female role would be less likely to be offended by sexual or sexist humor. "I think that women who choose to fit the part of kind of the sexualized figure, are going to be less likely to be offended. At least they should, since they are playing the part. But I think most women choose to not fit that. At least like to the most extent" (Olivia, senior, Physiology). As this quote shows, it was also a relatively common assumption that these women did not have a *right* to be offended due to the social benefits of their voluntary focus on maintaining a feminine appearance.

Sexism in the classroom

After discussing sexist humor with participants, I shifted the interview's focus to sexism within the classroom. Participants were first asked to come up with examples of sexism displayed by both instructors and peers, whether actual or hypothetical scenarios. Many students did not feel like they had ever witnessed sexism from an instructor, noting that professors were often careful not to say anything that might be perceived as offensive: "I personally haven't experienced any professors doing that 'cause they usually are very careful about the words they choose and how they act" (Pete, senior, Engineering Physics). Only one student noted a professor displaying sexist behavior on a regular basis. This professor was the same professor who made the comment regarding the women on CSI used in the sexist humor examples. In

addition to making jokes, the professor routinely referred to female scientists as "babes" during lectures and once had a pair of women's underwear visible to students in his textbook for no apparent reason. Natalie (senior, Biochemistry, Molecular Biology, Neuroscience), the student in his class, found the professor's remarks to be incredibly detrimental to her ability to learn:

> It was so bad for me that I didn't go to class. I…I found other ways to try to learn the material because I mean regardless of the fact that he was a horrible instructor, like taking all of this sexual stuff out of it, he was still a bad teacher. But um it would make me so frustrated and so angry that I couldn't even…I wasn't in a situation that I could even learn anything.

Natalie and other students tried to report his behavior to the university, but felt complaining would ultimately be futile:

> And I think the most frustrating thing about all of this is that we complained to you know authority figures, or at least looked to avenues of how…you know how to get this horrible feedback to the people in charge. And the more frustrating you know…it just became more and more frustrating because he's a tenured…tenure-tracked professor, and they're not going to fire him.

While there were no other examples as blatant as Natalie's, other students expressed doubt in the mechanisms available to provide feedback on instructors. The most common one mentioned was students was the university's course evaluation form. These anonymous forms are filled out by students at the end of the semester for every class, and the results for every instructor are available online. In addition, students can write comments on the forms, which are provided to the instructors after grades have been finalized. The forms have students rate the quality of the course and effectiveness of the instructor; there is also a question asking about the professor's respect for students regardless of gender, race, sexual identity, religion, et cetera. Matt (junior, Civil Engineering), said of the evaluations:

> I really, uh, put a lot of value when I was filling them out. But I ran into somebody who works with the [evaluation] stuff, and they say that if you write like really terrible things about the professor or something, there's no reason that they just don't crumple it up and throw it out. Once I heard that, um you know it really devalued the [evaluations] to me. So now if I ever have an issue, I don't even bother filling out an [evaluation].

When I asked about instances of sexism from peers in the classroom, participants volunteered more examples than when discussing instructors. These examples tended to be interactional, especially occurring during group work and projects, a crucial part of curricula for most STEM fields. Often, these occurred when differentiating roles in a project; for example, which group members actually perform experiments or build a project and which group members write and take data. Laura (senior, Environmental Engineering) said of group project roles:

> I'm the stereotypical girl who doesn't like to build things. And I'm not good at it either. Um and [the male group members] were all excited to build things, and they didn't want to write about it. And they had horrible grammar. They had horrible spelling. Every single one of 'em, which is also stereotype for engineers and for guys. And so ok, well [Laura's] going to do all of the um secretary work, I guess, like writing and making sure everything looks good for class. And [the male group members will] do the building stuff and like the math part.

As this quote shows, in STEM fields women still often end up doing female-stereotyped "secretarial" work for group projects, usually relating to writing and communication, and are distanced from the male-stereotyped technical aspects of projects. Ian (senior, Mechanical Engineering) noted that during group projects, "a few times a few groups brought up making the girl in the group the communications director, without really you know giving a fair chance. So I guess that's sexist." In these situations, women either accepted the role, as Laura did, or made an effort to prove that they were just as capable as male group members in working on the more technical aspects of projects and labs:

> I want to be pushed and I want to learn too. I paid a lot of money to be here, you know? Like a useless degree would really suck. So I try and find someone that I know is intelligent, and I know is at the same level as me. Like I don't want to do all the work, but I also want you know an equal. (Erica, senior, Computer Science)

Erica recognized the importance of having technical skills in her field of study, and therefore made an effort to find group members who she felt would allow her to fully participate in all aspects of the project, or to assert herself and prove her competence. Madeline (senior,

Environmental Engineering) echoed the importance of women "proving themselves" in group work:

> I just like try really hard to force them to listen to me. And usually with time, like guys will like they'll accept you. And they'll be like okay, maybe she does know what she's talking about after a little while. Like you…but you have to show that you know what you're talking about. They don't automatically assume that you do.

However, proving competence did not always work for women. They also offered other examples of coping when male group members refused to acknowledge their competency or when they felt discriminated against in class. For example, Beth (senior, Chemical Engineering, Biochemistry) when describing how she dealt with a male group member who did not trust her data collection or respond to her emails in a group project said, "Well I just started sending all my data through the [other male group members], and just having him get it that way. Or [ask the other members] 'Hey, can you send him an email, 'cause we need to get him here.'" While Beth recognized that this solution was not ideal, she chose not to waste energy on changing the sexist group member. Madeline also employed a similar tactic when she felt a female professor discriminated against female students: "I had a guy friend in the class who I would send in with my homework questions, 'cause she would help him." As these examples indicate, women in STEM fields often use creative coping mechanisms to create solutions to non-ideal, hard to remedy situations. These coping mechanisms are further discussed in the next section.

Women's strategies for success and coping

Downplaying gender

There were several different strategies women used to achieve success in STEM fields as well as deal with being female in male-dominated academic and work environments. A first, common strategy employed by both men and women in discussing gender in STEM fields was *downplaying* the role of gender in daily interactions. Thanh (male, junior, Chemical

Engineering) claimed, "Actually engineers don't really think about that kind of stuff…It's just everyone's equal. Being a junior already, it's kind of like everyone's mature enough not to really care what your gender is, or how you're represented, as long as you show like motivation." While Thanh used maturity as justification for his comment, he conversely implies that discussion of gender and sexism is immature in the context of academic STEM environments. This has the effect of silencing students who are experiencing discrimination by creating a false norm of effort and motivation as sole factors of performance evaluation.

While Thanh was the only participant to take such an extreme view of gender equality on campus, most female participants said that they did not feel extremely disadvantaged in their STEM field due to their gender identity. For example, Kristen (senior, Chemistry) wrote in her final journal entry:

> Since I started writing these journals, I have specifically looked for things related to sexism and gender that I may not notice on a normal basis, but also things which may not be that big of a deal. I mean sometimes if you are looking for something you tend to emphasize it in ways that might not actually be appropriate. There aren't any specific cases I can think of looking above, but my typical perspective is definitely not marked by an awareness of woman being disadvantaged.

In this entry, Kristen appears to be attempting to reconcile the sexist incidents she recorded in her journal with the status quo view that sexism is not a problem, and not one that affects her in any significant way. This idea of not being affected by sexism was also evident in students' attitudes about performance evaluation. Both male and female participants noted a desire from female scientists and engineers to be judged on merit, not gender: "I was talking with [a friend in engineering] and she's like, 'Well I hope we're hired because we're smart and because we're qualified, not because we're girls'" (Carl, senior, Architectural Engineering).

Proving competence: the role of assertiveness

Many women displayed different coping strategies used to prove their competence in their field. As discussed previously, being assertive was mentioned as an important characteristic for a female scientist or engineer to possess. However, there were limits on assertiveness: "If you kind of assume a leadership role, and like you're really strict about deadlines, I've actually been called a bitch because of that. But I'm like you wouldn't have called me that if I was a guy. It's just the guy's being a hard-ass" (Beth, senior, Chemical Engineering, Biochemistry). This mentality was also apparent in attitudes about instructors, indicating that this is not a phenomenon limited to student-to-student interactions:

> Like if a teacher is female and she's really hard, well then she's a hard bitch or whatever. She's a male-hater you know. She's one of those chicks. Whereas the cool—the more easier teachers—get put into the more like cool place. Oh that teacher, she's cool whatever. But whenever the teacher is hard, then she's automatically like I guess less socially attractive in some way. Like she seems bitter or something like that. (Ok and I mean is that the same with male instructors, who would be like equally hard per se?) No, I don't think so. I think that yeah, I would say it's probably like more of a sexist thing. 'Cause the male teachers, yeah I think men are seen as like…. Yeah, I would say it's the opposite for a male. Like if a male teacher is easy, then he's a joke. But if he's hard, then he's seen as just like that masculine thing. Like you're just supposed to push. (Jeff, senior, Psychology)

Therefore, there is a line that women in STEM fields have to walk: being assertive enough to be "taken seriously" without being perceived as "bitchy", a problem not encountered by men.

Pressure to perform and compete

However, just being assertive was not enough to prove competence. Many female students felt pressure to get good grades not only for the academic opportunities, but also as a way of negating stereotypes that women are intellectually inferior to men in the analytical work required of STEM fields:

> A lot of women in engineering have like a really high—or like in sciences—have like a really high standard for themselves. And like we think we are like intelligent, like hardworking women. And um so I guess sometimes I feel like I can get annoyed with like girls who aren't like working hard. (Madeline, senior, Environmental Engineering)

Madeline's experiences also point to the usage of tokenism concerning women in science—having the additional burden of her intelligence representing the intelligence of all women in engineering, and frustration when other women in her field presented a "bad image" of female engineers. Male engineers do not experience this phenomenon—their ability is not considered representative of their gender as a whole. Erin, a senior studying Mathematics and International Affairs said, "I really like competing against guys in math. And so I usually study with them. Like in my head, I'm kind of competing with them on tests and stuff. Um but then again there's not as much opportunity to compete with girls 'cause there's fewer girls." This behavior was not just something noticed in undergraduate students, but also in female instructors. Matt (junior, Civil Engineering) described a class in which a female STEM instructor "did a problem on the board, and a student didn't think she had it right. And she went through and proved that it was right and she [said], 'Oh—I got it right. And even though I'm a woman.'" It is interesting to note that a professionally accomplished female engineer still felt the same need to "defy" stereotypes about her gender, similar to the responses of female students, indicating that proving oneself in spite of one's gender is a career-long process for women.

For many of the female students interviewed, concomitant with pressure to prove intelligence was a pressure to always "be right." Being wrong was perceived as a greater offense for women scientists and engineers, as it was often viewed as enforcing the stereotype of their intellectual inferiority. Tom, a junior in Applied Math, described difficulties a female TA he knew encountered in teaching a math class:

> I knew someone, she was TA-ing for a math class. So there was a um…there was like a male and a female TA. And they would do like help sessions. And she was getting like really frustrated because you know a lot of times people wouldn't listen to her as much. Like would ask the same question like over again to the other TA. And she'd answered it.

When asked how the TA dealt with this obstacle, Tom described this coping strategy:

> I guess she was like sort of motivated by it. Like she you know…she made sure she knew what was going on all the time, so she was never confused. Like so she always like had the right answer right there. Um just kind of like perfecting herself, so that way you know there wouldn't be really any validity at all. That's kind of how she dealt with it.

Erica (senior, Computer Science) relayed advice she received from a female professional in her field of study regarding succeeding in a male-dominated field: "She was like, 'Just show them up,' you know. Everyday just show up and do better than them, you know, do your best." At the same time, feeling pressure to "show up" men in STEM fields had negative repercussions: Erica described an argument she had with her boyfriend, also an engineer:

> He kept saying that I needed to stop trying to make him think I'm smart because he already thought I was. But that wasn't it, I just wanted to do something by myself because all through out my career in computer science I have done group work or group projects…and I just want to be able to say I have done something for myself.

These quotations show both students and female professionals accepting the double standard and attempting to defy it by working harder and putting more pressure on themselves to succeed instead of questioning the standard and the stereotypes and assumptions about women that create it.

Distancing: "above the stereotype"

While showing academic and intellectual confidence and competency was a crucial part of success for women in STEM fields, there was also an important social aspect in terms of fitting into the culture of both a specific field and the university in general. A strategy used by some of the female students was fitting in as "one of the guys" and therefore distancing themselves from their minority status as women in a male-dominated field. Both men and women noted that *distancing*, or portraying oneself as being "above" stereotypes about one's own group, was a way for women to fit in. Laura (senior, Environmental Engineering) noted that she was able to find sexist and sexual humor funny, and bonded with a male roommate over it, because "I feel like I'm pretty intelligent, and I…I just don't feel insulted by something like

that. I feel like I'm above it. It's not even close to hurting me." Pete (senior, Engineering Physics) also brought up the idea of women being above the stereotype when discussing the Shii video:

> I think the video as a whole would be offensive to most women, um but some could still find it funny. Just the ones that realize that they're above that stereotype. (Ok and what do you think it means to be like above the stereotype?) Above the stereotype? They realize that it's a bunch of bullshit someone else is feeding us. And realize that everyone is leaving this life and can do whatever it is they decide to do with it. And they don't have to be a victim of this…they don't have to fit into any pattern that anyone's specified.

As both of these examples demonstrate, being "above the stereotype" was viewed as a positive characteristic that enabled women to excel in male-dominated fields. However, being "above the stereotype" meant that women were not supposed to challenge or be offended by the stereotypes—a more appropriate reaction from a woman who was above the stereotype was to find sexist humor funny because it did not apply to her. Interestingly, Erica (senior, Computer Scientist) indirectly described this phenomenon when talking about what makes certain images offensive:

> I think it's as soon as we identify with something in the image or something in the language. Um as soon as like there's something about it that you can relate to, it's all of a sudden offensive. Um which is probably like guys don't find a lot of that offensive, because they can't really relate to any of it.

In this case, women removed their identity from the images and were able to find sexist humor because of this disconnect, similar to how Erica perceived men viewing sexist humor.

Participants also indicated that women could benefit from going along with sexist humor or offensive humor. For example, Blaine (junior, Computer Science) described a scenario in which pornography[4] was used as an in-group joke:

> We like to mess with each other's computers, if we leave them unlocked in the lab, where we're all working. So I've come back to find very, very vulgar things on my computer. Um images

[4] There is current debate in sociology on whether or not pornography is degrading to women. However, as this is not the focus of my current research, I have forgone this discussion in favor of analyzing the social and interactional implications of pornography in this specific scenario.

> that you shouldn't see with your eyes. Ok that's redundant. (As in like porn?) Like really niche porn that's just very, very gross. So you'll come back to find that, and eventually the offensiveness factor of this stuff, you get desensitized to it…(Is it like other male computer scientists downloading it or putting it as your….) Yes, but there are a few girls who will join in our little games. (Ok. Um but then are there other girls who don't participate?) Who would definitely not. (Ok and have they…has there ever been like an issue with that?) No, um we just mess with each other's computers. Us being the boys. And then um one time one of the girls…she decided to jump in. She drew first blood. So the next time she left her computer unlocked, we uh…we set up a mild one. It wasn't as bad as what we would put on each other's. And then she was like, "Oh really, you're going to go easy on me." So now she's full on in the game…(Do you think does that make her more like a part of the culture of the major or of the group by participating, or not?) Um I'd say it's just more like…it brings her into our little clique a little more. Like within computer science, there's uh—I guess my close friends in my major, which is fairly separate from my close friends outside of my major—but yeah, so within the major there's our little group. And she's definitely gained more acceptance because she's uh just like one of the guys, I would say.

While there are obvious ethical questions regarding sexually explicit material in a classroom setting, this scenario reveals once again how "not being offended" by sexist behavior can lead to social gain for women. In this case, the woman who participated in the joke disproved stereotypes about women being offended by pornography and gained acceptance into the group—she was viewed as "one of the guys." Being "one of the guys" was also important for socializing outside of the classroom. In a less extreme example, Natalie (senior, Biochemistry, Molecular Biology, Neuroscience) noted that in situations where she was pursuing a potential romantic relationship:

> A lot of times your "guy friendly things" [are what] you're most willing to share initially—like oh I like to play video games or um I like big trucks, or I like hockey…you know the guy-friendly aspects of your personality—like come out really fast um to kind of help you I don't know move into a relationship maybe. And then the more like feminine things, maybe that you're more reserved about, come out a little bit later. Like when you're more willing, or you've already kind of hooked up, so you're like willing to share some of those things.

As both of these examples show, women can gained significant social advantages in both academic and personal interactions by defying stereotypes about their gender identity. However, it is important to note that there is a widely accepted double standard regarding behavior of men

and women in these interactions: for example, Natalie did not expect men she dated to share their "female friendly" traits to facilitate a relationship.

Attitudes about diversity initiatives

A final interesting theme that came up in many interviews in connection to coping strategies and classroom interaction was the idea of "affirmative action" and the efficacy of strategies used to attract and keep women and racial minorities in STEM fields. Many students displayed negative attitudes when discussing affirmative action and groups that they viewed as excluding the majority. Carl (senior, Architectural Engineering) noted that when discussing sexism with a female friend:

> She always gets mad when I say well I don't really know if we should have um affirmative action and stuff like that. Um especially when it's based on gender or something like that. But yeah, she doesn't …she doesn't like that I don't think that it's not that big of a deal, or that big of a problem. And I mean it is a problem, but it's not like fighting AIDS or I don't know…something like that.

While this quote indicates a member of the dominant, majority group expressing negative sentiments about affirmative action, women and racial minorities echoed similar feelings. When discussing an Engineering resource center on campus dedicated to increasing diversity and inclusivity in Engineering, Matt (junior, Civil Engineering), identified as Hispanic and felt that the center was bad preparation for careers after college:

> What I really dislike about the [Engineering resource center] is it has become a safe haven for minorities, and that's not—it's based on race but also sex. Women go there as well. And the problem that I have with that is I've been on tours of [engineering firms]. And uh we went to [manufacturing company] and looked at their manufacturing facility to look at the mechanics of the machines they do…or they work with. And in any of those tours, I've never seen a room designated for minorities. And so I think it's setting a really bad precedent for engineering students. Uh that they can go to the [resource center] to be safe. I understand you know you can go there to feel some sort of camaraderie or connection to people who are like you, but to advertise it as a safe haven for minorities is a terrible thing to be projecting.

Laura (senior, Environmental Engineering) also had negative feedback about the Engineering resource center:

> It used to be like more for women and now they've kind of expanded it to be like more inclusive. But um I think that's kind of dumb, because it's set up as a resource for women in engineering, and that's like implying that you need a resource. You're weak, so therefore you need a resource. Um and it's promoting sexism I think because like oh, all of girls need to stick together. And on one hand like I can see it being like yeah, I'm so scared like all these guys and I don't know any girls, and I want to know more girls. Um but so then it's just promoting uh boundaries and like promoting sexism I guess. And I think that's really…really backwards. And all these people who think they're like trying to empower women are like…they're like constructing walls. And uh I think it's really weird. And I've had like guys…and they always have like luncheons. And they send out like emails to people about their like free lunch, just come and mingle. And none of my friends can go because they're all white males…part of like being diverse is including everybody. And average white males are a part of "everybody." Um so like the [resource center] doesn't say like "no white males allowed," but you know it's like everyone's perception of it. So whether they intend to be that or not, that is what it is.

This quote illustrates a second part of the anti-affirmative action sentiments expressed by many students: feeling like there was "reverse" sexism or discrimination against men. Several students decried the lack of support for "white, middle-class men" in these fields, and made a point to note that similar groups were not available for men in female-dominated fields: "I think the part that I have the biggest problem with is that there's no [group for] men in Psychology. Or there's no 'Men in Visual Arts' or another major that's dominated by females" (Carl, senior, Architectural Engineering). These quotes illustrate the problem with denial of sexism as an issue on campus: if sexism is not acknowledged, attempts to remedy sexist situations are often viewed negatively as "reverse" sexism.

Women in other STEM fields also felt conflicted about initiatives geared toward women. For example, when discussing scholarships for women in science and engineering, Natalie (senior, Biochemistry, Molecular Biology, Neuroscience) said, "But at the same time it's kind of like, 'Man, is it right to get money just 'cause I have a vagina?'" She also noted that mixed feelings regarding gender-specific spaces and benefits extended beyond the classroom, using an example of a women-only section of the school recreation center:

> That's like…like a tricky thing. Like well no I don't think people should be excluded, but at the same time having a women's weight room—basically in the locker room—'cause the guys don't have that, that is excluding guys. But at the same time it's facilitating me actually doing a

> workout, whereas I would much more likely just pass it up if my only option was [to use the main weight room].

In contrast to these negative attitudes about college-level initiatives, several women reported positive feedback regarding programs to increase interest in STEM fields for girls during elementary and middle school. Many women noted that their interest in science or engineering started at a young age, and was encouraged by parents. Beth (senior, Chemical Engineering, Biochemistry) noted

> When I was in elementary school, I went to my dad's take-your-kid-to-work day every year at [computer company]. And so they are really tech savvy. And like he had um several female co-workers who were also computer engineers, and they were doing the same work. And um like it was cool to see that there was women there too. Like I never realized that there was a difference. Like there was a shortage of women in engineering. 'Cause I just grew up seeing these women in there.

Beth had also participated in initiatives to encourage younger girls to explore careers in engineering:

> I volunteer now for um Girl Scout Days. So they bring like the Brownies and the um Girl Scouts in for a half a day and we do like science experiments with them. And then they get their little badges because of it. And so then they also have us talk to the girls about engineering and like why it's cool. I mean we don't tell them all the hard stuff. You just tell them why it's cool. (What do you tell them, if you can give me a specific example?) Um like I tell them that I get to build reactors that can make anything from cosmetics to dairy to drugs. And that I get to—with these drugs—'cause at [pharmaceutical company] I was working on pharmaceuticals that were helping to cure cancer. Were helping to fight diabetes. And they're like oh cool. 'Cause I mean you have to give them some context. Like that helps them relate it to doctors giving medicine. So then they kind of have this reverence for doctors, and they're like oh that's really cool too. Or like an aerospace major that was volunteering, she was like oh I get to design airplanes that fly. Or I get to design space ships that travel around the earth.

While these strategies geared towards increasing interest in young girls as a way of increasing gender equity in STEM could be classified as "affirmative action," college students did not view them in this way. This possibly could be because female students were more aware and thus more likely to bring up these initiatives than men. However, as many men acknowledged that the positive intention of Computer Engineer Barbie was to encourage girls to

explore STEM, I would hypothesize that male college students would also be more supportive of elementary educational initiatives than they are of college and professional level affirmative action policies and other initiatives. Reskin (1988) argues that dominant groups will attempt to weaken programs or other mechanisms that help the minority group advance when feeling threatened by the increasing integration of a minority group. This theory helps explain why men did not mention the elementary school initiatives, but were often in opposition to groups at the undergraduate level—they want to maintain structures that have served to maintain the status quo and provide an advantage to men.

DISCUSSION

Summary

The purpose of this study was to examine how informal interactions influence and may contribute to the continued underrepresentation in STEM fields. I used 20 in-depth qualitative interviews and 4 participant-journals to study how current undergraduates majoring in a STEM discipline view and experience sexism and sexist humor in everyday interactions. Relevant themes included stereotypes, definitions of sexism, reactions to sexist humor, sexism in the classroom, and coping mechanisms.

Students described stereotypes of college students and male and female scientists. A particularly interesting stereotype that came up was the "sorority girl." To most STEM students, women in sororities represented the negative image of the university as a "party school," and by displaying disapproval for these women, students distanced themselves from this image of the school as a whole. Physical appearance took precedence over academics for sorority girls, and there were interesting connections to physical appearance when students discussed male and female scientist stereotypes. Students were much more likely to comment on physical appearance for female scientists, and being attractive cast suspicion on a female (but not a male) scientist's credentials. As expected, the "typical" scientist was white and male.

Student's definitions of sexism reflected *ambivalence* and *distancing*. This indicates that many students, regardless of gender, do not consider sexism to be a relevant issue, or one that seriously affects them personally. When discussing sexist humor, an interesting distinction came up between sexist and sexual humor. Sexual humor was viewed as more likely to be offensive, but not necessarily sexist, and therefore it was more acceptable and likely to be viewed as humorous by both women and men.

In terms of sexism in the classroom, incidents involving other students were noted far more often than incidents involving instructors. These incidents primarily involved peer interactions during group projects: women had to prove competence to male group members and were often assigned stereotypically female roles in the group. Women displayed two primary strategies when coping with sexism in these interactions. The first is primarily intellectual: women proved their competence to their peers through academic accomplishments and being assertive about their technical abilities. The second was social. In social coping, women attempted to fit into the culture of their fields. Participating in or being "okay with" sexist humor became a mechanism for proving that women could be "above the stereotype": *distancing* themselves from their minority group affiliation to better fit into the dominant group.

A final, relatively unanticipated theme was students' attitudes about affirmative action and interventions to increase representation of women and minorities in STEM. Both male and female, white and minority Engineering students complained that an engineering resource center aimed at increasing inclusivity created a "safe haven" for women and racial minorities and excluded white males. Students in other STEM disciplines, particularly women, noted conflicting feelings about these initiatives as well. They acknowledged the benefits, but felt that the "help" being offered conflicted with their desires to be competent in their field in their own right.

Implications

STEM women and physical appearance

The role of physical appearance for female scientists and engineers continues to be a complex issue. When stereotypes were discussed, physically attractive scientists were widely viewed as less competent. However, many female respondents took pride in the fact that they

did not "look" like a typical scientist or engineer, and felt that by defying the stereotype, they could help break it down for and thus encourage younger women. Interestingly, while they felt physical stereotypes could be overcome, these same women did not really discuss how they could break down stereotypes of women as less intellectually capable than men in STEM. Seymour (1995) found that women in STEM feel their academic success often comes at the expense of their femininity. This trend continues today—women, but no men, in the study often felt they had to change aspects of their appearance and personality in order to succeed in STEM and gain respect from peers and authority figures. These findings indicate that women in STEM still really cannot "win" in terms of their physical appearance. Negotiating this identity was a source of stress and anxiety for women due to social and professional sanctions: women who were too harsh or not feminine enough were "bitches," but women who were too feminine and not assertive enough felt denied opportunities. In addition, always having to defend their "right" to be in STEM fields left women hyper vigilant and exhaustingly aware of the way others perceived them. However, the informal nature of many of these interactions makes changing them difficult, as it will require addressing societal sentiment about sexism as a whole.

Sexism on campus

As expected, students often did not feel that sexism was a pressing issue on campus or in their own lives. However, these feelings appear to be at odds with the reality suggested by many descriptions of interactions in interviews and especially from instances brought up in journals. These findings are consistent with research on everyday incidences of sexism: in other studies, undergraduate students have also noted that participation in studies makes them more "aware" of everyday sexism, indicating a general lack of awareness of sexism and sexist incidents in the general population (Swim et al. 2001). However, resistance to acknowledging sexism and

attempts to justify being "overly aware" due to participation in the study indicated that students are attempting to deny sexism. These responses indicate emotional discomfort, as they force women to acknowledge their position as members of a stigmatized group and victims of discrimination (Crosby 1984). For women, denying sexism means that they do not have to view themselves as part of a stigmatized minority group, and students do not have to acknowledge their role in perpetuating a sexist status quo.

Further, denying sexism legitimizes the discrediting of women's intellectual capabilities if they receive "special treatment" due to underrepresentation. Therefore, women noted a strong desire to be judged on merit, rather than gender. However, research has shown that when organizations actively promote meritocracy, managers ironically tend to promote men over equally qualified women, despite meritocracy's emphasis on success and accomplishment (Castilla and Benard 2010). These findings indicate that meritocracy may be more difficult to enact than it seems, and that there may be significant gendered consequences. In keeping with their desire for meritocracy, and despite identifying incidents of sexism and gender inequality, many students, male and female, felt that any intervention that differentiated women and/or minority students from the rest of a STEM population qualified as "reverse sexism." Therefore, misconceptions about the potential of meritocracy in combination with general denial about sexism create an environment in which many students do not take discussion of sexism seriously, creating challenges to effective intervention.

Interventions and improvements

The results of this study indicate that there are significant interactional barriers that reinforce the underrepresentation of and discrimination against women in STEM fields. A fundamental but rarely acknowledged barrier is changing students' attitudes about sexism on

campus. As indicated previously, discussing sexism and feminism are largely unpopular, especially among students in STEM. For example, in a journal entry, Glenn (junior, Physiology) found that, post interview participation: "This is the first time I've ever caught myself laughing at the sexist comment. Usually I just accept that it's funny and don't actually consider the content. I guess now the joke's ruined." Glenn's comment indicates how difficult it is to create interventions that make college students take sexism seriously. While Glenn admits that he is more aware of sexism, he also notes that the joke is "ruined," implying that he would prefer to still enjoy the humor without having to acknowledge the sexism behind it. As sexism from peers was widely acknowledged to be an issue in labs and other settings involving group work, a potential intervention could include a mandatory workshop on sexism as a part of the class, especially for first-year students. However, the negative sentiments and denial of sexism discussed previously would most likely hinder students' willingness to take such an intervention seriously, and thus would need to be addressed in order for an intervention to be effective.

Interventions aimed at increasing representation of women and racial minorities must also be addressed in the context of increasing acknowledgement of sexism and discrimination. I cannot comment directly on the effectiveness of interventions already in place at the university, as I did not directly study how the Engineering resource center or other initiatives work. However, based on students' views of these initiatives as "reverse sexism," increased awareness and acceptance of sexism as an issue by students seems that it could potentially increase acceptance and effective utilization of existing campus resources such as the Engineering resource center.

However, these existing initiatives still primarily take an institutional and individual approach to increasing representation. Interventions that address interactional level barriers to

women's entry into and success in STEM fields are needed. One example of an intervention that could be adapted to women and racial minorities in STEM fields comes from a psychology study that significantly increased GPA and health for racial minority undergraduates using an intervention to increase feelings of social belonging (Walton and Cohen 2011). In this study, researchers had minority students read essays written by older minority students about their struggles and eventual success at adapting to college. The intervention was aimed at increasing minority students' sense of social belonging, providing them with a kind of inoculation against viewing adversity they experienced as being due to belief that they did not belong on campus due to stereotypes and marginalization. In addition, increased feelings of social belonging may translate to increased confidence in social interaction (Walton and Cohen 2011). While future research would be needed, this intervention could be adapted to first-year female students in STEM departments, with an intervention focused on describing overcoming interactional barriers in addition to those relating to social belonging in a male-dominated field.

Further interactional level interventions would address the informal interactions many women brought up as detrimental to their success or full participation in the classroom. This could be integrated into the class workshop on sexism mentioned previously. "Openly acknowledging" the political nature of science, and especially masculine constructions of science, in the classroom breaks down conceptualizations of science as "objective" (Blickenstaff 2005). By acknowledging that the production of scientific knowledge is not objective, instructors could facilitate a dialogue about the "culture" within STEM fields and especially behaviors that create a hostile environment and reinforce gender inequality.

Limitation of current research

A major limitation of this study is the small sample size of 20 participants. While the recruitment email went out to the entire student body, there was self-selection bias in the students who chose to respond to the survey, and due to budget and time restrictions not all eligible students who responded could be interviewed. In addition, engineering students made up over half of the sample—ideally, a more diverse and evenly distributed sample in terms of majors would provide a wider breadth of experiences. A comparison group of non-STEM majors could be used as a control as well as to illuminate differences between STEM and non-STEM students. Including students who did not persist as STEM majors—juniors and seniors who started but then switched out—could be used to study the role sexism may play in students leaving STEM fields and potentially illuminate differences in coping mechanisms or other interactional factors.

Another limitation of the current study is its reliance on self-reported data from participants. Potential social desirability bias in responses cannot be discounted, in part due to a lack of observational data connected to participants' reports of their actions and attitudes. However, as a central theme of the study was understanding how participants experienced sexism in everyday interactions, bias in the study is beneficial in terms of illuminating how participants may also incorporate bias into their everyday interactions.

Directions for future research

In terms of future research, the concept of the "sorority girl" was a topic that elicited strong opinions that I was only able to touch on briefly with some interviewees. However, the strongly negative attitudes present among students indicate that a study focusing on the "sorority girl" as a widely derided stereotype on college campuses could potentially shed more light on sexism and gender perspectives. Expanding the study to encompass students from a variety of

fields would allow for comparison of interactions and sexism between different disciplines, and potentially inform interventions or illuminate the need for sexism-reducing interventions in other fields. Other scholars have argued that instead of using the STEM grouping, studying disciplines individually will provide a clearer, more accurate picture of how women's experiences vary depending on their actual field within STEM, as evidenced by the "feminizing" of some fields but not others (Blickenstaff 2005). Therefore, studies focusing the role of interaction that better differentiate between STEM fields may be able to illuminate potential causes and solutions for these continued disparities better than the current study is able by comparing, for example, the experiences of women in biology to those of women in physics, instead of grouping all women in STEM fields together.

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APPENDICES

Appendix A: Phase I Interview Schedule

Interview Schedule

Where are you from?
Probe for SES, feel of community, similarities/differences to Boulder

What do your parents do? (level of education…etc)

How do you identify in terms of race/ethnicity?

What year are you in school?

What is your major?

What are your future career goals?

Why did you decide to major in (science major)?

Do you think females are adequately represented in your field of study? Why or why not?
Probes: at CU? What about in the field you want to go into professionally?

Can you describe some stereotypes of women in science? What about men in science?
Probes: things you've heard people say, things you think personally

Would you say that students in your major fit into these stereotypes? What about yourself?

Now I'd like to talk about your potential experiences with sexism during your time here at CU as well as your personal feelings about sexism as an issue.

How would you personally define the term "sexism"? -or- What comes to your mind when I say the term "sexism"? Are there certain behaviors you would define as sexist?

Now I'm going show you some different images, and have you explain your reaction to each one to me. (show several images) Probes: comparing the images, what seems more/less sexist

(Order: CE Barbie, Sexism demotivational, STEM professor scenario, Shii video)

What determines whether or not [image] is funny or inappropriate?

Are there settings that you've experienced where humor that you would define as sexist is more prevalent?

Do you think there are certain "types of girls" who are more sensitive to sexist humor or comments? How would you describe them?

Probes: describe physical appearance, participation in class, perception of intelligence, race, SES?

Can you think of examples of behavior by instructors that you would consider sexist? What about students in a classroom setting?

Would you say that you've ever experienced sexism in a class you've taken at CU? Even if it seems to be a "minor incident." (prompt to describe in detail)

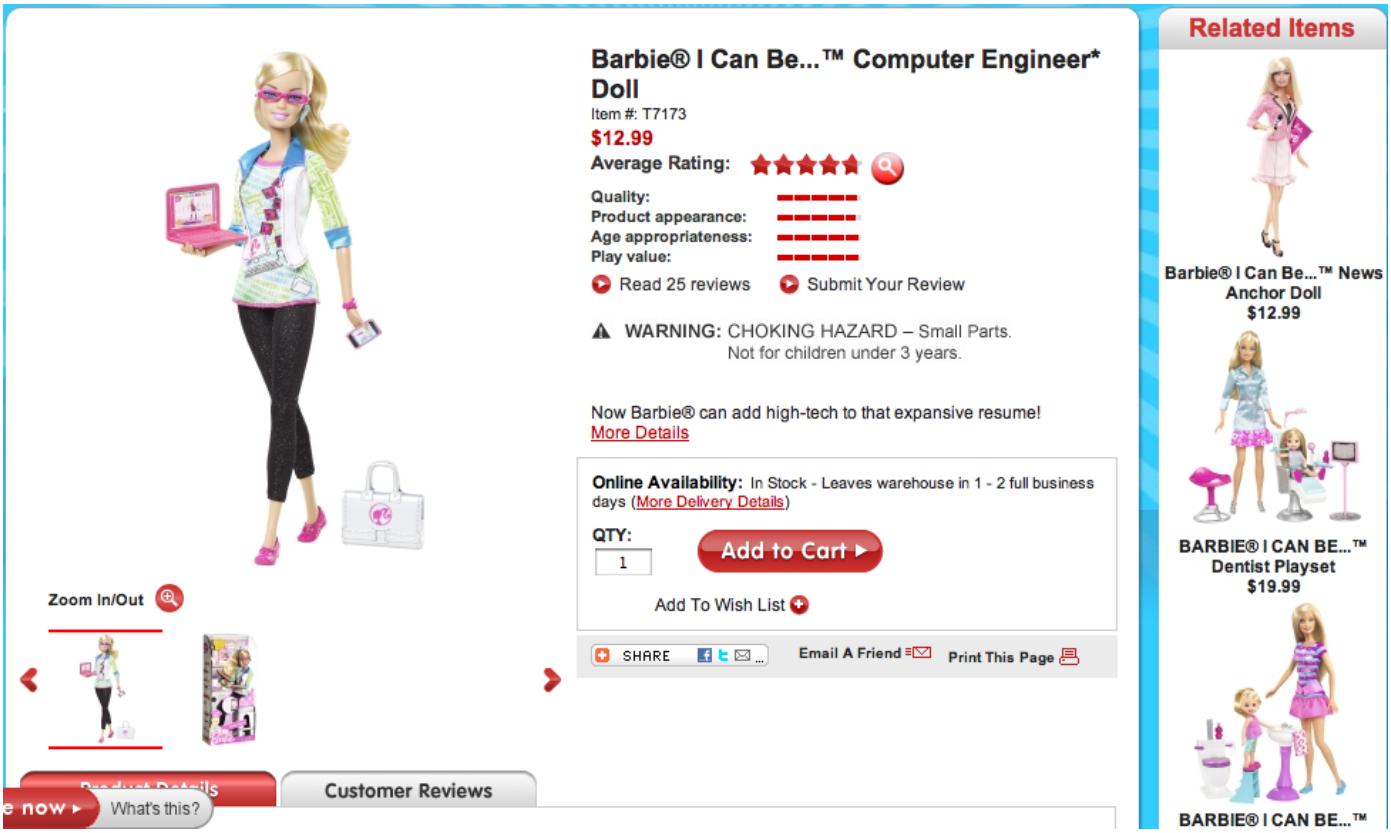
Probes: What did you do? How did it make you feel? How did your classmates seem to react to it? Would you have liked to react differently?

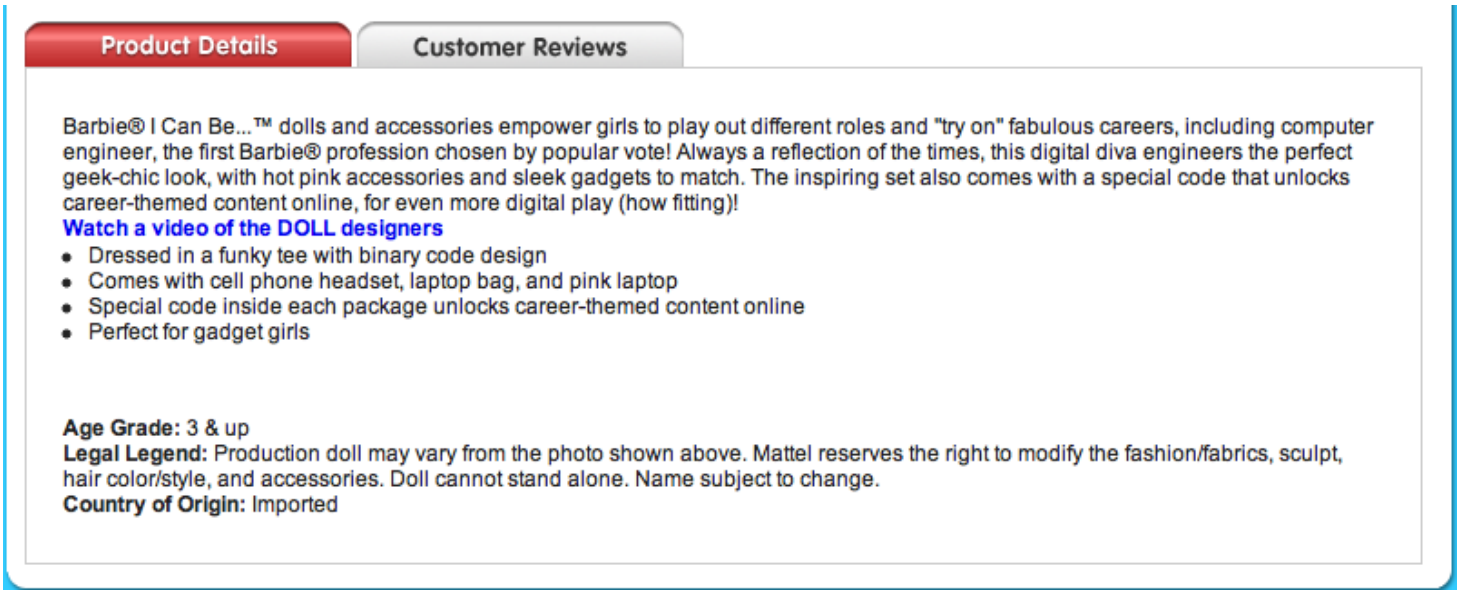
Have you experienced any obstacles/things that have hindered your success at college/What has been your most significant obstacle to being successful at college?
(probing for SES, race, gender issues)

What advice would you give to a freshman student in your major? Advice for a female versus to a male? (fitting in with other students, being successful)

Appendix B: Sexism/Sexist Humor Examples

1. Computer Engineer Barbie photo and description, retrieved at http://shop.mattel.com/product/index.jsp?productId=4032107





2. Sexism "demotivational" poster

3. STEM professor scenario, spoken, example taken from an interview transcript:

"My next one is kind of a verbal scenario. There was a male professor teaching organic chemistry at [university]. And in a joke to his class, he told them that the women who play scientists on CSI couldn't possibly be real scientists because they had good hair, huge knockers, and didn't wear glasses. What do you think about that?"

4. Shii video url: http://www.youtube.com/watch?v=KtabgqdB_k0&feature=related

Screenshot from Shii video: women playing ironing Shii game.

Appendix C: Phase II Modified Interview Schedule

New additions to the schedule are bolded.

Interview Schedule

Where are you from?
Probe for SES, feel of community, similarities/differences to Boulder

What do your parents do? (level of education…etc)

How do you identify in terms of race/ethnicity?

What year are you in school?

What is your major?

What are your future career goals?

Why did you decide to major in (science major)?

Can you describe some stereotypes of college students, women versus men?

> **Do you think college students "choose" stereotypes to fit into? Ex: sorority girls. Are there consequences to fitting into a particular "niche"?**

What about specifically women in science? What about men in science? What do female/male scientists look like?

Probes: things you've heard people say, things you think personally

Would you say that students in your major fit into these stereotypes? What about yourself?

Now I'd like to talk about your potential experiences with sexism during your time here at CU as well as your personal feelings about sexism as an issue.

How would you personally define the term "sexism"? -or- What comes to your mind when I say the term "sexism"? Are there certain behaviors you would define as sexist?

Now I'm going show you some different images, and have you explain your reaction to each one to me. (show several images) Probes: comparing the images, what seems more/less sexist

(Order: CE Barbie, Sexism demotivational, STEM professor scenario, Shii video)

What determines whether or not [image] is funny or inappropriate?

Are there settings that you've experienced where humor that you would define as sexist is more prevalent?

Do you think there are certain "types of girls" who are more sensitive to sexist humor or comments? How would you describe them?

Probes: describe physical appearance, participation in class, perception of intelligence, race, SES?

Should women be "okay" with sexist humor/can women benefit from being "okay" with sexist humor? Like "one of the guys" phenomenon.

Can you think of examples of behavior by instructors that you would consider sexist? What about students in a classroom setting?

Would you say that you've ever experienced sexism in a class you've taken at CU? Even if it seems to be a "minor incident." (prompt to describe in detail)

Probes: What did you do? How did it make you feel? How did your classmates seem to react to it? Would you have liked to react differently?

How do you choose your lab partners/people you want to work with?

Have you experienced any obstacles/things that have hindered your success at college/What has been your most significant obstacle to being successful at college?
(probing for SES, race, gender issues)

What advice would you give to a freshman student in your major? Advice for a female versus to a male? (fitting in with other students, being successful)

Appendix D: Recruitment Information

Phase I Recruitment Email Text:

$10 FOR 45 MINUTE INTERVIEW ABOUT SCIENCE, MATH, TECHNOLOGY AND ENGINEERING MAJORS

Seeking participants for a research study on undergraduate science, math, technology and engineering majors. The purpose of this research is to study the experiences and perspectives college students have regarding gender in a university setting. You will be compensated $10 for a 45 minute interview. If interested, please send an email with your major and year in school to melissa.kanack@colorado.edu.
Contact: Melissa Kanack

Phase II Recruitment Email Text:

$10 FOR 45 MINUTE INTERVIEW ABOUT SCIENCE, MATH, TECHNOLOGY AND ENGINEERING MAJORS

Seeking current juniors and seniors for a research study on undergraduate science, math, technology and engineering majors. The purpose of this research is to study the experiences and perspectives college students have regarding gender in a university setting. You will be compensated $10 for a 45 minute interview. If interested, please send an email with your major and year in school to melissa.kanack@colorado.edu.
Contact: Melissa Kanack

Appendix E: Journaling Instructions

Journaling Instructions

Please make at least one entry per day in your journal for the next two weeks. For your entries, I would like you to describe any incidents you have observed during the day, whether during class, an extracurricular activity, or recreational activities, that seem to you to reflect sexism, sexist humor, or speak to gender relations among college students. These incidents do not have to be related to "science." When talking about other people in your journal entries, please use pseudonyms.

Note: students kept journals as Word documents that were collected via email.

Appendix F: Participant Informed Consent Document

College Students' Perspectives on Sexism and Sexist Humor
Principal Investigator: Melissa Kanack

Participant Informed Consent Document
September 15, 2010

Please read the following material that explains this research study. Signing this form will indicate that you are informed about the study and want to participate. I want you to understand what you are being asked to do and what risks and benefits—if any— are associated with the study. This should help you decide whether or not you want to participate in the study.

My name is Melissa Kanack, and I am an undergraduate student performing research for an honors thesis in the Sociology Department at the University of Colorado at Boulder. You can contact me by email at melissa.kanack@colorado.edu or phone at [redacted]. My faculty sponsor is Professor Stefanie Mollborn. She can be contacted at stefanie.mollborn@colorado.edu or (303) 735-3796.

Project Description
The purpose of this study is to explore how college students experience and approach sexism in a classroom setting. I would like to gain an understanding of how students define sexism and how they view it as an issue on campus. In order to accomplish this, I will be asking you about specific sexist incidents you may have experienced in college, as well as how you reacted to the experience and why you reacted in that manner. I will also be asking you about other experiences and difficulties you may have had during your college career. I hope that this project will shed light on how student-student and student-instructor relationships play a role in sexism in the classroom. I also hope that the findings can be used to open a dialogue and hopefully improve classroom communication and university policy in regard to dealing with sexism in the classroom.

Procedures
As a participant in this study, I will ask you to interview with me for approximately one hour, for one or two sessions. The interviews will take place on campus, most likely in a study room in Norlin Library or other private, quiet area, and will be audiotaped to aid in data analysis. I will be asking you questions about any personal experiences you may have had with sexism in the classroom as well as questions about gender-based stereotypes of scientists. Some sample questions include, "How would you personally define 'sexism?" and "Can you describe some stereotypes of women and/or men in science?"

For journal participants
If you are willing to complete a journal and are chosen to do so, I will provide you with a journal and a sheet of written instructions. I would like you to write in this journal once daily for a period of two weeks, noting incidents of sexism, sexist humor, or other things that seem interesting to you in terms of sex and gender relations both in the classroom and in your daily life. Please use pseudonyms when writing about other people in your journal.

Risks of Participating
While I expect the potential risks of participating in this study to be minimal, you may experience some discomfort from talking about experiences you may have had that may have been upsetting or emotional.
However, please be aware that if you disclose any incidents of a sexual nature that have occurred between yourself and someone in a supervisory capacity to you at CU I may have mandatory reporting requirements.

Benefits
There are minimal direct benefits to your participation in this project. However, the data that comes from this project will hopefully improve understanding of sexism on college campuses, and thus help improve classroom climate in regard to gender relations.

Ending Your Participation
You have the right to withdraw your consent or stop participating at any time. You have the right to refuse to answer any question(s) or refuse to participate in any procedure for any reason. Refusing to participate in this study will not result in any penalty.

Confidentiality
I will maintain the privacy of your personal data. All material collected from interviews (audiotapes, notes, and informed consent forms) will be kept secure on a password protected computer and in a locked drawer, and then destroyed within a year. You will be assigned a pseudonym and will be referred to by this pseudonym in transcription, analysis, and publications.

Questions?
If you have any questions regarding your participation in this research, you should ask the investigator before signing this form. If you should have questions or concerns during or after your participation, please contact Melissa Kanack at [redacted] or at melissa.kanack@colorado.edu.

If you have questions regarding your rights as a participant, any concerns regarding this project or any dissatisfaction with any aspect of this study, you may report them -- confidentially, if you wish -- to the Executive Secretary, Human Research Committee, 26 UCB, Regent Administrative Center 308, University of Colorado at Boulder, Boulder, CO 80309-0026, 011 (303) 735-3702.

Authorization
I have read this description of the research study or it was read to me. I know the possible risks and benefits. I know that participating in the interview process and being in this study is voluntary. I choose to sign this form and be part of this study. I know that I can withdraw at any time. I have received, on the date signed, a copy of this document containing 2 pages.

Name of Participant (printed): _____

Signature of Participant: _____ Date: _____