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# The Effect of Hostile and Benevolent Sexism on Women's Cardiovascular Reactivity to and Recovery from a Laboratory Stressor

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The Effect of Hostile and Benevolent Sexism on Women's Cardiovascular  
Reactivity to and Recovery from a Laboratory Stressor

by

Kaleena Dennielle Burgess

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
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### Abstract

Hostile sexism is the antipathetic expression of sexism, in which men are antagonistic towards women who threaten their superiority. Benevolent sexism is the patriarchal expression of sexism, where men express protective, yet restrictive, attitudes towards women. Both forms of sexism originate from the view that women are inferior, frail, and only suited for nurturing or domestic responsibilities. Benevolent sexism may be more harmful to women because coping is thwarted by observers' underestimation of its effects (Bosson, Pinel, & Vandello, 2009). The present study aimed to examine women's responses to and recovery from hostile and benevolent sexism utilizing measures of cardiovascular reactivity and recovery. I predicted that women would exhibit greater reactivity to hostile sexism, but impaired recovery to benevolent sexism. Participants were 124 undergraduate women (50% Caucasian, age  $M = 18.92$ ), with no history of cardiovascular health issues. Sexism condition – benevolent, hostile, or no sexism – was manipulated by exposing participants to comments made by a male experimenter. Cardiovascular responses were obtained during rest, task, and recovery periods. As predicted, women exhibited greater cardiovascular reactivity after exposure to hostile sexism, and women who experienced benevolent sexism showed impaired recovery, compared to the other two conditions. Findings illustrate that hostile sexism elicits immediate responses that resolve relatively quickly. However, benevolent sexism may be more pernicious in terms of psychological and physical health due to its prolonged effects. Implications for chronic exposure to both kinds of sexism are discussed.

## Introduction

“Let us take first the virtue of a man—he should know how to administer the state, and in the administration of it to benefit his friends and harm his enemies; and he must also be careful not to suffer harm himself. *A woman's virtue, if you wish to know about that, may also be easily described: her duty is to order her house, and keep what is indoors, and obey her husband.*” – *Meno* by Plato

The historical context of sexism can be dated to the mid-400 BCE, when Greek General Meno described the difference between men's and women's virtues. Today, gender roles continue to be restrictive, as women are discouraged from top leadership positions (Ryan, Haslam, & Postmes, 2007). Yet gender discrimination can appear beneficial in some job specifications, such as the nursing profession where women predominate (Kermode, 2006). Though appearing juxtaposed in the supposed maleficence and beneficence of intentions, both expressions of gender differentiation portend restrictions based on gender, or sexism, with women as the target.

Sexism is expressed as a separation of gender roles and differential access to privileges and opportunities. Traditional gender role stereotypes describe women as nurturers who are emotional, sensitive, and warm. They also describe women as unambitious, incompetent, weak, and conniving in their relational power (Adams, 2009; Williams & Best, 1990). Even the positive qualities can hold negative implications. Whereas these traits are idealized in good romantic partners and mothers, they imply frailty, or ineptitude, in a competitive environment. These views are held towards women as a group and fail to view women as individuals, which would constitute sexism as a prejudice. However, prejudice is “an aversive or hostile attitude toward a person

who belongs to a group, simply because he [or she] belongs to that group, and is therefore presumed to have the objectionable qualities ascribed to the group” (Allport, 1954).

Contrary to the definition of prejudice, sexist attitudes and actions are not always hostile in nature. Women are viewed as inferior and incompetent, and yet, necessary for rewarding intimate relationships and procreation (Glick & Fiske, 2011). Out of these conflicting views arise both hostility and beneficence. This is the basis for Glick and Fiske’s (1996) Ambivalent Sexism theory, in which the same sexist attitudes towards women as inferior can be expressed in two different ways.

Glick and Fiske (1996) argue that sexism is not just marked by antipathy as a straightforward prejudice would be, but also marked by benevolent thoughts including the need to protect women. Their work can be linked to themes identified in 1959 by Nadler and Morrow, who explored patterns of men’s authoritarian attitudes toward women. One identified attitude type, *openly subordinating attitudes*, included supporting policies that restricted women’s freedoms and endorsing the stereotype that women are inferior, thus, should be subordinate. Another attitude was *chivalry*, defined as endorsing women’s positive value, showing deference and protectiveness toward women, promoting formalized rules and social conduct for women, and stereotypically viewing women as “morally pure, physically fragile, and intellectually naïve” (Nadler & Morrow, 1959). Thematically consistent, Glick and colleagues refer to the two components of ambivalent sexism as Hostile Sexism, akin to openly subordinating attitudes, and Benevolent Sexism, which is similar to chivalry. Hostile and benevolent sexist attitudes vary on multiple dimensions: Patriarchal view of society, differentiation of social roles, and biological need for sexual reproduction. These dimensions, unlike Nadler and

Marrow's (1954) work, relate to the variety of ways in which men and women interact with one another (Glick, Diebold, Bailey-Werner, & Zhu, 1997; Glick & Fiske, 1996, 2001, 2011).

### **Hostile Sexism**

Hostile sexism is rooted in the belief that women are inferior to men, which makes men more deserving of higher status and power (Becker & Wright, 2011; Glick et al. 1997). Often restrictive, hostile sexism is the antipathetic, most overt, and most easily recognizable form of sexism. Those with hostile sexist attitudes have a *dominative* patriarchal view of society. This is the perceived need for domination over women in all parts of society. Similarly, *competitive* gender differentiation attitudes reflect the separation of gender roles based on the belief that only men are capable of filling important societal roles. This reasoning offers social justification that men should rule, and women seeking to fill leadership roles are trying to usurp men's power and will not perform as well. Finally, heterosexual *hostility* is the hostile sexist attitude that men's biological need for women to reproduce leaves men vulnerable to needing a woman and threatens men with the possibility of rejection. This vulnerability may be uncomfortable for a man given the aforementioned belief that he should have dominion over all avenues of life (Glick & Fiske, 1996).

Hostile sexism is recognizable, because the attitudes are characterized by overt antipathy (Glick & Fiske, 1996). Attitudes include the degradation of women (e.g., "Women are too easily offended"), being sexually guarded against women (e.g., "Once a man commits, she puts him on a tight leash"), anti-feminist views (e.g., "Women seek special favors under guise of equality"), and explicit threats or accusations (e.g., "Women

seek power by gaining control over men”). Though these attitudes still exist, it is not acceptable social behavior for men to openly express hostility toward women and to subjugate them (Glick & Fiske, 2011). Alternatively, sexist attitudes may be expressed in other ways that can pass as socially acceptable.

### **Benevolent Sexism**

Attitudes that regard women as inferior can lead to discriminatory acts, some of which can be perceived as positive because they are helpful or protective; such are the defining characteristics of benevolent sexism. Benevolent sexism involves subjectively favorable, chivalrous attitudes that give protection and affection to deserving women who embrace the stereotypical gender norm (Glick & Fiske, 2001). Nadler and Morrow (1959) noted protection and the idealization of women as central features to less hostile expressions of sexism. Benevolent sexists might hold the attitude that women are in need of support and should be adored, and a woman’s love completes a man (Glick & Fiske, 2001). Like a porcelain doll, women are viewed as fragile, weak, meant to be cherished, and suited for only specific tasks like nurturing. These beliefs may seem like privileged treatment, however, they are often confining and restrictive.

Attitudes that define benevolent sexism include protective paternalism, complementary gender differentiation, and heterosexual intimacy (Glicke & Fiske, 1996). *Protective* paternalism is defined as the governing, ruling, or controlling of subordinates in a way that suggests a father’s relationship with his children. A benevolent sexist might dictate women’s behaviors, while morally justifying his behavior with the belief that he holds his ‘subordinate’s best interests in mind.’ This behavior reflects the patriarchal interaction between benevolent sexist men and women. When the interaction is about

social roles, benevolent sexists view male and female gender roles as *complementary* rather than competitive. The role of men is outside the home, while women's is inside. Traits can also be viewed in this complementary manner, as a benevolent sexist would view women as possessing traits, such as emotional sensitivity, which are perceived as favorable when complementing men's stereotypic lack of such traits (Glick & Fiske, 1996). Benevolent sexist attitudes are also expressed in interactions of heterosexual *intimacy*. A top source of happiness, heterosexual men seek romantic relationships, psychological closeness, and heterosexual intimacy with women (Brehm, 1992). Attitudes of heterosexual intimacy are reflected in phrases like, "Every man ought to have a woman he adores" and reversed, "Men are complete without women" (Glick & Fiske, 1996).

The Ambivalent Sexism Theory purports that both hostile and benevolent sexism are two expressions of the same sexist attitudes that women are inferior (Glick & Fiske, 1996). Both attitudes can originate from interactions between heterosexual men and women. Consider heterosexual relations; men seeking heterosexual intimacy with women are vulnerable to women's acceptance or rejection of his affection. Some men may seek to dominate women to cope with this vulnerability as in hostile sexism. This 'need, yet fear' of women is indicative of the close link between hostile and benevolent sexism. Indeed, other interactions between men and women may lead to juxtaposed responses from sexist attitudes. Women managers may have the ire of sexist men, where the same men would act protectively towards the women in their home (Cikara, Lee, Fiske, & Glick, 2009). A man may hold sexist attitudes that he should maintain control over women, and thus, hold both hostile and benevolent attitudes simultaneously. A

woman's behavior in adherence, or opposition, to the stereotypic gender role may dictate which attitude a man expresses, with more favorable attitudes reported towards women in traditional roles (Glick et al., 1997). The close link between benevolent and hostile sexism is important for acknowledging both as supporting sexist attitudes and the potential dangers.

### **Reactions to Ambivalent Sexism**

Ambivalent sexism describes contradictory, yet correlated attitudes and behaviors of sexism, with hostile sexism viewed as the less socially acceptable and benevolent sexism as subjectively positive (Glick et al., 1997). These juxtaposed variations of sexism have both persisted, possibly because if one perpetuates, the other does as well. Perpetuation may occur by the varying ways hostile and benevolent sexists are perceived by observers. When presented with information about men who endorsed either hostile or benevolent sexist beliefs, observers evaluated men who endorsed benevolent sexist beliefs more positively than those who endorsed hostile. This may occur because observers fail to recognize benevolent sexism as prejudice because it lacks antipathy, or observers view it as a tolerable form of prejudice because it benefits the target (Barreto & Ellemers, 2005). More positive attitudes reported by observers towards a benevolent sexist may be one way in which benevolent sexism is perpetuated.

Rather than just the opinions about the types of sexism expressions, propagation of ambivalent sexism may alternatively be due to how it changes observers' opinions of women targets themselves. Good and Rudman (2009) showed participants a transcript of an interview between a male interviewer and a female applicant, then asked for participants' judgments of each person and their hiring decision for the female applicant.

In the transcript, the male interviewer expressed benevolent sexist, hostile sexist, or neutral attitudes towards the woman applicant. The applicant's responses and qualifications were held constant across conditions. Participants' liking of the sexist interviewer negatively related to participants' decision to hire the female applicant. Further, applicant competency ratings mediated this relationship. Men who displayed benevolent sexist attitudes were seen as more likeable by observers, who then perceived the woman target of his statements as less competent. The consequence was observers choose not to hire her (Good & Rudman, 2009). Expressions of benevolent sexism may be effective in continuing gender differentiation by affecting observer opinions to match stereotypic attitudes.

Ambivalent sexism may also perpetuate gender differentiation by shaping the opinions and behaviors of the women targets, themselves, who receive sexist treatment. Benevolent sexism is particularly effective in shaping women's behaviors (e.g. Fischer, 2006; Glick & Fiske, 2001) and maintaining the gender discriminating social order (for a review, Cikara & Fiske, 2007; Jost & Kay, 2005). Women who endorse benevolent sexism themselves may perpetuate discrimination by emphasizing their relational qualities and de-emphasizing their task-related characteristics (Barreto, Ellemers, Piebinga, & Moya, 2009). For example, activating the communal qualities of women – a positive stereotype emphasized by benevolent sexism – women's support for existing system of gender relations increases (Jost & Kay, 2005). Exposure to benevolent sexism also decreased women's engagement in collective action to reduce gender inequality, whereas exposure to hostile sexism increased engagement toward social change (Becker & Wright, 2011). Dumont, Sarlet, and Dardenne (2008) found that women exposed to

benevolent sexist comments, rather than hostile sexist comments, were more likely to generate mental intrusions of incompetency and more likely to recall autobiographical memories dealing with incompetence. Encounters with benevolent sexism can change women's own attitudes and behaviors, allowing the sexist attitudes to continue.

The insidious nature of benevolent sexism to perpetuate the stereotype that women are incompetent becomes clearer when viewed in terms of its effect, not just on observers' perceptions of women, but on the reaction of women targets, themselves. Experiencing sexism may impair women's performance, which would perpetuate stereotypic attitudes as well (Dardenne, Dumont, & Bollier, 2007; Vescio, Gervais, Snyder, & Hoover, 2005). Vescio et al. (2005) had women participate in a gender discriminatory team challenge, where male leaders made role assignments, disbursed monetary rewards, and praise. Men in leadership positions discriminated against subordinate women when choosing team roles with the justification that women would be incompetent at the male-oriented task. However, the discrimination was made protective or pleasant by the leaders still giving the subordinate an unjustifiably high amount of praise. These juxtaposed behaviors demonstrate restrictive and patronizing qualities that are similar to benevolent sexism. Both men and women subordinates became angry when they received the devalued-yet-high-praise position. Whereas men performed better after receiving the anger-inducing position, women performed worse because of that anger (Vescio et al., 2005). This effect may have been due to men perceiving the ability to change the situation and utilizing anger as a motivator (Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003), whereas the nature of the interaction did not allow women to utilize it the same way.

When specifically manipulating ambivalent sexism, Dardenne et al. (2007) also found performance deficits for women. Female participants exposed to a male confederate who acted in a benevolent sexist way in a job interview setting – as compared to a hostile sexist or a non-sexist – performed worse on a working memory and cognitive resources task. Impaired performance was mediated in the benevolent sexism condition by mental intrusions about a lack of competence (Dardenne et al., 2007). In sum, though benevolent sexism may be subjectively positive and a benevolent sexist viewed more likeable, being the target of benevolent sexism has consequences, facilitated by to anger and mental intrusions of incompetency, on a woman's thoughts and cognitive performance.

### **Coping with Sexism**

Though benevolent sexism has negative repercussions on women targets, observers tend to believe that hostile sexism should have the most uniformly negative impact on women's emotions due to its overtly antagonistic nature. However, research examining women's actual emotional reaction to hostile sexism suggests that this assumption is incorrect (Bosson, Pinel, & Vandello, 2009). When compared to women's actual responses to sexism, observers tended to overestimate women's initial anger and disgust response to hostile sexism and underestimate the responses to benevolent sexism. In fact, women reported experiencing equivalent, or slightly more anger, when they were the target of benevolent sexism as compared to hostile sexism. Observers also overestimated the time necessary to recover from hostile sexism, and underestimated the recovery time from benevolent sexism. Women who were victims of sexist behaviors reported a similar amount of time to recover from either type of sexism (Bosson et al.,

2009). While these findings suggest that emotional reactivity to and recovery from both forms of sexism are similar, the actual time course of response to benevolent and hostile sexism are difficult to accurately predict from retrospective self-report. Whether there are differences in initial reactivity and subsequent recovery is a matter of debate.

Reports of equivalent anger between benevolent and hostile sexism may be due to hindsight bias, such that anger towards hostile sexism diminishes, but persists after a benevolent sexism encounter. Seeking social support for or validation of angry feelings may be possible after a hostile sexist encounter, because overt hostility is not socially acceptable behavior (Swim, Aikin, Hall, & Hunter, 1995). Women may still react more to hostile sexism, but are readily able to cope. Benevolent sexism, however, is not always viewed by observers as detrimental to the target (Bosson et al., 2009) and, recall, a benevolent sexist can be viewed positively (Barreto & Ellemers, 2005; Good & Rudman, 2009). As a result, women who are targets of benevolent sexism may receive implicit social messages that benevolent sexism is “no big deal” and negative reaction to it is uncalled for (Bosson et al., 2009). This minimizing of anger response to benevolent sexism could interfere with coping or add to negative affect (Bosson, Pinel, & Thompson, 2008) and possibly rumination. Women would be more likely to retrospectively report a level of anger that had not been coped with, which may be equivalent or greater than anger that had been coped with after a hostile sexist encounter, consistent with Bosson et al.’s (2009) findings. While retrospective self-report can be biased by time and coping differences, self-report measures of emotion are additionally subject to bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). More objective and online methods, which assess reactivity and recovery, would provide stronger evidence of the time-course of response

to sexism. Measures of cardiovascular responses are less affected by volitional control and as such may be less biased (Blascovich & Tomaka, 1996; Dasborough, Sinclair, Russell-Bennett, & Tombs, 2008). Cardiovascular physiological measures, which can be assessed continuously during and after a task, may prove useful in identifying discrete responses to ambivalent sexist encounters.

### **Cardiovascular Response**

Cardiovascular measures, including blood pressure, heart rate, cardiac output, and cardiac contractility, change in response to stress primarily due to activation of the sympathetic nervous system. Often called the “fight or flight” system, the sympathetic nervous system increases physiological arousal to prepare the body to actively cope with or escape from a stressor. Stressors are usually aversive, difficult, or require attention, such as an academic test (Hazlett, Falkin, Lawhorn, Friedman, & Haynes, 1997) or a motivated performance situation that includes social evaluation (Blascovich & Tomaka, 1996). Cardiovascular reactivity refers to the change in cardiovascular function from resting levels in response to a stimulus or stressor (Hazlett, Falkin, Lawhorn, Friedman, & Haynes, 1997; Kamarck & Lovallo, 2003). Cardiovascular recovery refers to the time following a stressor, called the recovery period, in which the persistence of the physiological reactivity is measured (Linden, Earle, Gerin, & Christenfeld, 1997). The recovery period is provided for participants to return to pre-stress, or baseline, levels of cardiovascular functioning (Christenfeld, Glynn, & Gerin, 2000).

Few studies have examined cardiovascular responses to ambivalent sexism, specifically. Similarly, however, Schneider Tomaka, and Palacios (2001) manipulated harassment by a man while measuring cardiovascular and emotional reactivity in women.

In the harassment condition, a male confederate made sexist comments and took control of a shared task from the female participant. In the equality condition, the male confederate worked with the participant to complete the task. Finally, in the female-control condition, the male confederate did nothing and gave the female participant full responsibility of the task. Although not identified by the authors as such, the harassment condition could easily be construed as hostile sexism. The male confederate said, “Girls aren’t very good at this. I’ll do it all and get a good score for us,” then forcibly took the paper away from the female participant. In line with past research about reactions to hostile sexist treatment, women in the harassment condition rated the male very low on likeability and friendliness as compared to the other conditions. In addition, women in the harassment condition showed greater cardiovascular reactivity during the task. Specifically, women in the harassment condition exhibited greater increases in heart rate, systolic blood pressure, mean arterial pressure, and cardiac contractility, relative to the other two conditions (Schneider et al., 2001). Interesting to note, women in the harassment condition were not completing a task at the time of cardiovascular reactivity assessment; the task had been taken away from her by the male confederate. The fact that cardiovascular reactivity was greatest in this condition is contrary to most cardiovascular literature, in which a motivated performance situation is required to elicit significant changes in cardiovascular reactivity (Blascovich & Tomaka, 1996). If women responded with increased cardiovascular reactivity to a condition similar to a hostile sexist encounter when the situation only required passive engagement, greater reactivity would be expected if they had also been engaged in a motivated performance situation.

Using physiological measure other than cardiovascular measurement, significant differences have been found in women experiencing sexism, facilitated by a women's own perception of sexism. Townsend, Major, Gangi, and Mendes (2011) measured women's cortisol levels – a primary stress hormone (Ulrich-Lai & Herman, 2009) – in conjunction with sexist treatment, comparable to hostile sexism, in a series of studies. The first study, women faced rejection from a man for either sexist (i.e. being too emotional) or merit-based reasons. In the second study, women interacted with a male confederate who expressed sexist attitudes (e.g., “Women should not earn the same amount of money in certain fields because they do not have the same abilities as men.”) or whose attitudes were unknown. Women who perceived a high likelihood of sexism in either situation exhibited higher cortisol levels as compared to participants who experienced non-gender-based rejection or an explicitly non-sexist interaction (Townsend et al., 2011). This research illustrates women's physiological response increases when women are prone to identifying sexism.

Group and gender identification may also impair cardiovascular recover after the prevalence of sexism is made salient. Eliezer, Major, and Mendes (2010) had participants read and summarize an article either explaining the prevalence or rarity of sexism. Regardless of high or low gender identification, participants had greater vascular reactivity after reading that sexism was prevalent. However, they also found that women high in group identification showed a prolonged recovery from the prevalent sexism exposure and reported higher anxiety. Though not benevolent or hostile sexism, these findings suggest that the tendency to perceive sexism may be an important factor in the experience of sexism, and may play a role in impaired recovery.

Although research has not examined cardiovascular recovery after ambivalent sexism specifically, predictions may be made about cardiovascular response to sexism based on the affective and cognitive experiences of different types of sexism. Recall that anger is a prime emotion experienced by women who are targets of sexism (Bosson et al., 2009; Vescio et al., 2005). Anger is related to increased blood pressure reactivity and future incidence of hypertension (Everson, Goldberg, Kaplan, Julkunen, & Salonen, 1998; Suls, Wan, & Costa, 1995). Not only the experience of anger can increase reactivity, but its inhibition can affect cardiovascular response as well. Individuals show greater diastolic blood pressure reactivity and slower systolic blood pressure recovery when harassed and anger inhibited (Vella & Friedman, 2009). Anger inhibition may be the case in encounters with benevolent sexism. The inability to express anger can also lead to perservative cognition, worry, or rumination, which have also been shown to be detrimental to cardiovascular recovery (Suchday, Carter, Ewart, Larkin, & Desiderato, 2004). Rumination occurs when a stressor persists in thoughts after the termination of the stressor event. Rumination alone, whether it is on anger or other thoughts, has been shown to impair recovery (Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Neumann, Waldstein, Sollers, Thayer, & Sorkin, 2004; Suarez, Harlan, Peoples, & Williams, 1993). Based on these findings, predictions may be made about the varied cardiovascular response to experiences of ambivalent sexism.

### **The Present Study**

The present study examines and distinguishes the influences of hostile and benevolent sexism on emotions and cardiovascular response of women. Cardiovascular reactivity to and recovery from a motivated performance task were measured after

exposing women to hostile sexist, benevolent sexist, or non-sexist remarks. By exposing women to varying types of sexism while measuring cardiovascular responses, the types of sexism may be distinguished in their immediate- and short-term effects.

**Hypotheses.** Men displaying benevolent sexism tend to be rated more positively (Barreto & Ellemers, 2005) and more likeable (Good & Rudman, 2009), than men displaying hostile sexism. In addition, men who display harassment, akin to hostile sexism, are rated low in likeability and friendliness by the women they harass (Schneider et al., 2001).

*Hypothesis 1.* Women will rate the male confederate in the hostile and benevolent sexism conditions as less likeable, and have more complaints against him, than in the non-sexism condition. The hostile sexist experimenter will be rated as least likeable.

Performance on the motivated performance task may also be affected by the sexist encounter. Participants in the two sexism conditions should perform worse than those in the no-sexism condition (Dardenne et al., 2007; Vescio et al., 2005). This may be more pronounced in for benevolent sexism, because women's engagement may decrease (Becker & Wright, 2011) and mental intrusions of incompetency increase (Dardenne et al., 2007; Dumont et al., 2008).

*Hypothesis 2.* Women experiencing sexism will show a decrease in performance relative to women experiencing no sexism, regardless of whether the sexism is hostile or benevolent. (*Exploratory*) This effect may be mediated thoughts of incompetency.

As for cardiovascular response, sexism should lead to greater cardiovascular reactivity because it elicits anger (Bosson et al., 2009; Vescio et al., 2005). If hostile sexism elicits greater initial anger than benevolent sexism, as observers predict (Bosson

et al., 2009), women may exhibit greater reactivity in response to hostile, relative to benevolent sexism which may delay. Additionally, Schneider et al.'s (2001) unique finding that cardiovascular reactivity increased in response to sexist harassment, above that of task engagement reactivity, also supports the hypothesis that a hostile sexist encounter will lead to greater reactivity.

*Hypothesis 3.* Women who are exposed to hostile sexism will exhibit greater cardiovascular reactivity as compared to women who are exposed to benevolent and/or non-sexism. (*Exploratory*) This difference may be mediated by increased anger.

As for cardiovascular recovery, the recovery from benevolent should be impaired as compared to recovery after hostile sexist or non-sexist encounters. Though anger should be produced in each sexist condition, women in the benevolent sexism condition may not directly cope with the sexism and therefore ruminate (Bosson et al., 2009; Neumann et al., 2004). Since benevolent sexism may lead to anger and mental intrusions of incompetency (Dardenne et al., 2007; Dumont et al., 2008), which are not directly coped with, rumination may be greater for benevolent sexism targets than for hostile sexism targets, which can impair recovery (Gerin et al., 2006).

*Hypothesis 4.* Women exposed to benevolent sexism will exhibit impaired recovery relative to those who were exposed to hostile sexism or no sexism. Women exposed to no sexism will show the least impaired recovery.

Exploratory measures, like thoughts of incompetency, anger, and individual differences in perceptions of sexism, were also included to examine potential mediators of responses to sexism exposure. State affect after the sexism manipulation was

examined as a partial manipulation check and mediator. Individual differences in sexist beliefs and attitudes were also measured.

## Method

### Participants

Participants were 124 female undergraduate students aged 18 to 26 years ( $M = 18.97$ ,  $SD = 1.50$ ) recruited from the University of South Florida (USF). The sample was 50% Caucasian and consisted of women with no prior history of cardiovascular disease and mostly non-smokers (see Table 1). Two participants were dropped from subsequent analyses because of missing data due to equipment malfunction. The final sample size was 122. Recruitment occurred through the USF Psychology Department online participant pool, Sona Systems. Inclusion criteria for participation were (1) between the ages of 18 to 25 years at the time of pre-screening because of age differences in perceptions of sexism (Dardenne et al., 2007) and cardiovascular responses (Stratton et al., 2003), (2) no prior diagnoses of cardiovascular disease, (3) not currently pregnant, and (4) no participation in any other cardiovascular psychophysiological studies during the same semester to avoid suspicion. Compensation was course credit; up to 3.5 Sona credits for full participation in both the online surveys and laboratory involvement.

### Measures

**Attitudes and Perceptions of Sexism.** Due to the deceptive nature of the study, scales assessing attitudes and experiences regarding sexism were collected using an online survey feature of Sona, called Mass Testing. Participants completed the following surveys among others from other studies, and then volunteered to participate in the

Table 1.

*Demographic Information*

	<i>M (SD)</i>	Min	Max
BMI	23.65 (4.99)	15.35	42.64
Frequency (%)			
Race/Ethnicity			
American Indian or Alaska Native		1 (0.8)	
Asian or Asian-American		10 (8.1)	
Arab or Middle Eastern		2 (1.6)	
Black or African American		16 (12.9)	
Hispanic or Latino		19 (15.3)	
Native Hawaiian or Pacific Islander		0 (0.0)	
White or Caucasian		62 (50.0)	
Mixed/Multiracial		13 (10.5)	
Other, Non-specified		1 (0.8)	
Smoke Nicotine Cigarettes			
No		118 (95.2)	
Yes		5 (4.0)	
Not Reported		1 (0.8)	

laboratory portion of the study. This eliminated the possibility of the surveys influencing responses in the laboratory.

*Ambivalent Sexism Inventory (ASI)* (Glick & Fiske, 1996; Glick & Fiske, 2001).

The ASI was used to measure perceptions of the relationship between men and women, both the hostile and benevolent components. It consists of 22 statements, measured on a Likert-type scale from 1 (*disagree strongly*) to 7 (*agree strongly*), to which participants rated how much they endorse the attitude phrase. An example of a benevolent sexism statement is “No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman,” and a hostile sexism statement is “Many women are actually seeking special favors, such as hiring policies that favor them over men, under the guise of asking for ‘equality’” (see Appendix A for complete survey). Both subscales, hostile sexism and benevolent sexism, showed high reliability in the present study, Cronbach’s  $\alpha$  of .77 and .81, respectively, which is consistent with previous research. Higher scores on the ASI indicate greater endorsement of sexist statements, and indicate a stronger belief in traditional gender roles.

*Attitudes Towards Women Scale (AWS)* (Byrne, Felker, Vacha-Haase, & Rickard,

2011; Nelson, 1988; Spence, Helmreich, & Stapp, 1973). The AWS is a measure of

individual-differences in regards to attitudes toward women on a one-dimensional scale.

The AWS measures traditional and conservative attitudes of women’s place, including separate factors of rights, position relative to men, freedom, family role, and legal rights for college-aged participants (Byrne et al., 2011). The 25 items, such as “Women should take increasing responsibility for leadership in solving the intellectual and social problems of the day,” are measured on a Likert scale from 1 (*strongly disagree*) to 7

(*strongly agree*) (see Appendix B). In the present study, the AWS had sufficient reliability with a Cronbach's  $\alpha$  of .88, which is equivalent to past research with a mixed-age sample including college females (Daugherty & Dambrot, 1986). Lower scores indicate endorsement of traditional sex-role stereotypes.

*Modern Sexism Scale (MSS)* (Swim et al. 1995). Current attitudes toward gender-related political issues or the denial of continuing discrimination against women are measured using the MSS. This measure attempts to assess more subtle aspects of sexism in society. This 7-item scale is assessed on a Likert scale from 1 (*strongly agree*) to 7 (*strongly disagree*), with content valid statements like "Discrimination against women is no longer a problem in the United States [Reverse-scored]" (see Appendix C). Participants rate their belief that sexism issues still occur in modern society. In past research, the MSS has a shown high internal reliability (Cronbach's  $\alpha = .84$ ), which was similarly found with the current sample (Cronbach's  $\alpha = .75$ ). Higher scores on the MSS indicate a belief that sexism is still a modern issue.

### **Laboratory Measures.**

*Health Questionnaire.* Participants reported their current state of physical health and recent behaviors that may affect cardiovascular functioning using a brief health questionnaire. Questions include recent food and caffeine intake, smoking habits, recent medication, and menstrual cycle (see Appendix D). This questionnaire also served as a secondary screening for exclusion criteria (i.e. pregnant, diagnosed with conditions affecting cardiovascular function).

*Performance – Remote Associates Task (RAT).* The Remote Associates Task, developed by Mednick (1968), was used as a motivated performance task. Other studies

have utilized the RAT because it includes items of varying difficulty that match participants' perceptions (McFarlin & Blascovich, 1984; Seery, Blascovich, Weisbuch, & Vick, 2004). The RAT consists of providing participants with three related words that are associated with a fourth word, which is the solution word. For example, the series *cottage/swiss/cake* is associated with *cheese* each by compound or conjunction (*cottage cheese, swiss cheese, cheese cake*). This task is often referred to as an insight task, which requires problem solving and creativity (Bowden & Jung-Beeman, 2003). This task has also been shown to elicit cardiovascular reactivity (Seery et al., 2004). Normative data of university samples for completion frequency, given a specific time limit to complete, indicate 15 seconds is an optimal time to complete each series within the difficulty categories (Bowden & Jung-Beeman, 2003). A collection of six RAT series were chosen for each difficulty level, easy, moderate, and hard. Three minutes would be given to complete 12 series. Task performance is measured by the number of series completed correctly in the allotted amount of time.

*State Affect.* The extent to which participants currently felt 20 different emotions was taken at baseline and after task. Participants rated on a 9-point Likert-type scale of *none* (0) to *an extreme amount* (8), how much they felt emotions like fearful, happy, and annoyed (see Appendix E). Composite emotion measures of *depression/fear* and *anger/disgust* were used, following Bosson et al. (2009).

*Task Appraisal Questionnaires.* Pre-task appraisal and initial motivation were measured with a series of laboratory-developed questions. Participants rated demand, threat, stress, and ability to cope with the task (Tomaka, Blascovich, Kibler, & Ernst, 1997). On a scale of 1 (*not at all*) to 9 (*extremely or very much*) participants answer four

appraisal questions and two additional questions derived from the initial motivation questions of Vescio et al. (2005), “In general, how interested are you in the task to come?” and “How well do you think you will perform on this task?” Post-task appraisals include the same questions written in past tense (see Appendix F for pre-task appraisal). These questions were used before a practice version of the task ,which participants completed previous to the manipulation, and before and after the actual task following the manipulation.

*Subjective Reaction to Task.* After the task, participants completed the post-task appraisals and were additionally asked to make judgments about their performance on the task. Participants were asked to respond to outcome satisfaction questions including: “How satisfied are you with the way things turned out in the experiment?” and “How satisfied are you with the way you handled the situation?” on a 1 – 9 Likert-type scale (Schneider et al., 2001; see Appendix G for Post-task appraisals).

*Intrusive Thoughts of Incompetency/Rumination.* A questionnaire, used by Dumont et al. (2008), asked participants to report how much thoughts of incompetency, thought suppression, and concentration occurred during the task. On a 9-point Likert scale (1=*never came to mind* to 9=*came to mind very often*), participants answer 14 questions about how much certain thoughts entered their mind during the task, such as “I feel incompetent” (see Appendix H). Consistent with previous research, the questionnaire showed a high reliability (Cronbach’s  $\alpha = .91$ ) with the present sample.

*Subjective Response to Sexist.* A questionnaire was developed to measure participants’ opinions about their experience with the researchers and the research (see Appendix I). Participants rated the male and female researchers on a 9-point Likert scale

(1=*not at all*, to 9=*very much*) for both positive qualities (i.e. politeness, communication skills), and how much they made the participant feel a set of negative emotions (i.e. depressed, angry; Bosson et al., 2009). A question asked participants to make a recommendation, whether each researcher should continue to perform research. Further questions about thoughts the participant had were assessed here as well, such as “I have a feeling the researcher(s) may be sexist” (Dumont et al., 2008) on a 9-point Likert scale, among other distractor questions. This served as a manipulation check. An open-ended section was provided for the participant’s comments about the research or the researchers.

### **Physiological Recording Apparatus**

All physiological measures were recorded noninvasively according to established guidelines. Systolic (SBP) and diastolic blood pressure (DBP) were measured with an Accutorr Plus BP monitor (Datascope, Corp., Mahwah, NJ) according to published guidelines (Shapiro et al., 1996). Blood pressure (BP) was measured once per minute during the stress task and once every two minutes during rest and recovery periods. A Biopac MP150 system (Biopac Instruments Inc., Goleta, GA) was used to acquire the electrocardiogram (ECG), impedance cardiography (ZKG), and respiration signals. ECG was collected utilizing a Biopac ECG100 amplifier with Cleartrace CT disposable Ag/AgCl electrodes (Conmed Andover Medical, Haverhill, MA) placed in a modified (no ground) Lead II configuration on the chest. ZKG was collected using four mylar-band electrodes placed in full circumference around the neck and chest according to the Sherwood et al. (1990) guidelines. A minimal current of 4mA at 100kHz is transmitted through the two outer-most bands, and the impedance waveforms are measured by the

inner-most two bands, amplified by a NICO100C Biopac system. ECG and ZKG signals were digitized at 1000 Hz, collected, and saved using the Biopac AcqKnowledge 3.9.1 software on a PC.

### **Procedure**

Participants completed prescreening and mass testing questionnaires online through SONA Systems prior to the laboratory portion of the study. Pre-screening questions included age, gender, if a medical professional had ever diagnosed them with any type of cardiovascular disease, cardiovascular problem, high blood pressure, or diabetes, if they were currently pregnant, and if they currently took medication that might affect their cardiovascular system. The ASI, the AWS, and the MSS were completed in Mass Testing to avoid the questions influencing the experience in the laboratory. Compensation for Mass Testing was .5 extra credit points in a psychology course. Once potential participants completed Mass Testing, they were given the option to participate in the laboratory portion of the study. Upon arrival to the laboratory, participants were greeted by a female research assistant, who was either a trained research assistant or the principal investigator. She identified herself as the “research assistant” and said, “The primary researcher is in his office.” The “primary researcher” referred to a trained male research assistant who acted as a confederate in the study, and this statement set the expectation that he was in-charge, since he would otherwise have limited interaction with the participant. All researchers were blind to condition until just before the manipulation occurred. Participants then reviewed the informed consent and completed the Health Questionnaire.

Next, the research assistant attached the electrodes for the cardiovascular measurements to the participant. Necessary height, weight, waist-to-hip ratio, and band placement measurements were recorded. The research assistant then led the participant into a small private room and seated them in a comfortable chair. After attaching the electrodes to the leads for the ECG and ZKG measurements, respiration bands were placed around the participant's chest and abdomen, and a blood pressure cuff was placed around the participant's non-dominant arm. Sample measurements were taken to ensure all equipment was operating properly.

At this time, another interaction was staged to confirm that the male confederate was in charge of the study. The female research assistant audibly informed the male confederate that the participant was ready. The male confederate then inspected the equipment, and said, "Okay," and left the participant room to begin the study. The research assistant then instructed the participant through a respiration calibration task, where the participant breathed into a fixed volume bag. The male confederate instructed the female research assistant to conduct the calibration twice and then, when completed, commented "That's fine."

Participants were then asked to sit quietly and watch a neutral video about Alaska, which served as a 10-minute acclimation period. The last five minutes of the video served as the cardiovascular baseline period. After the video, participants completed a baseline State Affect questionnaire. The research assistant then read the instructions for the RAT task. Instructions informed the participant that there were three difficulty sections of the RAT, easy, medium, and hard. Participants were told they would have 15 seconds to come up with the correct word with which the three displayed words were

associated. They were informed that not answering an item was considered a wrong answer. Following an opportunity for questions, participants were informed that would be completing a practice trial of the RAT task. Participants then answered a pre-practice questionnaire, identical to the pre-task questionnaire they would complete before the actual task. A paper answer sheet was provided with designated spaces for the participant to fill in their answers. The RAT practice task took 3 minutes to complete, and included a 30-second instruction screen, two items from each difficulty level displayed for 15 seconds each, and the correct answers visible for 10 seconds after each example. A timer bar was visible on every slide to show how much time participants had remaining on each item. At the end of the practice, the computer gave instructions to wait for the researcher to continue.

At this time, the manipulation took place. The male confederate entered the room abruptly and began adjusting the program on the computer. While adjusting the computer, he informed the participant of one of the following statements:

*No Sexism Condition:* “We’re running short on time; so I’m going to have the computer randomly get rid of one of the sections... Looks like it got rid of the hard section.”

*Hostile Sexism Condition:* “We’re running short on time... Girls aren’t good at this task anyway; so I’m going to get rid of the hard section to save me some time... I’m willing to sacrifice a little data, so I don’t have to hear another girl complain about how hard the last section is.”

*Benevolent Sexism Condition:* “We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you... I’m willing to sacrifice a little data, so I don’t make another girl upset about how hard the last section is.”

The male research assistant was trained to use an informative voice in the neutral condition, a dismissive tone in hostile, and a pleasant-yet-patronizing tone in the benevolent condition. The above statements were selected through pilot testing from a

set of six-phrases for each sexist condition, judged on believability, accuracy to the sexism concept, and how intensely the phrase elicited anger and disgust (see Appendix J). Participants in the present study only heard one of the above phrases. Random assignment was used, and the researchers stayed blind to the condition until just before the sexism manipulation.

Adjusting the computer meant the male researcher obviously removed the hardest section from the program. He gave the participant the Pre-Task Questionnaire to complete, told the participant, “Complete this and my assistant will be in momentarily to start the task,” and left the room. The assistant entered after a small pause, and began the full task on the computer. Participants completed six easy and six medium difficulty RAT items on a new paper answer sheet with the hard section crossed-out. The computer program, as before, was set to continue from one item to the next once started. The timer was once again visibly counting down the 15 seconds for each item. After the task was completed, the computer displayed instructions to sit quietly for the next several minutes and wait for further instructions. Participants then sat in the room alone for 10 minutes. Once the 10-minute recovery period was over, the female research assistant re-entered the room and gave the participant the Post-Task questionnaire, a post-manipulation State Affect questionnaire, and the Intrusive Thoughts of Incompetency questionnaires to complete. These questions were not given immediately following the task because distraction has been shown to improve recovery (Gerin et al., 2006), and completing these questionnaires would serve as a distraction.

Following these questionnaires, the research assistant returned, informed the participant that the experiment was over, and began to remove the cardiovascular

measurement equipment from the participant. At this time, the male confederate stated, “I will be in my office,” and left to another room, which provided more privacy from the male confederate. The research assistant then informed the participant that there was one more thing she had to ask the participant to do. At this time, the participant was given the Subjective Response to the Sexist questionnaire, described by the research assistant as a standard departmental review used for studies with high interaction levels. To reinforce believability that the questionnaire was separate and confidential, the research assistant instructed the participant, upon their completion of the evaluation, to place it in an envelope and place it with others in a larger office mail envelope. At this time the research assistant left the room to allow the participant to complete the questionnaire in privacy. When the participant was done, final sensor removal was conducted, followed by thorough debriefing. As a part of the debriefing, the male confederate apologized for any rudeness or ill-feelings, and the participant was thanked for her participation. Three Sona credit points were awarded for full completion of the laboratory portion of the study. Extra information was offered about USF support for women and the Relational Equality and Anti-violent League (REAL), if a participant had concerns.

### **Data Qualification and Reduction**

Cardiovascular (CV) measurements were recorded during baseline, practice, task, and recovery periods. ECG, ZKG, and respiration were recorded continuously during the last five minutes of the 10-minute baseline period. BP was taken at the beginning of the 5<sup>th</sup>, 7<sup>th</sup>, and 9<sup>th</sup> minute of the baseline period. Of the three minutes of the practice task, cardiovascular and respiration values were recorded continuously, and BP was taken at the beginning of the 1<sup>st</sup> and 3<sup>rd</sup> minutes. The same was true of the 3-minute task period.

ECG, ZKG, and respiration signals continued to be monitored through the recovery period that immediately followed the task, and BP was taken every two minutes starting with the minute immediately after the task.

Cardiac parameters, such as heart rate (HR), stroke volume (SV), cardiac output (CO), and pre-ejection period (PEP), were derived from the ECG and ZKG measurements. The measure of vascular function, total peripheral resistance (TPR), was calculated from ZKG and BP measurements. MindWare IMP 2.56 software (MindWare Technologies, Ltd., Gahanna, OH) was used to process stored EKG and ZKG signals. Data were screened for artifacts by visual inspection of the  $dZ/dt$  waveforms. Ensemble-averages were calculated in MindWare for each one-minute period for HR, PEP, and CO. Mean arterial pressure (MAP) was calculated by the formula  $(SBP + (2 * DBP))/3$  for each minute of BP measurement. TPR was then calculated using the formula  $(MAP/CO) * 80$  in dyne-s/cm<sup>5</sup>. Mean SBP, DBP, HR, PEP, CO, and TPR for baseline, practice, and task periods were calculated. Reactivity was calculated as the difference between practice or task and baseline averages. Cardiovascular recovery was calculated using an area-under-the-curve (AUC) method. Based upon Kario et al. (2002), the difference between peak stress response (highest value for each measurement during task) and average baseline value was calculated to create the recovery span (distance to be recovered after stressor, to return to baseline value). Then the difference from peak stress response to the average of each recovery minute was calculated. These values were then divided by the recovery span and multiplied by 100, to create a percent recovered value for each minute, valued between 0% and 100% recovered in each minute. Values that exceeded 100% (the difference between peak stress response and recovery minute average was greater

than the recovery span) were considered 100% recovered in that minute, and values that were less than 0% (the different between peak stress response and recovery minute average was negative, that is, recovery minute average was greater than the peak stress response) were considered 0% recovered. Finally, an average of the percent recovery values for each of the 10 minutes were taken to equal the AUC average percent recovered for each participant for each cardiovascular measure. Calculating recovery calculated in this fashion allows for greater variability in a participant's recovery period.

Cardiovascular indices may fluctuate to below baseline values and then return to above baseline levels, such as if rumination occurs a short delay after the stressor ends (Kario et al., 2002; Fekedulegn et al., 2007).

Calculations for acquiring subscale and total scale values from the ASI, AWS, MSS, and Intrusive Thoughts of Incompetency were calculated as described above. Body mass index (BMI) was calculated as  $703 * (\text{weight in lbs}/(\text{height in inches, squared}))$ . For the state affect questionnaires, subscales identical to Bosson et al. (2009) were created for anger/disgust and depress/sad, for both baseline and post-manipulation questionnaires. Exploratory factor analyses were also conducted and matched between baseline and post-manipulation questionnaires to explore other emotion items not previously included in previous research. This yielded three factors for the current sample, which we named anger/resentment, sad/ashamed, and happy, named for the first emotion item in each factor. For the Subjective Response to the Sexist questionnaire, an average score was created for all positive qualities, and average scores were calculated for how much participants reported the male confederate made them feel anger/disgust and depress/sad. In addition, intrusive thoughts of sexism, a subscale of the Intrusive

Thoughts of Incompetency questionnaire used by Dumont et al. (2008), was calculated from the participant's responses to items 4, 5, 6, and 7 of the subjective response to the sexist measure (see Appendix I).

### **Analytic Strategy**

SPSS Version 21 (SPSS Inc., Chicago, IL) was used to conduct data analyses. Hypothesis 1 was tested using a series of one-way, between-subjects ANOVAs to test participant's subject responses to the male confederate by sexism condition. Dependent variables analyzed came from the Subjective Response to the Sexist questionnaire, and were the average amount of positive qualities reported and the report of how much anger/disgust and depress/fear caused by the male researcher. Hypothesis 2 was tested using overall task performance (percentage correct) and percent changed from practice as dependent variables. One-way, between-subjects ANOVAs were used to test for performance differences by sexism condition. Hypothesis 3 was tested using a series of one-way ANOVAs with the between-subjects factor of sexism condition for cardiovascular reactivity indices: SBP, DBP, HR, CO, PEP, and TPR. Reactivity was calculated as average task minus average baseline cardiovascular levels. Hypothesis 4 was similarly tested using a series of one-way, between-subjects ANOVA for cardiovascular AUC-recovery variables by sexism condition. Analyses of cardiovascular measures initially used ANCOVA that included ASI, AWS, MSI, and BMI as covariates. Post-hoc tests used Tukey's HSD. To conduct mediation analyses, first correlations were performed to confirm mediation analyses were appropriate. Following that, regression and Sobel tests were conducted to examine mediation for specific paired levels of the independent variable, as appropriate given post-hoc analyses.

## Results

### Random Assignment Validation

A series of one-way, between-subjects ANOVAs were conducted on descriptive participant variables (i.e. age, BMI, etc.) by sexism condition to assess random assignment variation. None of these variables were different between conditions (see Table 2). A multivariate ANOVA was conducted for the baseline emotion subscales, and none were significantly different between conditions (also see Table 2).

Also to check the success of random assignment, a series of one-way, between-subjects ANOVAs were conducted on average baseline cardiovascular variables. None were significantly different between sexism conditions (all  $p$ 's > .225). The same series of ANOVAs was conducted to examine practice reactivity scores, which were measured before the manipulation. Practice PEP reactivity was significantly different between conditions ( $F(2,113) = 3.65, p = 0.03$ ). A Tukey's HSD post-hoc analysis showed that the hostile sexism condition exhibited greater PEP reactivity (i.e., more negative change,  $M = -4.52, SD = 0.68, p = .024$ ) than the neutral condition ( $M = -2.06, SD = 0.63$ ), with the benevolent sexism condition not significantly different from either ( $M = -3.57, SD = 0.66$ ). Practice PEP reactivity was controlled for in further PEP reactivity analyses.

### Manipulation Check

A One-Way ANOVA was conducted on intrusive thoughts of sexism, as reported on the Subjective Response to the Sexist questionnaire. Results indicated a significant difference in how much sexism participants reported experiencing,  $F(1,117) = 14.08, p < .001$ . Post-hoc analyses indicated that all conditions were significantly different from one another (all  $p$ 's < .029). No participants indicated experiencing sexism in the neutral

Table 2.

*Random Assignment Analyses*

	No Sexism	Benevolent	Hostile	
	Mean ( <i>SD</i> )	Mean ( <i>SD</i> )	Mean ( <i>SD</i> )	<i>p</i>
Age	18.64 (1.21)	19.15 (1.35)	19.03 (1.91)	.284
BMI	23.87 (4.32)	23.05 (4.78)	24.07 (5.95)	.633
ASI Total	4.02 (0.78)	4.17 (0.77)	4.10 (0.60)	.627
ASI Benevolent	4.29 (1.07)	4.29 (0.94)	4.28 (0.92)	.997
ASI Hostile	3.74 (0.87)	4.05 (1.04)	3.93 (0.73)	.297
AWS Total	5.47 (0.84)	5.36 (0.73)	5.53 (0.90)	.664
MSS Total	4.50 (0.93)	4.37 (0.84)	4.40 (0.86)	.789
Depress/Fear	0.20 (0.49)	0.21 (0.3)	0.11 (0.42)	.561
Anger/Disgust	0.23 (0.57)	0.19 (0.37)	0.15 (0.59)	.788
Anger/Resentment	0.58 (0.86)	0.42 (0.50)	0.52 (0.84)	.620
Sad/Ashamed	0.21 (0.53)	0.21 (0.44)	0.10 (0.40)	.488
Happy	1.62 (0.92)	1.98 (1.11)	2.00 (1.24)	.199

Note: ASI, AWS, and MSS values are on a scale from 1 to 7. Emotions are rated from 0 to 8, and were compared using a MANOVA instead of separate ANOVAs. Depress/Fear and Anger/Disgust are the subscales from Bosson et al. (2009).

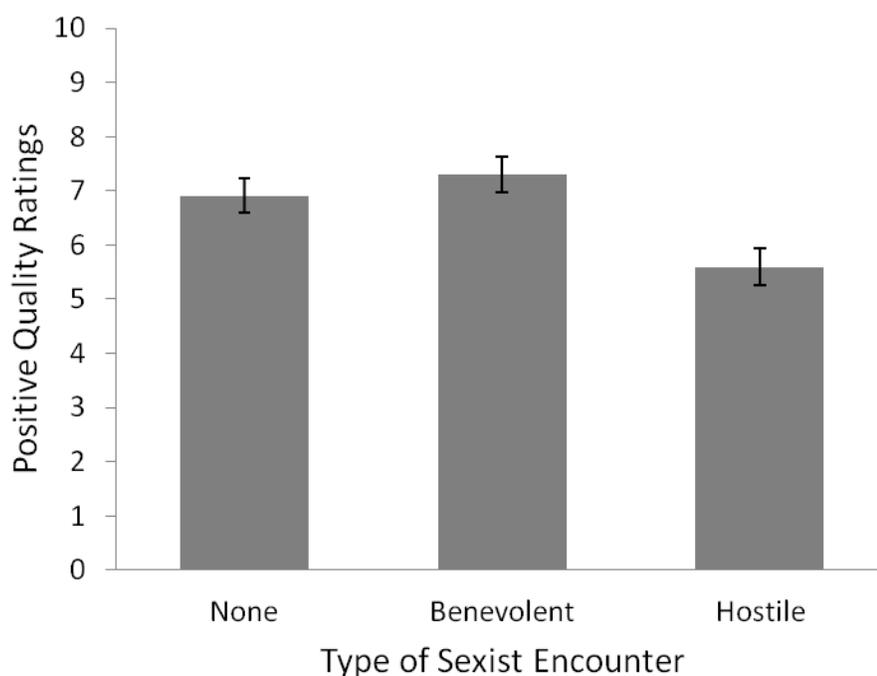
condition ( $M = 1.00$ ,  $SD = 0.00$ , on a scale where 1 meant “none”). Participants in the benevolent sexism condition reported experiencing some sexism ( $M = 2.18$ ,  $SD = 1.91$ ), and participants in the hostile sexism condition reported experiencing a greater amount of sexism ( $M = 3.31$ ,  $SD = 2.82$ ). Reporting sexism was considered answering anything other than 1 to at least one of the Intrusive Thoughts of Sexism questions. In the

benevolent sexism condition, 40% of participants reported experiencing sexism, while 56% reported sexism in the hostile sexism condition.

### **Hypothesis 1: Effect of Sexism Condition on Ratings of Male Sexist**

Correlations showed no significant relationships between participant beliefs about sexism (ASI, AWS, and MSS) and ratings of the male confederate. A series of one-way ANOVAs were conducted on subjective responses to the male confederate sexist.

Positive qualities significantly differed by sexism condition ( $F(2,119) = 7.15, p = .001$ ), with the male researcher in the hostile sexist condition rated the least positive ( $M = 5.59$ ) as compared to both neutral ( $M = 6.91, p = .015$ ) and benevolent ( $M = 7.30, p = .001$ ), which were not significantly different (see Figure 1).



*Figure 1. Positive Quality Ratings of Male Sexist by Condition.*

Still using the Subjective Response to the Sexist questionnaire, analysis of how the sexist made the participant feel, anger/disgust and depress/fear, yielded significant

results,  $F(2,117) = 3.99, p = .021$  and  $F(2,117) = 5.72, p = .008$ , respectively. After an experience with hostile sexism, participants reported experiencing anger/disgust and depress/fear emotions significantly more towards a hostile sexist than toward a neutral male researcher, with the benevolent sexist rated not significantly different from either (see Figure 2).

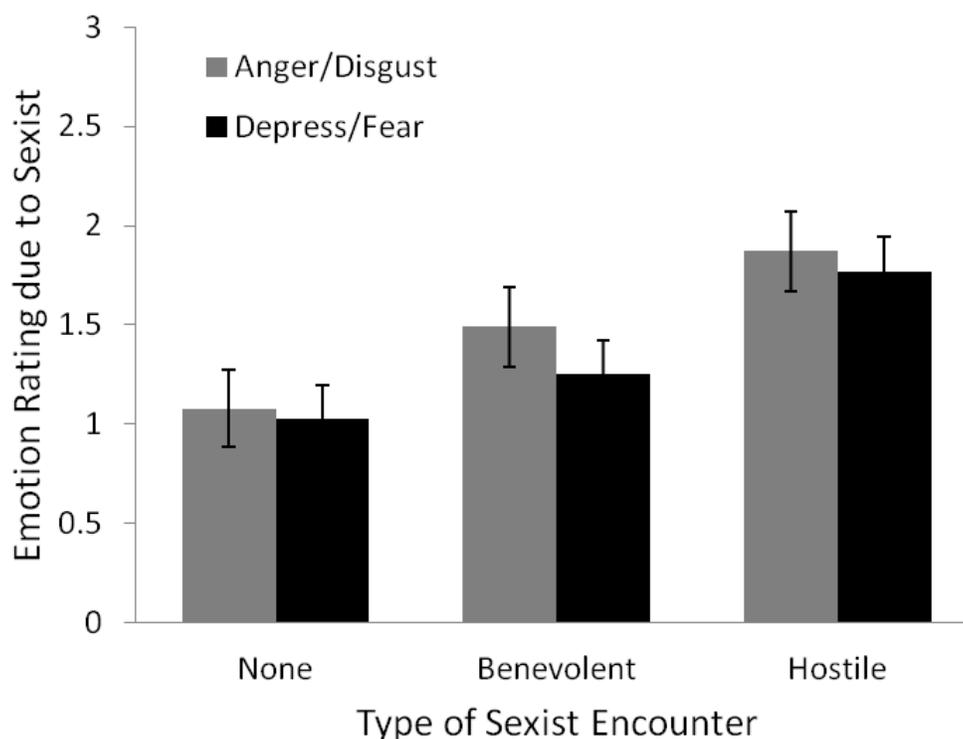


Figure 2. Emotion Ratings about the Male Confederate by Sexism Condition.

### **Hypothesis 2: Effect of Sexism Condition on Performance and Thoughts of Incompetency**

Consistent with past research (Seery et al., 2004), post-task estimation of performance and actual overall task performance were positively correlated ( $r = .47, p < .001$ ). Overall task performance did not, however, vary by sexism condition ( $F(2,119) = .26, p = .770$ ). Performance was also measured as a change between percent correct in

practice (only easy and medium items used) and percent correct in task after the manipulation had occurred. When performance was analyzed as a change score, non-significant results ( $F(2,119) = 2.30, p = .104$ ) suggested that performance of participants in the neutral condition improved ( $M = 7.95, SE = 5.80$ ) while performance decreased from practice to task in the benevolent ( $M = -8.13, SE = 6.01$ ) and hostile conditions ( $M = -6.84, SE = 6.09$ ). The prediction that thoughts of incompetency were related to sexism conditions was tested separately with a one-way ANOVA. A significant effect was found,  $F(2,119) = 3.75, p = .026$ . Participants reported the least total thoughts of incompetency in the neutral condition ( $M = 3.51, SE = .26$ ) and significantly more in the hostile sexism condition ( $M = 4.52, SE = .28, p = .025$ ). Benevolent sexism, on average, did not differ significantly from either ( $M = 4.23, SE = .27$ ). Mediation analysis was not applicable for performance, because of non-significant results.

### **Hypothesis 3: Effect of Sexism Condition on Cardiovascular Reactivity**

A series of one-way, between-subjects ANOVAs were conducted on cardiovascular reactivity indices, SBP, DBP, HR, CO, PEP, and TPR to compare the differences in task reactivity between sexism conditions. Significant effects of condition emerged for SBP reactivity, ( $F(2,119) = 5.20, p = .007$ ), HR reactivity ( $F(2,119) = 8.98, p < .001$ ), and PEP reactivity ( $F(2,119) = 6.28, p = .003$ ). Participants in the hostile sexism condition exhibited greater SBP reactivity ( $M = 7.05, SE = .82$ ) than those in the benevolent ( $M = 3.87, SE = .81, p = .017$ ) and neutral ( $M = 3.86, SE = .63, p = .015$ ) conditions, which were not different from one another. For HR reactivity, participants exhibited greater HR reactivity in the hostile sexism condition ( $M = 7.74, SE = .67$ ) than in the benevolent ( $M = 5.41, SE = .66, p = .038$ ) and neutral ( $M = 3.85, SE = .63, p <$

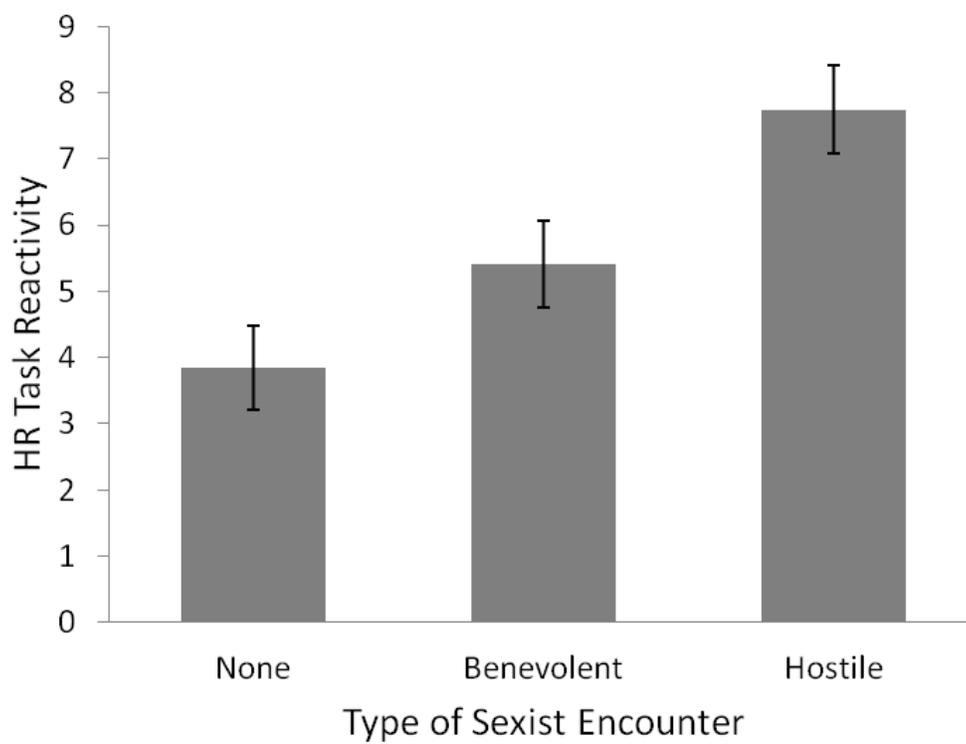
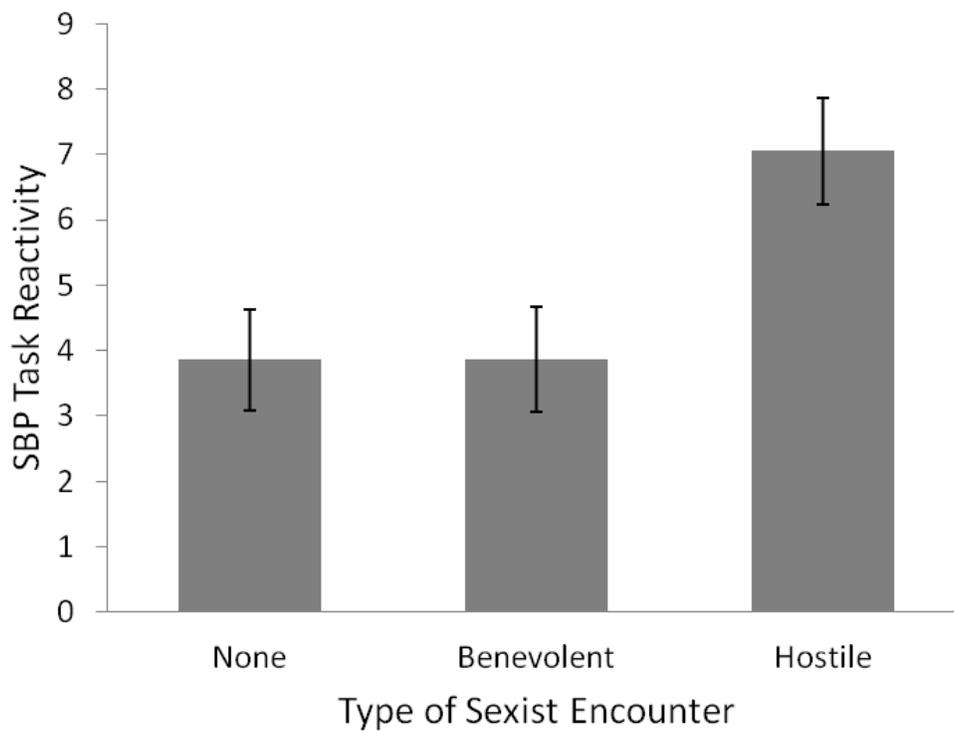


Figure 3. Systolic Blood Pressure and Heart Rate Task Reactivity by Sexism Condition.

.001) conditions, which were still not different from one another. PEP reactivity suggested the same pattern, but when covarying PEP practice reactivity, this effect was reduced to non-significance ( $F(2,109) = 2.23, p = .112$ ). See Figure 3 for depiction of SBP reactivity and HR reactivity.

#### **Hypothesis 4: Effect of Sexism Condition on Cardiovascular Recovery**

Another series of one-way ANOVAs were conducted on cardiovascular recovery AUC values. Significant effects of condition were found for HR recovery ( $F(2,117) = 4.05, p = .020$ ) and PEP ( $F(2,105) = 3.23, p = .043$ ), and the effect for CO recovery approached significance ( $F(2,107) = 2.81, p = .065$ ; Benevolent:  $M = 44.92, SE = 5.49$ ; Hostile:  $M = 62.95, SE = 5.57$ ; Neutral:  $M = 50.26, SE = 5.07$ ). Post-hoc tests indicated not significantly different from either ( $M = 58.75, SE = 3.90, p = .142$  and  $.618$ , respectively). PEP recovery remained significantly different between conditions when controlling for differences in practice reactivity ( $F(2,104) = 3.44, p = .036$ ). Post-hoc analysis showed that the benevolent sexism condition had the least PEP recovery ( $M = 32.46, SE = 5.24$ ) over the 10 minutes, and was significantly different from the neutral condition ( $M = 49.93, SE = 4.83, p = .042$ ); PEP recovery from hostile sexism was not significantly different from either other condition ( $M = 46.18, SE = 5.24, p = .158$  and  $.859$ , respectively). See Figure 4 for significant AUC recovery variables.

#### **Mediation Analyses**

Mediation analyses methodology used was described in Preacher and Hayes (2004; 2008) and expanded upon to include multicategorical independent variables in

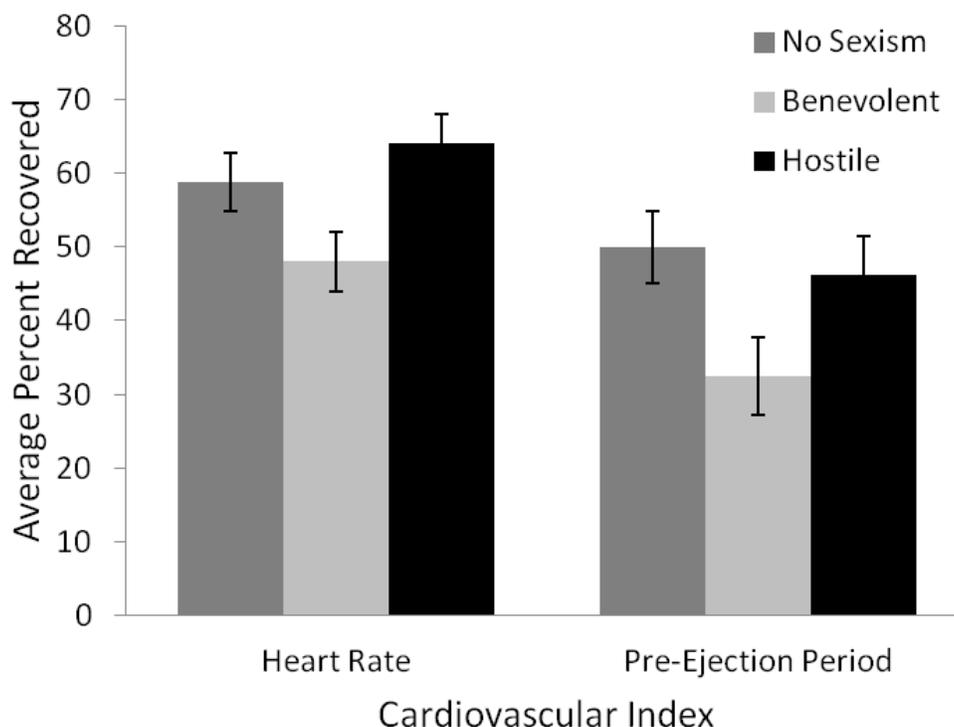


Figure 4. Area-Under-the-Curve Percentage Recovery by Sexism Condition.

Hayes and Preacher (2013). Sexism condition was dummy coded into dichotomous variables, such that neutral condition was a reference for benevolent and hostile sexism conditions, as guided by Hayes and Preacher (2013). Exploratory predictions included anger as a mediator between sexism condition and cardiovascular reactivity. Change in state affect was calculated by subtracting baseline affect variables from post-manipulation levels of affect in the anger/resentment subscale described previously. A one-way ANOVA found that sexism condition had a significant effect on change in state affect, anger/resentment,  $F(2,119) = 5.79, p = .004$ , such that participants in the hostile sexism condition displayed a greater increase in anger/resentment ( $M = .67, SE = .12$ ) than participants in the neutral condition ( $M = .12, SE = .11, p = .004$ ). Participants' change in anger/resentment in the benevolent condition did not significantly differ from

the hostile condition ( $M = .50$ ,  $SE = .12$ ,  $p = .568$ ), but displayed a trend towards greater anger/resentment than neutral condition ( $p = .061$ ). However, criteria for mediation was not met, as anger/resentment change did not significantly correlate with ( $p$ 's  $> .900$ ) nor predict SBP task reactivity ( $F(1,121) = 2.30$ ,  $p = .132$ ) or HR task reactivity ( $F(1,121) = .456$ ,  $p = .501$ ). Change in state anger/resentment also did not correlate with ( $p$ 's  $> .425$ ) nor predict HR AUC recovery ( $F(1,119) = .597$ ,  $p = .441$ ) or PEP AUC recovery ( $F(1,107) = .55$ ,  $p = .460$ ).

Cardiovascular recovery may also be impaired by rumination, which may include intrusive thoughts of incompetency. Mediation analyses were conducted to investigate if thoughts of incompetency mediated the relationship between sexism condition and CV recovery variables, HR AUC recovery and PEP AUC recovery. Though the IV-to-DV pathway was significant ( $F(2,119) = 4.05$ ,  $p = .020$  and  $F(2,107) = 3.23$ ,  $p = .043$ , respectively), as was the sexism condition to total intrusive thoughts of incompetency, IV-to-mediator pathway ( $F(2,119) = 3.75$ ,  $p = .026$ ), the pathway between total intrusive thoughts and HR AUC and PEP AUC recovery variables were not significant ( $F(1,119) = .04$ ,  $p = .836$  and  $F(1,107) = 1.25$ ,  $p = .266$ ). Criteria for mediation analysis, investigating if intrusive thoughts mediated sexism condition and performance, was also not met, as once again the mediator-to-DV pathway was not significant ( $F(1,121) = .44$ ,  $p = .507$ ).

### **Additional Findings**

Analyses on benevolent and hostile sexism conditions only, revealed findings related to participants' reports of experiencing sexism, sexism condition, and cardiovascular responses. A series of 2x2 ANCOVAs (Type of sexism: Benevolent or

hostile, by Report of Sexism: Reported or failed to report) were conducted for significant cardiovascular indices of reactivity and recovery. Individual difference in likelihood to perceive sexism, as measured by ASI and AWS total scores, were included as covariates. The main effect for sexism condition remained significant for SBP task reactivity ( $F(1, 73) = 6.47, p = .013$ ), such that participants in the hostile condition showed greater reactivity as before. No main effect or interaction existed with report of sexism ( $p$ 's  $> .350$ ). For HR task reactivity, however, a main effect for sexism condition ( $F(1, 73) = 6.80, p = .011$ ) and a main effect for report of sexism ( $F(1, 73) = 5.76, p = .019$ ) existed, but no interaction ( $p = .901$ ). Participants in the hostile condition showed greater HR reactivity as before. Those participants who failed to report experiencing sexism also showed greater HR reactivity ( $M = 7.84, SE = .73$ ) as compared to those who did report sexism ( $M = 5.23, SE = .76$ ), as displayed in Figure 5. For reference, the covariates included in the analysis, the estimated marginal mean for HR task reactivity for the neutral condition was 3.84 ( $SE = .628$ ).

Cardiovascular recovery variables were analyzed in the same method, using a series of 2x2 ANCOVAs with ASI and AWS again as covariates. HR AUC recovery continued to have a significant main effect for sexism condition ( $F(1,72) = 9.76, p = .003$ ), such that benevolent sexism participants displayed impaired recovery. Neither the main effect nor the interaction was significant for report of sexism ( $p$ 's  $> .325$ ). PEP AUC recovery, on the other hand, displayed a significant main effect for sexism condition ( $F(1,62) = 4.89, p = .031$ ) and a marginally significant main effect for report of sexism ( $F(1,62) = 3.77, p = .057$ ); the interaction was not significant ( $p = .392$ ). Those

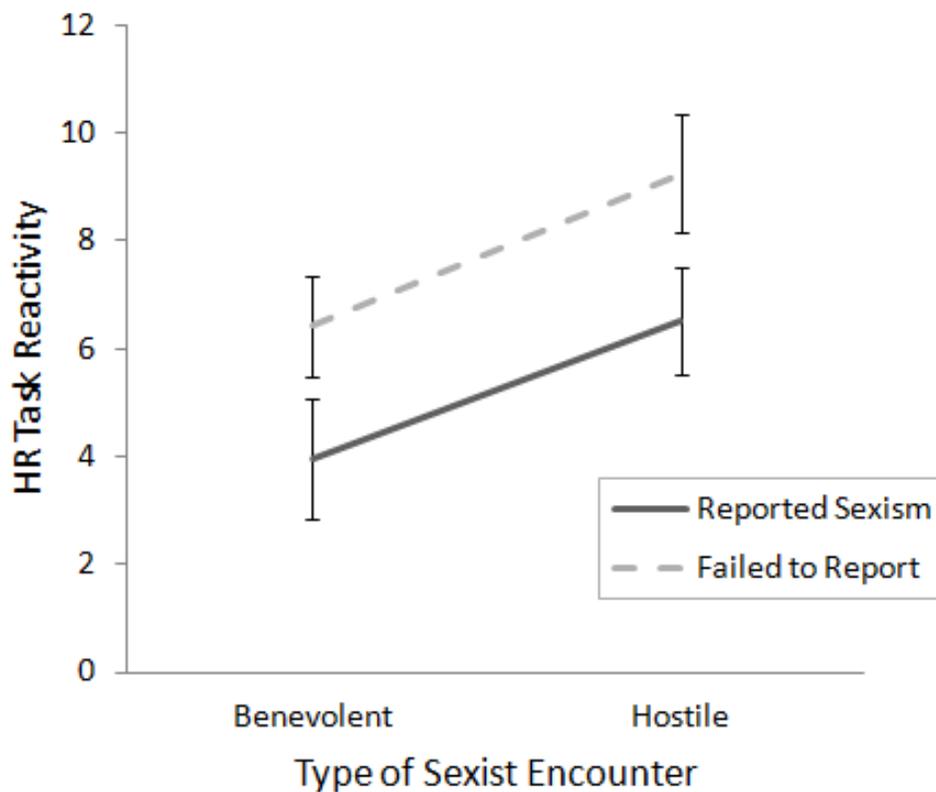


Figure 5. HR Task Reactivity by Sexism Condition and Report of Sexism.

who reported sexism showed impaired recovery ( $M = 32.08$ ,  $SE = 5.51$ ) in comparison to those who failed to report sexism ( $M = 47.44$ ,  $SE = 5.37$ ) (see Figure 6). Neutral condition PEP AUC recovery mean was 49.42 ( $SE = 5.27$ ).

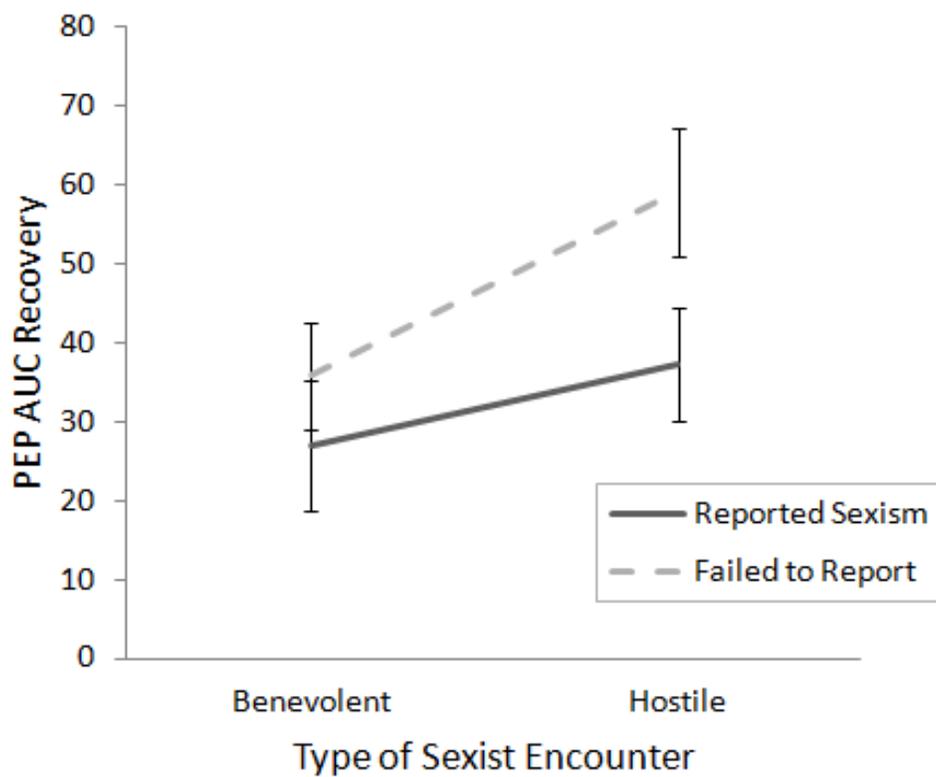


Figure 6. PEP AUC Recovery by Sexism Condition and Report of Sexism.

## Discussion

### Hypotheses Summary

Most hypotheses of the present study were supported. As predicted, women rated the benevolent sexist more positively than the hostile sexist man. This supports Hypothesis 1 and previous findings that a benevolent sexist is rated more positively than a man displaying hostile sexist attitudes (Barreto & Ellemers, 2005; Good & Rudman, 2009). Anger elicited specifically by the male researcher showed similar findings to past research (Bosson et al., 2009; Schneider et al., 2001). More anger was reported towards the hostile sexist man, as compared to neutral, with the benevolent not significantly different from either, which also supports Hypothesis 1. For Hypothesis 2, changes in performance suggest that an experience with sexism reduces performance, somewhat similar to past findings (Dardenne et al., 2007; Vescio et al., 2005). However, these performance differences were not significant in the present study, possibly due to measurement limitations. Women reported more thoughts of incompetency in the hostile condition than the neutral or benevolent conditions, which is contrary with past research (Dardenne et al., 2007; Dumont et al., 2008) in which more intrusive thoughts were found after a benevolent sexism encounter. Mediation analyses with intrusive thoughts of incompetency were not significant for performance or cardiovascular response. Cardiovascular response differed by sexism condition in support of both Hypotheses 3 and 4. As predicted, women showed the greatest cardiovascular reactivity after

experiencing hostile sexism. Cardiovascular reactivity did not differ between the benevolent sexism and neutral conditions. Although women reported more anger after the hostile sexist encounter, anger did not appear to mediate the relationship between condition and reactivity. Also as predicted, women in the benevolent sexism condition showed impaired cardiovascular recovery relative to the hostile and neutral conditions.

### **Alternative Explanations of Findings**

The present study found significant differences in the experience of hostile and benevolent sexism; however, the explanation of these differences in the data collected was limited. Women experiencing hostile sexism exhibited increased cardiovascular reactivity during the task, immediately following the sexist encounter. Predictions were made that this would be due to anger, but mediation analyses did not support this. Methods of anger measurement may have limited these findings. Other possible factors that may have led to increased cardiovascular reactivity are surprise or shock at the sexist encounter. If the woman believed sexist interactions do not occur regularly, the study encounter may have been startling. However, we did not find any relationship between cardiovascular reactivity and measurements of belief in sexism's prevalent.

Another explanation of the differences between the sexist encounters' effects on women's cardiovascular reactivity, though not measured in the present study, may be the nature of the encounter itself. Women could have been reacting to being told that their gender does not perform well by increasing their effort on the task. Increased effort does lead to increased cardiovascular reactivity (Wright & Kirby, 2001). The increase in cardiovascular reactivity may be due to effort, or linked to anger through effort. Anger can increase approach motivation when there is the perception that one can do something

about the anger-inducing situation (Harmon-Jones et al., 2003). This increased effort or approach motivation would need to only be found in the hostile sexism condition, since women in the benevolent sexism group did not show the increased cardiovascular reactivity above the neutral condition. Women encountering a benevolent sexist may not feel the ability to do something about the anger-inducing situation, which would reduce the likelihood that anger would be used as approach motivation (Harmon-Jones et al., 2003). This may be because of an implicit social message that would minimize her reaction to benevolent sexism (Bosson et al., 2008).

Importantly, although women who experienced a hostile sexist encounter exhibited greater reactivity, recovery was not impaired relative to women who did not experience sexism. Many strategies can be utilized to minimize the impact of unexpected negative interactions, such as self-serving attributions and rationalization (e.g. “He was just a jerk” or “I’m not like most women”). Women in the hostile condition may have used these strategies to recover from the encounter. Women later reported that the male researcher was less likeable and that he made them feel greater anger and disgust, but showed no impaired cardiovascular recovery. Change in state anger and thoughts of incompetency were also greater for those who experienced a hostile encounter, as compared to neutral, a difference that could still be reported after the recovery period. Thus, while hostile sexism clearly had an impact on the women exposed to it, it did not affect their cardiovascular recovery. An encounter with benevolent sexism, however, did affect women’s recovery.

Women’s initial reaction to the benevolent sexist encounter did not differ from women’s reaction to the neutral encounter. Though women who encountered a

benevolent sexist reported state anger and intrusive thought levels that suggested they were closer to a hostile sexist encounter, cardiovascular reactivity did not differ between women in the benevolent sexist and neutral conditions. However, what reactivity the women in the benevolent condition did have was prolonged, and they showed impaired recovery after the task and encounter was over. Rumination has been shown to impair recovery (Gerin et al., 2006), which was measured with intrusive thoughts of incompetency. However, given the limitations of this measure, it may still be the case that women may have ruminated, but clearer measurement is required.

Another explanation of the impaired recovery may involve an inability to cope, potentially because coping strategies were not triggered. Findings related to a minor negative state lasting longer in unpleasantness than initially greater negative states has been reported by Gilbert, Lieberman, Morewedge, and Wilson (2004). Though people expect that greater dislike or discomfort will lead to longer recovery from that dislike or discomfort, research has shown that this expectation is incorrect (Bosson et al., 2009; Gilbert et al., 2004). As stated previously, multiple coping strategies can be employed to deal with intense negative experiences; however, these same strategies are not always triggered when the negative experience is mild. This may prolong the negative effects, even if they were small to begin with (Gilbert et al., 2004), and may have been the case with the present findings.

Alternatively, rather than not activating coping strategies to a mildly negative event, coping strategies may have actually been thwarted as a result of benevolent sexism being viewed socially as benign. Women may receive implicit messages that minimize their reaction as targets of benevolent sexism (Bosson et al., 2008). The implicit social

message not to be upset by benevolent sexist treatment may make the woman feel that her negative reaction is invalid or inappropriate; this may lead a woman to inhibit her anger. Anger inhibition may explain the impaired recovery (Neumann et al., 2004; Suchday et al., 2004) of women in the benevolent sexism condition. This social message to not be upset by benevolent sexist treatment may also explain why women experiencing a benevolent sexist encounter reported state anger and anger towards the sexist at a mid-range between neutral and hostile groups; they may have not reported their full measure of anger. On the other hand, women in the hostile sexist group may not have felt their anger inhibited during recovery, as evidenced by freely reporting greater anger after the encounter and towards the hostile sexist at the end of the recovery phase. Interesting exploratory findings related to this include women's ending report of experiencing sexism.

Women were given the opportunity to report whether or not they experienced sexism at the end of the study, and the amount of sexism varied based on condition. As expected, women reported experiencing the greatest amount of sexism after a hostile encounter, followed by a benevolent sexist encounter, and no sexism reported in the non-sexist encounter. The differences in reporting sexism may be due to an unwillingness to report benevolent sexism as sexism because of the social pressure that is not harmful. When taken as a dichotomous measure, women reported sexism or did not, later reporting the incident as sexism had a buffering effect on cardiovascular reactivity, yet exacerbated the impairment of cardiovascular recovery. Those women who later reported experiencing sexism, in either condition, showed less HR reactivity than those who did not report experiencing sexism. Attribution of negative experiences to discrimination has

been seen to act as a buffer for cardiovascular response (Salomon & Jagusztyn, 2008), yet research is still inconclusive as to the mechanism. Conversely, discrimination based on gender may react differently based on how interactions between heterosexual men and women differ from interactions between other individuals. Men and women tend to have very intertwined relations, which may alter the effects of ambivalent discrimination based on gender (Glick & Fiske, 2011). As for recovery, those women who later reported experiencing sexism showed greater impaired recovery. This may be due to rumination or thoughts associated with sexism during the recovery period, though the present measures were not able to expand upon this.

Cardiovascular responses to demanding tasks are used to illuminate the time course of reactivity to and recovery from stressful events. It provides measurement which is outside volitional control. Multiple indices of cardiovascular response are measured and treated as individual measurements, due to the varying nature of how the physiological system innervates and regulates each index (Brownley, Hurwitz, & Schneiderman, 2000). Some indices may be more sensitive to changes, such as PEP (Sherwood, 1993), while others show slower changes, such as with intermittent blood pressure measurement. These differences may contribute to why the present study found changes between conditions in some cardiovascular indices, but not others. The present study found differences in reactivity for SBP and HR, which were two of the indices found to respond when the stressor included a sexist harassment manipulation in previous research (Schneider et al., 2001). Cardiac response by SBP and HR has been shown in other discrimination research as well (Salomon & Jagusztyn, 2008). Heart rate has also shown response to anger and anger rumination during reactivity and recovery periods in

previous research (Gerin et al., 2006). Cardiovascular responses can also be used to reveal important health implications for the risk of cardiovascular disease. Exhibiting cardiovascular reactivity is not necessarily damaging, even for larger responses like those seen after a hostile sexist encounter, because the cardiovascular system is made to respond to stressful situations with activation. Conversely, negative health outcomes are associated with inappropriate or prolonged reactions (Blascovich & Katkin, 1993; Phillips, 2001), as seen in the impaired recovery of women experiencing a benevolent sexist encounter. In addition, previous research has shown that the inward containment of anger, which may be part of the reaction to benevolent sexism, can contribute as a risk factor for future cardiovascular disease (Everson et al., 1998). Based on this research, benevolent sexism may in fact be the more pernicious type of ambivalent sexism, even though observers underestimate its effects (Bosson et al., 2009).

### **Limitations**

As mentioned, the limitations of measuring factors that may have contributed to variations in response to sexism, including anger and intrusive thoughts, hindered full explanation of the present findings. The lack of immediate measurement of emotional and mental response to sexism limited the ability to determine mediation. Measuring emotions as they occur is difficult, which is why the present study examined cardiovascular responses. Thoughts of incompetency were also measured well after the end of the task, which may explain why they did not serve as a mediator either. Whereas Dardenne et al. (2007) and Dumont et al. (2008) measured women's thoughts of incompetency immediately after their experience with sexism; participants in the present study were delayed reporting these thoughts and their emotions for approximately 13

minutes after the sexist treatment. This protocol was necessitated by design, because measuring thoughts during or before recovery would have served as a distractor. Distraction has been shown to facilitate recovery (Gerin et al., 2006). The order of measurement also violated the assumption of order in mediation analyses. In addition, measurements of emotion may still have contained bias, as women may have felt the social pressure not to report accurate levels of emotion towards the benevolent sexism encounter. Thus, our emotion scale measurements of anger and our thoughts of incompetency findings are somewhat inconclusive. This and the order of measurement limit our ability to explain what drove the cardiovascular findings.

One final limitation involved the performance measurement, paramount in Hypothesis 2 predictions. The performance on the practice task was not a completely accurate measurement of starting skill level on the task. Participants were encouraged to answer the practice items on their own, but were then shown the answers to the items after. It is unclear if participants might have written down the answers after seeing them. Future replication should provide a pre-manipulation measurement of task skill from which actual task performance can be measured.

### **Future Research**

Further research should examine the context generalizability of responses to ambivalent sexism. If a benevolent sexist interaction leads to impaired recovery from a laboratory stressor, it may be worse if work environment stress is prolonged by interactions with a benevolent sexist manager. A study conducted in a work related context to investigate the physiological response to different sexist environments should be conducted. Another question of generalizability, as alluded to prior, ambivalent

sexism may have unique effects based on the nature of interactions between men and women (Glick & Fiske, 2011). Other forms of patronizing versus rude discrimination may need to be investigated separately and contrasted.

Another direction to investigate would be into the social pressure to not be upset by benevolent sexist treatment. This concept, known as *minimizing messages*, has been shown to heighten negative affect when the message is internalized (Bosson et al., 2008). Investigation of how society may play a role in minimizing concerns of benevolent sexist treatment is necessary. Potentially, future research may place similar minimization on hostile sexist encounters (e.g. “hostile sexism is no longer an issue”) or remove the social minimization from benevolent sexism (e.g. “benevolent sexism is still sexism”), and see if the impaired recovery persists. Subsequent coping strategies may also be investigated.

### **Conclusions**

Hostile sexism is clearly understood as a negative form of prejudice. Yet women’s reactions to hostile sexism may actively involve coping strategies, which mitigate the negative effects of the encounter. However, benevolent sexism may be more insidious in nature because coping is thwarted and recovery impaired. Benevolent sexism may be considered only a mildly negative event, because of the social message that benevolent sexist treatment isn’t that bad. This view originates because benevolent sexism appears helpful, and observers predict that it is not as detrimental to the targets (Bosson et al., 2009). The findings of the present study suggest otherwise. Promotion of sexist stereotypes, the likeability of the sexist, the subtleness of the sexist message, the impairment of women’s cardiovascular recovery even from a mildly stressful event, and the general lack of awareness to its detrimental effects are all dangerous features of

benevolent sexism. If benevolent sexism continues to fly under the radar as a potentially harmful form of sexism, the behaviors and attitudes will perpetuate without women being able to cope.

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## Appendices

## Appendix A

## Ambivalent Sexism Inventory

Below is a series of statements concerning men and women and their relationships in contemporary society. Please indicate the degree to which you agree or disagree with each statement using the scale below:

0	1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Disagree Slightly	Agree Slightly	Agree Somewhat	Agree Strongly

- B 1. No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman.
- H 2. Many women are actually seeking special favors, such as hiring policies that favor them over men, under the guise of asking for "equality."
- \*B 3. In a disaster, women ought not necessarily to be rescued before men.
- H 4. Most women interpret innocent remarks or acts as being sexist.
- H 5. Women are too easily offended.
- \*B 6. People are often truly happy in life without being romantically involved with a member of the other sex.
- \*H 7. Feminists are not seeking for women to have more power than men.
- B 8. Many women have a quality of purity that few men possess.
- B 9. Women should be cherished and protected by men.
- H 10. Most women fail to appreciate fully all that men do for them.
- H 11. Women seek to gain power by getting control over men.
- B 12. Every man ought to have a woman whom he adores.
- \*B 13. Men are complete without women.
- H 14. Women exaggerate problems they have at work.
- H 15. Once a woman gets a man to commit to her, she usually tries to put him on a tight leash.
- H 16. When women lose to men in a fair competition, they typically complain about being discriminated against.
- B 17. A good woman should be set on a pedestal by her man.
- \*H 18. There are actually very few women who get a kick out of teasing men by seeming sexually available and then refusing male advances.
- B 19. Women, compared to men, tend to have a superior moral sensibility.
- B 20. Men should be willing to sacrifice their own well-being in order to provide financially for the women in their lives.
- \*H 21. Feminists are making entirely reasonable demands of men.
- B 22. Women, as compared to men, tend to have a more refined sense of culture and good taste.

\* = Reverse scored

## Appendix B

## Attitudes Towards Women Scale

Below is a series of statements. Please indicate the degree to which you agree or disagree with each statement using the scale below:

1	2	3	4	5	6	7
Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree

- \* \_\_\_\_\_ 1. Swearing and obscenity are more repulsive in the speech of a woman than of a man.
- \_\_\_\_\_ 2. Women should take increasing responsibility for leadership in solving the intellectual and social problems of the day.
- \_\_\_\_\_ 3. Both husband and wife should be allowed the same grounds for divorce.
- \* \_\_\_\_\_ 4. Telling dirty jokes should be mostly a masculine prerogative.
- \* \_\_\_\_\_ 5. Intoxication among women is worse than intoxication among men.
- \_\_\_\_\_ 6. Under modern economic conditions with women being active outside the home, men should share in the household tasks such as washing dishes and doing the laundry.
- \_\_\_\_\_ 7. It is insulting to a woman to have the "obey" clause remain in the marriage service.
- \_\_\_\_\_ 8. There should be strict merit system in job appointment and promotion without regard to sex.
- \_\_\_\_\_ 9. A woman should be as free as a man to propose marriage.
- \* \_\_\_\_\_ 10. Women should worry less about their rights and more about becoming good wives and mothers.
- \_\_\_\_\_ 11. Women earning as much as their dates should bear equally the expense when they go out together.
- \_\_\_\_\_ 12. Women should assume their rightful place in business and all the professions along with men.
- \* \_\_\_\_\_ 13. A woman should not expect to go to exactly the same places or to have quite the same freedom of action as a man.
- \* \_\_\_\_\_ 14. Sons in a family should be given more encouragement to go to college than daughters.
- \* \_\_\_\_\_ 15. It is ridiculous for a woman to run a locomotive and for a man to darn socks.
- \* \_\_\_\_\_ 16. In general, the father should have greater authority than the mother in the bringing up of children.
- \* \_\_\_\_\_ 17. Women should be encouraged not to become sexually intimate with anyone before marriage, even their fiancés.
- \_\_\_\_\_ 18. The husband should not be favored by law over the wife in the disposal of family property or income.
- \* \_\_\_\_\_ 19. Women should be concerned with their duties of childbearing and house tending rather than with desires for professional and business careers.

- \* \_\_\_\_\_ 20. The intellectual leadership of a community should be largely in the hands of men.
- \_\_\_\_\_ 21. Economic and social freedom is worth far more to women than acceptance of the ideal of femininity which has been set up by men.
- \* \_\_\_\_\_ 22. On the average, women should be regarded as less capable of contributing to economic production than are men.
- \* \_\_\_\_\_ 23. There are many jobs in which men should be given preference over women in being hired or being promoted.
- \_\_\_\_\_ 24. Women should be given equal opportunity with men for apprenticeship in the various trades.
- \_\_\_\_\_ 25. The modern girl is entitled to the same freedom from regulation and control as is given to the modern boy.

\* = Reverse scored

## Appendix C

## Modern Sexism Scale

Below is a series of statements. Please indicate the degree to which you agree or disagree with each statement using the scale below:

1	2	3	4	5	6	7
Strongly Agree	Somewhat Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Somewhat Disagree	Strongly Disagree

- \* \_\_\_\_\_ 1. Discrimination against women is no longer a problem in the United States.  
 \_\_\_\_\_ 2. Women often miss out on good jobs due to sexual discrimination.  
 \* \_\_\_\_\_ 3. It is rare to see women treated in a sexist manner on television.  
 \* \_\_\_\_\_ 4. On average, people in our society treat husbands and wives equally.  
 \* \_\_\_\_\_ 5. Society has reached the point where women and men have equal opportunities for achievement.  
 \_\_\_\_\_ 6. It is easy to understand the anger of women's groups in America.  
 \_\_\_\_\_ 7. It is easy to understand why women's groups are still concerned about societal limitations of women's opportunities.  
 \* \_\_\_\_\_ 8. Over the past few years, the government and news media have been showing more concern about the treatment of women than is warranted by women's actual experiences.\*

\* = Reverse scored

## Appendix D

## Health Questionnaire

1. Age: \_\_\_\_\_
2. How would you describe your race or ethnicity?
  - American Indian or Alaska Native
  - Asian or Asian-American
  - Arab or Middle Eastern
  - Black or African American
  - Hispanic or Latino
  - Native Hawaiian or Other Pacific Islander
  - White or Caucasian
  - Mixed/Multiracial
  - Other, Non-specified
3. Have you ever been diagnosed with any of the following conditions:

<input type="checkbox"/> Heart disease	<input type="checkbox"/> Hypertension (high	<input type="checkbox"/> Arrhythmia (irregular
<input type="checkbox"/> High cholesterol	blood pressure)	heartbeat)
<input type="checkbox"/> Heart Valve Problems	<input type="checkbox"/> Stroke	<input type="checkbox"/> Diabetes
4. Please list all prescription and non-prescription medications that you are currently taking. Be sure to also include any medications you have taken in the last 48 hours, even if it is something you do not regularly take (such as aspirin or cold medicine).
 

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5. When did you last eat? \_\_\_\_\_ am / pm (circle one)
  - a. What did you eat? \_\_\_\_\_
6. Do you drink beverages containing caffeine?  Yes  No (check one)
  - a. If yes, when did you last drink a caffeinated beverage?
 

Time: \_\_\_\_\_ am / pm (circle one)
  - b. How many caffeinated drinks have you had today? \_\_\_\_\_
  - c. How many servings (8 oz.) of “energy drinks” (e.g., Redbull, Rockstar, etc.) do you consume in a typical day?
 

Regular: \_\_\_\_\_ Diet: \_\_\_\_\_
  - d. How many servings (8 oz.) of soda do you consume in a typical day?
 

Regular: \_\_\_\_\_ Diet: \_\_\_\_\_

1. Do you smoke nicotine cigarettes? If yes, when did you last smoke? Time: \_\_\_\_\_ am / pm (circle one)
  - a. If yes, when did you last smoke? Time: \_\_\_\_\_ am / pm (circle one)
  - b. How many nicotine cigarettes have you smoked today? \_\_\_\_\_
  - c. How many nicotine cigarettes do you normally smoke in a day? \_\_\_\_\_
2. Which of the following describes your typical diet?

<input type="checkbox"/> Omnivore (Meat, etc.)	<input type="checkbox"/> Vegetarian	<input type="checkbox"/> Vegan
<input type="checkbox"/> Pescetarian (only fish, no other meat)	<input type="checkbox"/> Other: _____	
3. When did you last exercise? Please consider any activity that elevated your heart rate for 30 or more minutes.  
Date: \_\_\_\_\_ Time: \_\_\_\_\_ Activity: \_\_\_\_\_
4. When was the first day of menstruation during your last cycle (mm/dd/yyyy)? \_\_\_\_\_
5. Are you pregnant?  Yes  No  Not Sure (check one)

## Appendix E

## State Affect Questionnaire

	none									an extreme amount
	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	
1. How <b>fearful</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
2. How <b>guilty</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
3. How <b>happy</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
4. How <b>annoyed</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
5. How <b>anxious</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
6. How <b>sad</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
7. How <b>ashamed</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
8. How <b>distressed</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
9. How <b>disgusted</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
10. How <b>nervous</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
11. How <b>elated</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
12. How <b>enthusiastic</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
13. How <b>hostile</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
14. How <b>angry</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
15. How <b>jittery</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
16. How <b>depressed</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
17. How <b>embarrassed</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
18. How <b>doubtful of yourself</b> do you feel?...	0	0	0	0	0	0	0	0	0	0
19. How <b>resentful</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0
20. How <b>surprised</b> do you feel?.....	0	0	0	0	0	0	0	0	0	0

## Appendix F

## Pre-Task Questionnaire

- 1) How **demanding** do you expect the upcoming task to be?  
Not at all demanding    1    2    3    4    5    Very demanding
- 2) How **threatening** (or intimidating) do you expect the upcoming task to be?  
Not at all threatening    1    2    3    4    5    Very threatening
- 3) How able are you to **cope** with the upcoming task?  
Not at all able    1    2    3    4    5    Very able
- 4) How **stressful** do you expect the upcoming task to be?  
Not at all stressful    1    2    3    4    5    Very stressful
- 5) In general, how interested are you in the task to come?  
Not at all interested    1    2    3    4    5    Very interested
- 6) How well do you think you will perform on this task?  
Not at all well    1    2    3    4    5    Very well

## Appendix G

## Post-Task Questionnaire

- 1) How **demanding** was the task you just did?  
Not at all demanding    1    2    3    4    5    Very demanding
- 2) How **threatening** (or intimidating) did you think the task was?  
Not at all threatening    1    2    3    4    5    Very threatening
- 3) How able to **cope** were you?  
Not at all able    1    2    3    4    5    Very able
- 4) How **stressful** was the task?  
Not at all stressful    1    2    3    4    5    Very stressful
- 5) In general, how interested were you in the task?  
Not at all interested    1    2    3    4    5    Very interested
- 6) How well do you think you performed on this task?  
Not at all well    1    2    3    4    5    Very well
- 7) How satisfied are you with the way things turned out in the experiment?  
Not at all satisfied    1    2    3    4    5    Very satisfied
- 8) How satisfied are you with the way you handled the situation?  
Not at all satisfied    1    2    3    4    5    Very satisfied

## Appendix H

## Intrusive Thoughts of Incompetence

Rate the extent to which you thought of the following during the task. Use the scale below.

1	2	3	4	5	6	7	8	9
Never came to mind								Came to mind very often

- \_\_\_\_\_ 1. I feel silly.
- \_\_\_\_\_ 2. I feel incompetent.
- \_\_\_\_\_ 3. I feel that I'm not performing well.
- \_\_\_\_\_ 4. Others are surely faster than I am.
- \_\_\_\_\_ 5. Others surely perform better than I do.
- \_\_\_\_\_ 6. I'll never achieve it.
- \_\_\_\_\_ 7. I must stop thinking that I've made a mistake.
- \_\_\_\_\_ 8. I must stop thinking that I must repeat the words again and again.
- \_\_\_\_\_ 9. I must stop thinking that I've missed a word.
- \_\_\_\_\_ 10. I must be organized.
- \_\_\_\_\_ 11. I must do better.
- \_\_\_\_\_ 12. I must think about all the words.
- \_\_\_\_\_ 13. I must not be wrong.
- \_\_\_\_\_ 14. I must come up with the right word.

## Appendix I

## Subjective Reactions to the Experimenter (Departmental Review)

Research undergoing evaluation: _____	Date of Evaluation: _____
Researcher's Title Being Evaluated: _____	Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female

1) Rate the researcher on the following qualities:

1	2	3	4	5	6	7	8	9
Not at all								Very Much

_____ Politeness	_____ Professionalism
_____ Communication skills	_____ Interpersonal skills
_____ Positive attitude	_____ Negative attitude

2) Did the experimenter make you feel the following?

1	2	3	4	5	6	7	8	9
Not at all								Very Much

_____ Depressed	_____ Sad
_____ Fearful	_____ Angry
_____ Ashamed	_____ Disgusted
_____ Guilty	_____ Hostile
_____ Embarrassed	_____ Resentful
_____ Doubtful of myself	_____ Surprised

3) Would you recommend this researcher continue to perform research?  Yes  No

Research undergoing evaluation: _____	Date of Evaluation: _____
Researcher's Title Being Evaluated: _____	Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female

1) Rate the researcher on the following qualities:

1	2	3	4	5	6	7	8	9
Not at all								Very Much

_____ Politeness	_____ Professionalism
_____ Communication skills	_____ Interpersonal skills
_____ Positive attitude	_____ Negative attitude

2) Did the experimenter make you feel the following?

1	2	3	4	5	6	7	8	9
Not at all								Very Much

_____ Depressed	_____ Sad
_____ Fearful	_____ Angry
_____ Ashamed	_____ Disgusted
_____ Guilty	_____ Hostile
_____ Embarrassed	_____ Resentful
_____ Doubtful of myself	_____ Surprised

3) Would you recommend this researcher continue to perform research?  Yes  No



## Appendix J

### Pilot Study Details

The pilot study was conducted to determine which statements in each condition were best perceived as neutral, benevolent sexist, or hostile sexist. The criteria for determining the best statements were believability, accuracy to the different sexist concepts, and impact of the statement on participant's attitudes. Frequency and descriptive data were collected as participants voted and judged the statements.

Pilot participants were recruited from an Introductory Psychology course in the summer of 2012. Of the 65 participants, 12 were dropped because of incomplete data, leaving a total of 53 participants; 27 evaluated a benevolent sexism phrase and 26 evaluated a hostile sexism phrase. All participants were between the ages of 18 to 25 years old, most were female (37, 69.91%), and 19 (35.85%) were Caucasian and 12 (22.64%) were Black or African American. Participants accessed the survey online through SurveyGizmo©. To maintain anonymity, no email addresses or contact information were collected during recruitment. The survey took 15 to 20 minute to complete, and participants received 1 extra credit point on an exam , as assigned by the instructor of the course they were recruited from.

Pilot participants judged a scenario similar to what the main study participants would go through, described in a vignette. They were instructed to imagine they were sitting in a laboratory study, waiting to do a puzzle task with easy, medium, and hard difficulties. Pilot participants completed practice problems for the Remote Associates Task, one at each difficulty level. Participants rated their experience with the task, using the first 6 questions of the post-task questionnaire from Appendix G. Participants then were told to imagine that, “After having practiced the task, and right as you are about to begin, the male experimenter interrupts you by coming into the room and says to you...” This statement was followed by the neutral condition phrase, “We’re running short on time; so I’m going to have the computer randomly get rid of one of the sections... Looks like it got rid of the hard section.” Participants answered questions on a Likert scale of 0 (*Not at all* or *None*) to 6 (*Extremely* or *All*) about this phrase. Believability was assessed by asking, “How believable is this scenario?” and “How likely would a man say something like this?”. Accuracy to the concepts of sexism was measured by asking, “To what extent do you believe that what the male experimenter said was based on his hating/resenting women?” and “To what extent do you believe that what the male experimenter said was based on his wanting to protect women?”, along with asking participants to rate how likely the male experimenter who said the phrase would be to endorse statements from the ASI (items 2, 3, 4, 8, 9, 14, and 19 from Appendix A). Finally, female participants rated how they would feel immediately after the male experimenter interrupted them, using the State Affect questionnaire, as seen in Appendix E. After completing the questionnaires for the neutral experience, participants were presented with the same scenario, this time with one of the 12 sexist phrases (6 benevolent, 6 hostile) chosen at random. Participants were once again asked to complete the questions about the sexist scenario. This offered us information about the sexism condition phrases. Table 3 shows the results for all 13 manipulation phrases.

Table 3.

*Results of Pilot Testing for Manipulation Phrases.*

(Phrase, N)	[Rank] Mean (SD)			
	Believ-ability	Said based..	ASI-Total	Anger/disgust
Neutral Phrase				
(No Sexism, N = 56) “We’re running short on time; so I’m going to have the computer randomly get rid of one of the sections... Looks like it got rid of the hard section.”	[~] 2.00 (1.11)	[~] 1.00 (1.24)	[~] 2.46 (1.02)	[~] 1.97 (1.12)
Benevolent Phrase		Protect Motive	ASI-Benev.	Anger/disgust
(Benevolent 1, N = 3) “We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you.”	[#5] 1.00 (1.32)	[#6] 0.67 (1.16)	[#6] 1.67 (1.44)	N = 3 [#6] 1.67 (0.12)
(Benevolent 2, N = 5) “Now don’t be upset; I know how easily girls get upset... We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you.”	[#2] 2.30 (1.79)	[#2] 2.80 (2.17)	[#3] 2.90 (0.96)	N = 3 [#3] 4.33 (1.81)
(Benevolent 3, N = 6) “We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you... I’m willing to sacrifice a little data, so I don’t make another girl upset about how hard the last section is.”	[#1] 2.50 (1.92)	[#1] 3.67 (1.21)	[#2] 2.92 (0.89)	N = 3 [#5] 3.27 (1.14)
(Benevolent 4, N = 6) “We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you... Not doing the hardest section will lower your score, but that’s ok, you seem like a nice girl anyway.”	[#4] 1.33 (2.09)	[#5] 1.33 (1.75)	[#4] 2.21 (1.43)	N = 4 [#2] 4.45 (1.60)
(Benevolent 5, N = 4) “We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you... I’m willing to sacrifice a little data, so I don’t make another girl upset about how hard the last section is... Not doing the hardest section will lower your score, but that’s ok, you seem like a nice girl anyway.”	[#6] 0.63 (0.48)	[#4] 1.75 (2.36)	[#5] 2.00 (0.46)	N = 4 [#4] 3.65 (3.22)
(Benevolent 6, N = 3) “Now don’t be upset; I know how easily girls get upset... We’re running short on time... Girls don’t like the hard section; so I’m going to go ahead and get rid of it for you... I’m willing to sacrifice a little data, so I don’t make	[#3] 1.67 (2.02)	[#3] 2.33 (3.22)	[#1] 3.92 (0.38)	N = 2 [#1] 4.50 (3.54)

Hostile Phrase	Believ -ability	Hate/ Resent	ASI- Hostile	Anger/ disgust
another girl upset about how hard the last section is... Not doing the hardest section will lower your score, but that's ok, you seem like a nice girl anyway."				
(Hostile 1, $N = 6$ ) "We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time."	[#3] 1.58 (2.29)	[#5] 3.17 (2.48)	[#6] 3.00 (2.08)	$N = 2$ [#5] 4.50 (0.42)
(Hostile 2, $N = 4$ ) "Now don't get offended; I know how easily girls get offended... We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time."	[#1] 2.75 (2.06)	[#4] 4.00 (1.63)	[#4] 3.56 (1.23)	$N = 3$ [#4] 4.60 (2.11)
(Hostile 3, $N = 2$ ) "We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time... I'm willing to sacrifice a little data, so I don't have to hear another girl complain about how hard the last section is."	[#6] 0.00 (0.00)	[#1] 5.00 (1.41)	[#3] 3.56 (0.18)	$N = 2$ [#1] 7.30 (0.99)
(Hostile 4, $N = 7$ ) "We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time... Not doing the hardest section will lower your score, but women don't score well on this task anyway."	[#5] 1.07 (1.06)	[#6] 3.86 (2.19)	[#5] 3.18 (1.31)	$N = 4$ [#6] 3.30 (2.00)
(Hostile 5, $N = 2$ ) "We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time... I'm willing to sacrifice a little data, so I don't have to hear another girl complain about how hard the last section is... Not doing the hardest section will lower your score, but girls don't score well on this task anyway."	[#2] 2.75 (2.47)	[#2] 5.00 (1.41)	[#2] 4.00 (1.41)	$N = 1$ [#3] 6.00 (N/A)
(Hostile 6, $N = 5$ ) "Now don't get offended; I know how easily girls get offended... We're running short on time... Girls aren't good at this task anyway; so I'm going to get rid of the hard section to save me some time... I'm willing to sacrifice a little data, so I don't have to hear another girl complain about how hard the last section is... Not doing the hardest section will lower your score, but girls don't score well on this task anyway."	[#4] 1.50 (0.94)	[#3] 4.80 (1.30)	[#1] 4.65 (0.49)	$N = 4$ [#2] 6.85 (0.72)