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Original Article

Gender-based perceptions of the 2001 anthrax attacks: Implications for outreach and preparedness

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Abstract Extensive research dealing with gender-based perceptions of fear of crime has generally found that women express greater levels of fear compared to men. Further, studies have found that women engage in more self-protective behaviors in response to fear of crime, as well as have different levels of confidence in government efficacy relative to men. The majority of these studies have focused on violent and property crime; little research has focused on gender-based perceptions of the threat of bioterrorism. Using data from a national survey conducted by ABC News/*Washington Post*, this study contrasted perceptions of safety and fear in response to anthrax attacks among male and female respondents. Results indicated some gender differences in perceptions and responses to possible anthrax exposure, although not all achieved statistical significance. Results are discussed in relation to their implications for criminological theory, security and bioterrorism preparedness.

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Keywords: gender; bioterrorism; fear of crime; anthrax; terrorism

Introduction

The US government has been engaged in a multimillion dollar public awareness campaign designed to increase preparedness for natural disasters and terrorism since 2003 (Ready Campaign Fact Sheet). The *Ready* campaign encourages the public to prepare for disasters and encourages the public to visit websites such as www.ready.gov for specific guidance designed to reduce the impact of disasters and the need for first responder assistance (US Government Accountability Office, 2010).¹ Educating the public on best practices in disaster preparedness is a challenging task. For instance, the Federal Emergency Management Agency (FEMA) needs to impart the public with key information on vastly different response



strategies for chemical, biological and radiological attacks. There may be reason to believe that women may prove to be a superior target for preparedness campaigns as they have higher levels of fear of crime than men (Warr, 1984; Ferraro, 1995; Ferraro, 1996; Warr, 2000; Fisher and Sloan, 2003; Yavuz and Welsh, 2010), more favorable perceptions of government efficacy (for example, Schlesinger and Heldman, 2001) and exhibit greater self-protective behaviors in response to crime (see Gilchrist *et al*, 1998; Nellis, 2009). The present study contrasted perceptions of safety, concern, government effectiveness and responses to fear among male and female respondents during the anthrax attacks in 2001 using data from a national survey² conducted by ABC News and the *Washington Post*. The relationship between gender and a relatively new form of victimization, bioterrorism was discussed along with implications for government outreach for disaster preparedness.

The data for the study were captured at a unique time, that is, while the public was under threat of exposure to anthrax sent through the US Postal Service in 2001. The current study brings to bear the literature on fear of crime to bio-victimization and adds to the understanding of gender differences in fear of crime by addressing two primary research questions: Does the perception of bio-victimization risk vary by gender? – *in a circumstance when there is no likely interaction with fear of sexual victimization factors*. The second research question: Does gender influence behavioral responses to the anthrax threat? – *providing insight into whether or not theoretical understandings of gender should be considered in security analyses and government outreach efforts for disaster preparedness*.

As discussed below, public interest in disaster response tends to peak and ebb after major events such as 9/11 or the Oklahoma City bombings. The present study, along with others with a similar design in this area, faces a historical effect that may limit the applicability of findings (see Maxfield and Babbie, 1995). Nonetheless, studies with historical effects (for example, Laub and Sampson, 2003) can present valid and unique opportunities to examine criminological theories in response to low frequency/high-impact events or crimes that are statistically rare such as the post 9/11 anthrax attacks.

The Anthrax Attacks

Anthrax is a virulent disease that has been the focus of much attention since the anthrax attacks of 2001 (Gorman *et al*, 2011). The threat of bioterrorism remains real with predictions holding that subsequent attacks remain a possibility in the near future (Graham *et al*, 2008). The anthrax attacks between October and November of 2001 resulted in 22 cases of anthrax and five fatalities (Jernigan *et al*, 2002). Despite the low fatality rate of the 2001 attacks anthrax poses a very real threat as it is extremely hardy in the environment (Bouri and Franco, 2010) and scores highly on key bioweapon attributes such as virulence, time to disease and susceptibility of possible target populations (Casadevall and Pirofski, 2004). Those who are infected with anthrax and not treated face a death rate in excess of 99 per cent (Pittman, 2010). Fortunately, anthrax treatment is highly effective if those exposed to it receive proper treatment within 48 hours of infection (Pittman, 2010). However, effective treatment would rely on both an organized government response and cooperation from the suspected victims. Gaining insight into how attitudes towards both anthrax victimization and how responses would differ based on characteristics such as gender is essential to mitigate casualties and restore public order.



Literature Review

A large body of research over the last few decades has found that gender is one of the most influential variables in predicting fear of crime, confidence in government efficacy and self-protective actions on the part of citizens (Warr, 1984; Junger, 1987; Covington and Taylor, 1991; Ferraro, 1995; Schlesinger and Heldman, 2001; Williams-Reid and Konrad, 2004; Nellis, 2009; Penn *et al*, 2009; Wilcox *et al*, 2009; Yavuz and Welsh, 2010). Scholars have offered numerous explanations for women's elevated levels of fear of crime; one of the most common is that gender-based perceptions of crime are explained by fear of sexual victimization. However, if that relationship is as strong as prior scholars have argued, fear and perceptions of bioterrorism, a crime that has no sexual component, should not produce differences in fear, confidence in the government or differing levels of self-protective behaviors by gender. Thus an examination of some of the most prevalent theories is warranted. We begin with a brief overview of the literature regarding fear of terrorism. Next we provide an examination of leading theoretical explanations in the literature, followed by studies examining the relationship between gender and government efficacy, and finally how gender influences responses to crime.

Fear of Terrorism

Prior research has identified public trends in fear and concern from terrorist attacks (Nellis, 2009; Wilcox *et al*, 2009). Nellis (2009) discussed the history of trends in fear of terrorism, beginning with questions asked in response to the bombing of the Alfred P. Murrah building in Oklahoma City in 1995. Surveys such as Jones (2000) found that a large percentage of Americans were worried that they or a family member could be the victim of a terrorist attack similar to the Oklahoma City bombing. Despite this perception public concern dropped in the ensuing years until the terrorist attacks of 2001 (Nellis, 2009). The cycle consisting of a spike in fear from a terrorist attack followed by its ebb over time appears to have repeated again after the terrorist attacks of 2001 (Nellis, 2009). For example, a survey conducted on the evening of the 9/11 attacks on September 11, 2001 found that 58 per cent of respondents were somewhat (35 per cent) or very (23 per cent) worried about being victimized by terrorism (Saad, 2004). By 2005, however, a Gallup poll found that only 8 per cent were very worried about terrorism (The Gallup Organization, 2005, cited in Nellis, 2009). Thus, the abovementioned cycle of a post-attack spike in fear and its diminishment demonstrates that research in this area is subject to distinct historical effects, especially where high-profile terrorism events can influence public response to surveys.

Wilcox *et al* (2009) posed the question, 'Is fear of terrorism unique from fear of crime?' (p. 344). It is not possible to answer this question owing to the limited research in this area, but the existing literature does indicate that gender does seem to be a factor in fear of terrorism. Wilcox *et al* (2009) studied gender-based fear of terrorism using a sample of Turkish high school seniors and found that women were more fearful of terrorism than males. Wilcox *et al*'s (2009) study is of particular interest as Turkey has had significantly greater instances of terrorism and terrorism-related loss of life compared to the United States. The results of Wilcox *et al*'s (2009) study parallel the findings of Huddy *et al* (2002) who used survey data from a sample of residents of Long Island and Queens, New York, who reported that gender is a factor in perceptions of public risk and fear in regard to terrorism, with women reporting



higher levels of fear and risk perception than men. These findings support the idea that gender-based differences in fear of terrorism cross regional and national boundaries.

Theoretical explanations of gender differences in fear of crime

Studies have consistently found gender-based differences in fear of crime. Women's heightened fear of sexual victimization (Ferraro, 1995) is perhaps the most prevalent difference. This warrants careful scrutiny due to the 'shadow hypothesis' (for example, Nellis, 2009), which argues women's greater incidence of sexual victimization generalizes to fears of other crimes (Warr, 1984; Stanko, 1990; Ferraro, 1995; Wilcox *et al.*, 2009). Schafer *et al.* (2006) explained that the 'shadow hypothesis' accounts for an 'ever-present fear of sexual victimization' (p. 286) due to women's increased likelihood of being victimized. As such women's fear of crime may be shaped by their fear of sexual assault; serving as what Ferraro (1996) argued is a 'master offense' that shapes women's perceptions of fear and risk assessments made in relation to other forms of victimization.

Studies in recent years have provided support for this perspective (Warr, 1984; Ferraro, 1995; Ferraro, 1996; Fisher and Sloan, 2003). For example, Schafer *et al.* (2006) provided support for the shadow hypothesis (of sexual assault) through survey data (regarding safety and fear of personal property victimization) that found women reported greater levels of fear of personal victimization and were more concerned with safety than men. However, more recent studies have questioned the shadow hypothesis. Nellis (2009) examined if men and women had differing levels of fear of terrorism in response to terrorism-related media exposure using survey data collected from samples in Washington DC and New York City. Nellis found that women reported greater amounts of fear than men, and that women sought out more information regarding terrorism and took more avoidance behaviors. However, Nellis felt that if sexual victimization was the only factor that explained women's increased fear of victimization, there would not have been a gender effect in her study. Nellis (2009) offered that terrorist attacks lack a sexual component and thus males and females have the same chance of being victimized by terrorist attacks, so something else must be co-occurring with women's fear of terrorism.

While a large portion of studies dealing with the 'shadow hypothesis' suggest that females have a heightened fear of crime due to their fear of sex crimes, studies such as Nellis (2009) suggest that fear of terrorism may not be explained by this hypothesis. The present study provides another opportunity to consider the applicability of the shadow hypothesis to terrorism. Other explanations, such as the vulnerability perspective discussed below may be more applicable to terrorism-based crimes. However, the 'shadow hypothesis' has yet to be tested in relationship to a bioterrorism threat. The results of the present study may help provide clarification regarding the influence of the 'shadow hypothesis' and its influence on fear of bioterrorism.

Another common theoretical explanation for increased levels of fear of crime among women is the perception that women are more vulnerable and as such have an increased likelihood of victimization compared to males (Warr, 1994). Nellis (2009) argued that women's greater sense of vulnerability may transfer to terrorism. The 'vulnerability' perspective was viewed by Skogan and Maxfield (1981) as having three prongs: (1) the likelihood of being attacked; (2) the decreased ability to repel an attack; and (3) the emotional and physical



trauma associated with being victimized. Others have noted that women tend to be perceived as a 'softer' target compared to male victims and less able to defend against a physical attack (Junger, 1987; Warr, 1994; Smith and Torstensson, 1997).

Others such as Smith (1989) have expanded the notion of the vulnerability perspective by suggesting that women with children have an enhanced sense of vulnerability. Smith (1989) argued that women's heightened sense of vulnerability is also due to their societal role, which emphasizes a greater sense of responsibility and related concern for their children, as women tend to worry about the vulnerability of their children in addition to their own. In support of Smith's (1989) argument, Gilchrist *et al* (1998) noted that women not only worry about their own vulnerability, but also that of their children. As such we may expect to find that women, being the primary caregivers of children, are likely to have higher levels of fear than men due to their increased sense of personal vulnerability and their concern for the welfare of their families.

Key to understanding Gilchrist *et al*'s (1998) work is the role of altruistic fear (Warr, 2000). Distinct from personal fear (fear for oneself) altruistic fear refers to how an individual may fear for their own safety (fear of oneself), but also fear for others such as children and spouses whose safety and well-being they value (Warr, 2000). Using data from a Texas sample, Warr and Ellison (2000) investigated the prevalence and organization of altruistic fear in family households. Their sample reported higher levels of altruistic fear compared to personal fear and that women were more likely to express higher levels of altruistic fear for their children compared to men. Further, husbands expressed greater concern for their wives at younger ages; conversely females expressed lower levels of concern for their husbands. The results of this study may support the idea that women are perceived by males as more vulnerable to crime and females view males less likely to be victimized.

More recently Snedker (2006) used qualitative interviews from a sample of New York City residents to study fear of crime finding that women's altruistic fears were influenced by their maternal roles reflected in their fear for their children, older parents and siblings. In regard to males Snedker (2006) found males were most concerned with the safety of their wives reflecting the paternal protector role. While the vulnerability perspective and the idea of altruistic fear have been a component of prior research in the area of terrorism, scholars have yet to incorporate and apply these ideas to bioterrorism.

Scholars such as Williams-Reid and Konrad (2004) have argued that women are socialized to believe that weakness and passivity are appropriate feminine characteristics. Others such as Gordon and Riger (1989) argued that women's fear of crime was rooted in their subordinate position to males, providing them an inbuilt vulnerability. Sacco (1990) stated that both men and women's fear of crime are the result of socialization because females are socialized to be more aware of risks and males less fearful of crime. Nellis (2009) reflected Sacco's perspective, suggesting that women are socialized to be viewed as subordinate to men (for example, females are socialized to be passive, while males are socialized to be aggressive) and women feel they are weaker and more vulnerable to criminal victimization (see Madriz, 1997).

Gender and government efficacy

The question of gender-based differentials of support for governmental actions and policies is likewise addressed in the present study. In recent years, political scientists such as



Andersen (1997) and Schlesinger and Heldman (2001) have examined whether gender was a factor in public perceptions of policy issues and government responses to domestic issues. Using data from a 1995 national telephone survey Schlesinger and Heldman (2001) examined whether or not there was a gender gap in areas of domestic policy. The results of their study found that there were significant differences including an awareness of social institutions and the perceived efficacy of government programs across five policy domains with women reporting higher mean responses and perceptions of issues (for example, lack of health care, lack of health insurance). More recently, Penn *et al* (2009) studied data from a telephone poll of 862 Pennsylvanians to examine several areas of public satisfaction with government response to crime, in particular homeland security. The results of their study found that participants were satisfied overall with the government's performance in the area of homeland security. There were, however, differences by gender with white males demonstrating greater levels of fear and concern regarding homeland security issues compared to white women, black women and black males. Penn *et al* (2009) explained that the gender differences in this area may be the result of males being more dominant in the military and law enforcement, and as such believe that terrorism is a more pronounced threat. The present study follows by examining gender perceptions of governmental efficacy during the 2001 anthrax attacks.

Gender and self-protective behaviors

Individual-level response to crime is another factor related to fear of crime. Nellis (2009) found that women reported greater amounts of fear than men; they also sought out more information regarding terrorism and took more avoidance behaviors. These results are consistent with the findings of other studies such as Schafer *et al* (2006), which considered violent and personal crime. Although Schafer *et al* (2006) found that men and women reported nearly equal levels of fear of property victimization. These results may suggest that men may be more comfortable reporting fear of property victimization compared to personal or violence crimes due to gender roles and cultural pressures that influence men's repression of their feelings or fears. Kaminski *et al* (2010) examined survey responses to fear of crime on campuses before and after shooting incidences at Virginia Tech and Northern Illinois University. The study found that women have higher rates of fear than men, possibly reflecting male repression of fear. In another study, Gilchrist *et al* (1998) conducted qualitative interviews using a sample of 64 men and women in Glasgow, Scotland to study fear of crime. Their study found that both men and women managed their fear of victimization by trying to be more aware of their surroundings, avoiding 'bad' areas or staying in after dark. Females in the sample mentioned fear of sexual victimization more than males, as well as worrying more because they did not have anyone to protect them. Some women discussed how they had security systems installed to prevent burglaries and drove instead of walking to reduce their chances of being robbed. The findings of these studies may suggest that males are less likely to report being fearful of violent victimization owing to gender role socialization.

The literature provides insights into gender and crimes against individuals as opposed to crimes against society, which require universal protective protocols. Thus, government outreach needs to be informed by the potential for gender differences in perceptions of terrorism and its possible consequences for readiness compliance.



In sum, gender-based differences in fear of crime, views towards government efficacy and responses to fear of crime have been examined extensively in the literature. There are many theoretical explanations for these differences and empirical support for these explanations; however, little research has specifically examined these theories in relation to terrorism, and fewer have examined them relative to the fear and responses to bio-victimizations such as the anthrax attack of 2001.

Limitations of Prior Research

The aforementioned studies clearly show that the criminological literature on gender-based perceptions of fear of crime is an important area of study with respect to terrorism and disaster preparedness. However, there is an absence of information about fear of terrorism related to gender in the literature, in particular the bio-victimization threat from anthrax. As previously discussed, anthrax poses a significant threat to the public and an attack could result in mass casualties in addition to major social and economic disruption. Moreover, the few studies that examined gender-based perceptions of fear of terrorism such as Nellis (2009) and Huddy *et al* (2002) did not use national samples and as such and may face problematic generalizability challenges. Wilcox *et al* (2009) faced a similar limitation because they used a convenience sample of high school students.

Methods

Data

This study utilized data from an ABC News/*Washington Post* special topic telephone poll conducted on 24 October 2001, which are housed at the Inter-University Consortium for Political and Social Research (ICPSR 3320). The poll was designed to assess public responses to the post 9/11 anthrax attacks using letters tainted with anthrax bacteria (ABC News/*Washington Post*, 2001). Therefore, results should be interpreted with this in mind, and generalizability to other time periods cannot be assumed. A total of 508 individuals from across the United States were interviewed regarding their reactions to factors including: (a) the danger posed by anthrax, (b) the level of concern they had that a friend, or relative would contract anthrax, (c) changes in behavior due to the threat of anthrax, (d) the level of confidence they had in the government's ability to respond to a large-scale biological attack on the United States, (e) whether or not they were satisfied with the government's response to the anthrax attacks, and (f) if they felt the United States was taking appropriate steps to prevent a biological attack. An additional question asked respondents if they felt the news media overestimated the dangers posed by anthrax. Items were re-coded so that higher values reflected increases in the response categories (for example, higher score = more concern). Demographic information regarding gender, region and political party were also collected (see Tables 1 and 2 for descriptive statistics of the demographics and survey questions and responses utilized for this study).

It should be noted there are limitations to these data. First, only gender, political affiliation and region were collected. The exclusions of other demographic factors prevents investigation

**Table 1:** Descriptive statistics of demographics

<i>Variable</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Gender</i>	Male	246	48.5
	Female	262	51.5
<i>Political affiliation</i>	Democrat	168	33
	Republican	142	28
	Independent	168	33
<i>Region</i>	East	95	18.7
	Mid-West	118	23.2
	South	182	35.8
	West	113	22.3

of other important factors, which have been shown to influence fear of crime including race, education, socio-economic status, religious affiliation and occupation (see Warr, 1994, 2000). Second, as mentioned above, these data were collected during a time when the public's concern regarding the government ability to protect it from terrorist attacks was at its peak – while this provides advantages for this study, allowing us to take advantage of this unique historical effect, it does prevent generalizability to other time periods.

Despite the limitations of these data, they are of unique value owing to the historical timing as they capture a distinctive way to study gender-based fear during an actual bioterrorist attack on targets throughout the country. Other data sources such as the General Social Survey provide information regarding fear of terrorism, but do not provide the level of detail regarding specific responses to a threat such as anthrax, nor the unique historic effect that the ABC News/*Washington Post* survey provides as it was conducted as the public experienced the anthrax attacks of 2001.

Analysis

In order to test the two primary research questions: 'Do perceptions of risk of bio-victimization vary by gender and does gender influence behavioral responses to the anthrax threat?', a series of independent *t*-tests and chi-squares (allowing a comparison between males and females) and regression analyses (allowing an examination of what factors predict more responses to anthrax) were employed. Analyses utilized questions 1 through question 10 and two scales dealing with behavioral responses to anthrax (see Table 4 – results of independent sample *t*-tests and chi squares). The scales were created by subjecting the 11 items (see Table 3 for results of factor analysis using questions 11a–f and 12a–e and Appendix A) from the survey that indicated responses or changes in behavior following the 9/11 anthrax attacks to exploratory factor analysis. Before performing the principle components analysis (PCA), the suitability of data for factor analysis was assessed using a correlation matrix. The correlation matrix identified the presence of several coefficients of 0.3 and above. The Kaiser-Meyer-Olkin value was 0.81, exceeding the recommended value of 0.6

**Table 2:** Descriptive statistics independent and dependent variables

<i>Question/Variable</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
Q1. How concerned are you about the chance that you personally, or a close friend or relative, might be the victim of an anthrax attack	Don't know	3	0.5
	Not at all	108	21.2
	Not too much	159	31.3
	Somewhat	150	29.5
	Great deal	89	17.4
Q2. Apart from a friend or relative, what about the chance that you yourself might get anthrax	Don't know	3	0.7
	Not at all	167	32.9
	Not too much	168	33.1
	Somewhat	109	21.4
	Great deal	61	12.0
Q3. How would you describe your own personal reaction to the anthrax situation?	Don't know	1	0.2
	Not concerned	56	11.7
	Concerned, but not scared	387	76.3
	Scared	60	11.9
Q4. Are you satisfied or dissatisfied with the way government authorities have been handling the anthrax situation?	Don't know	12	2.3
	Very dissatisfied	43	8.5
	Somewhat dissatisfied	57	11.3
	Somewhat satisfied	211	41.6
	Very satisfied	183	36.0
Q5. Given what you know about it, do you think of the anthrax situation as?	Don't know	34	6.6
	Isolated cases	211	41.6
	First of ongoing series	261	51.4
Q6. How confident are you in the federal government's ability to respond effectively to a large-scale biological or chemical attack in the United States?	Don't know	9	1.8
	Not confident at all	32	6.2
	Not too confident	85	16.8
	Somewhat confident	268	52.7
	Very confidence	113	22.3
Q7. Overall, do you think the mail you receive at home is safe, or unsafe	Unsafe	30	5.9
	Safe	466	91.8
Q8. Do you think the United States government was as prepared as it reasonably could have been to deal with a biological attack like this anthrax situation, or do you think it should have been better prepared	The United States should do more	306	60.2
	The United States did all it could do	190	37.5
Q9. Do you think the United States is doing all it reasonably can do to try to prevent further biological attacks like this anthrax situation, or do you think it should do more	The United States should do more	185	36.5
	The United States did all it could do	308	60.6
Q10. Generally speaking, do you think the news media	Did not exaggerate the danger	248	48.9
	Did exaggerate the danger of the situation	233	45.9

**Table 2** *continued*

<i>Question/Variable</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Scales</i>	<i>Range</i>	<i>Mean</i>	<i>SD</i>
Mail handling scale	0–4 (higher score = more response)	1.38	1.64
Other response scale	0–6 higher score = more response)	0.79	1.08

Table 3: Results of factor analysis

<i>Question/Variable</i>	<i>Component 1</i>	<i>Component 2</i>
11a. Since September 11, have you or has anyone in your household done the following Yes, no but have considered it, no and have not considered it, don't know/no opinion Brought a supply of antibiotics in case of biological attack	—	0.510
11b. ... Spoken with a doctor about anthrax or some other biological attack	—	0.512
11c. ... Started to exercise caution in opening your mail	0.940	—
11d. ... Gathered information about what to do in case of anthrax or other biological attack	—	0.607
11e. ... Started avoiding crowded places such as shopping malls because of the chance of anthrax or other biological attack	—	0.429
11f. ... Tried to reduce the amount of mail you handle by asking people to send you e-mail instead	—	0.501
12a. As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Looking it over more carefully than usual	0.907	—
12b. ... Throwing away unfamiliar mail without opening it	0.825	—
12c. ... Wearing clothes or a mask when handling mail	—	0.511
12d. ... Washing your hands after handling the mail	0.738	—
12e. ... Doing anything else with the mail	—	0.449

(Kaiser, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

PCA with varimax rotation revealed two components with an eigenvalue exceeding one, explaining 28.72 per cent and 17.33 per cent of the variance, respectively (see Table 3). This first factor consisted of four items that dealt with using increased caution when handling the



mail. The second factor consisted of the remaining items that dealt with exercising caution in other areas such as contacting a doctor about how to treat anthrax. Next, the items in each component were subjected to a reliability test. The first component, labeled 'mail handling responses to anthrax scale', was found to have good internal consistency, with a Cronbach α coefficient of 0.89. The second scale, labeled 'other response to anthrax scale', had an α of 0.54 (see Appendix B for a complete listing of the variables in each scale) (Cronbach, 1970).³

Results

Table 4 provides an overview of the independent sample *t*-tests and chi-square tests that were conducted to examine the first research question of this study: do perceptions of bio-victimization vary by gender? Of the independent sample *t*-tests conducted three revealed statistically significant results, and two additional tests approached statistical significance at a $P < 0.10$ level.⁴ The first questions that males and females had statistically significant different scores on was questions 1, *how concerned are you about that chance that you personally or a close friend or relative, might be the victim of anthrax attack?* with females having a slightly higher score [$M = 3.54$, $SD = 1.0$; $t(506) = -2.61$, $P = 0.00$] than males ($M = 3.29$, $SD = 1.03$). The second question that males and females scored differently on was question 3, *how would you describe your own personal reaction to the anthrax situation?* with females scoring higher [$M = 3.08$, $SD = 0.47$; $t(503) = -3.93$, $P = 0.00$] than males ($M = 2.91$, $SD = 0.48$). The final significant independent sample *t*-test compared the results of males and females on the 'mail handling' response to anthrax scale, with females scoring higher [$M = 1.54$, $SD = 1.69$; $t(506) = -2.201$, $P = 0.02$] than males ($M = 1.21$, $SD = 1.57$). In addition, two other independent sample *t*-tests approached statistical significance at the $P < 0.10$ level, question 5, *given what you know about it do you think the anthrax situation?* and question 6, *how confident are you in the federal government's ability to respond effectively to a large scale biological or chemical attack in the United States?* Results revealed that females had slightly higher mean scores than males on both questions.

Of the chi-square tests conducted none were significant. The next step in the analysis was a series of regression models using the 'mail response to anthrax' scale⁵ to test what factors predicted greater levels of response.

Three models were run using the 'mail response to anthrax' scale to address our second research question. Multicollinearity was not an issue and VIF and Tolerance values were in acceptable ranges (see Table 5 for results of all models). Model 1 examined the influence of gender in predicting scores on the 'mail' outcome. The ANOVA for model 1 was statistically significant ($P < 0.05$, $F = 4.84$). The results of model 1 revealed that females have a 0.320 increase in the mail response to anthrax scale compared to males.

Model 2, which controlled for both political affiliation and region (South was used as the reference category), in addition to gender was statistically significant (ANOVA = $P < 0.05$, $F = 2.576$). In the second model gender approached significance at the $P < 0.10$ level, with females having a 0.262 increase in the mail response to anthrax scale relative to males. Of the variables measuring region and political affiliation, only West was significant at a $P < 0.05$ level with those living in the Western portion of the United States having a -0.416 decrease in the 'mail' scale, compared with those who live in other regions. The final model

**Table 4:** Results of independent sample *t*-test/chi squares

<i>Question (Independent sample t-tests)</i>	<i>Gender</i>	<i>N</i>	<i>Mean (SD)</i>
1. How concerned are you about the chance that you personally, or a close friend or relative, might be the victim of an anthrax attack	Male	246	3.29 (1.03)*
	Female	262	3.54 (1.0)
2. Apart from a friend or relative, what about the chance that you yourself might get anthrax	Male	246	3.03 (1.03)
	Female	262	3.18 (1.0)
3. How would you describe your own personal reaction to the anthrax situation	Male	245	2.91 (0.48)*
	Female	261	3.08 (0.47)
4. Are you satisfied or dissatisfied with the way government authorities have been handling the anthrax situation	Male	246	3.98 (1.0)
	Female	260	4.03 (1.02)
5. Given what you know about it, do you think of the anthrax situation as ...	Male	245	2.40 (0.63)**
	Female	260	2.50 (0.60)
6. How confident are you in the federal government's ability to respond effectively to a large-scale biological or chemical attack in the United States	Male	246	3.80 (0.57)**
	Female	261	3.95 (0.54)
Mail handling scale	Male	246	1.21 (1.57)*
	Female	262	1.54 (1.69)
Other response scale	Male	246	0.72 (1.03)
	Female	262	0.85 (1.11)
<i>Question (Chi-square results)</i>	<i>Gender</i>	<i>% within gender</i>	
7. Overall, do you think the mail you receive at home is safe, or unsafe	Male	Unsafe 5.8	Safe 94.2
	Female	Unsafe 6.3	Safe 93.7
8. Do you think the United States government was as prepared as it reasonably could have been to deal with a biological attack like this anthrax situation, or do you think it should have been better prepared	Male	Do more 64.7	Did all 35.3
	Female	Do more 54.4	Did all 41.6
9. Do you think the United States is doing all it reasonably can do to try to prevent further biological attacks like this anthrax situation, or do you think it should do more	Male	Do more 38.3	Did all 61.7
	Female	Do more 37.1	Did all 62.9
10. Generally speaking, do you think the news media exaggerated or did not exaggerate the danger	Male	Did not 48.9	Did 51.1
	Female	Did not 54.1	Did 45.9

* $P < 0.05$; ** $P < 0.10$.

was also significant (ANOVA $P < 0.05$, $F = 7.853$). In model 3, none of the demographic variables (gender, region or political affiliation) were significant. However, several of the questions utilized from the survey were found to predict mail-based responses to anthrax. The first significant question was question 2, *Apart from a friend or relative, what about the chance that you yourself might get anthrax (higher score = more concern)*, with every unit

**Table 5:** Results of regression models

<i>Variable</i>	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Gender	0.320*	0.145	0.262	0.146**	0.123	0.136
Democrat	—	—	0.411	0.321	0.218	0.295
Republican	—	—	0.170	0.325	0.203	0.299
Independent	—	—	-0.007	0.321	-0.123	0.296
East	—	—	0.143	0.206	-0.092	0.191
Mid-West	—	—	-0.247	0.193	-0.199	0.177
West	—	—	-0.416	0.195*	-0.277	0.180
Q1. How concerned are you about the chance that you personally, or a close friend or relative, might be the victim of an anthrax attack -?	—	—	—	—	0.110	0.100
Q2. Apart from a friend or relative, what about the chance that you yourself might get anthrax -?	—	—	—	—	0.277	0.096*
Q3. How would you describe your own personal reaction to the anthrax situation?	—	—	—	—	0.381	0.164*
Q4. Are you satisfied or dissatisfied with the way government authorities have been handling the anthrax situation?	—	—	—	—	0.027	0.076
Q5. Given what you know about it, do you think of the anthrax situation ?	—	—	—	—	0.150	0.114
Q6. How confident are you in the federal government's ability to respond effectively to a large-scale biological or chemical attack in the United States?	—	—	—	—	0.066	0.083
Q7. Overall, do you think the mail you receive at home is safe, or unsafe?	—	—	—	—	-0.226	0.294
Q8. Do you think the United States government was as prepared as it reasonably could have been to deal with a biological attack like this anthrax situation, or do you think it should have been better prepared?	—	—	—	—	-0.272	0.152**

**Table 5** *continued*

Variable	Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE
Q9. Do you think the United States is doing all it reasonably can do to try to prevent further biological attacks like this anthrax situation, or do you think it should do more?	—	—	—	—	-0.398	0.153*
Q10. Generally speaking, do you think the news media ...?	—	—	—	—	-0.376	0.141*
Constant	1.219	0.104	1.19	0.320	-1.018	0.739
	$R^2=0.009$	—	$R^2=0.035$	—	$R^2=0.214$	—
	Df=1	—	Df=7	—	Df=17	—

* $P < 0.05$; ** $P < 0.10$.

Mean replacement was employed to cope with missing data in these models. Parallel results were run using listwise deletion and results were comparable.

increase in concern about getting the individual getting anthrax there was a 0.277 increase in the mail response to anthrax scale. The next question that was significant in the model was question 3, *How would you describe your own personal reaction to the anthrax situation (higher score = more fear)*, with every unit increase in fear of anthrax having a corresponding 0.381 increase in the mail-related response to anthrax scale. The third question found significant was question 9, *Do you think the United States is doing all it reasonably can do to try to prevent further biological attacks like this anthrax situation, or do you think it should do more*, with those who felt the United States should do more scoring 0.389 higher on the mail response to anthrax scale compared to those who felt the United States did all it could. The final question significant at $P < 0.05$ level was question 10, *Generally speaking, do you think the news media exaggerated danger of the situation or did not exaggerate danger of the (anthrax) situation?* The results of model 3 found that those who felt the news media did not exaggerate the danger scored 0.376 higher on the mail response to anthrax scale compared to those who felt the media did exaggerate the danger. In addition, question 8, *Do you think the United States government was as prepared as it reasonably could have been to deal with a biological attack like this anthrax situation, or do you think it should have been better prepared?* approached significance at the $P < 0.10$ level, with those who felt the United States should have been more prepared scoring 0.272 higher on the mail response to anthrax scale relative to those who felt the United States was adequately prepared for a biological attack.

Discussion

Overall, the gender-based differences in fear and response to anthrax findings found in this study are consistent with the results of similar studies. Women reported more concern about potential victimization, greater levels of fear, felt anthrax would be an ongoing issue, had



greater levels of confidence in the government's ability to handle the threat, and were more likely to alter their behavior regarding handling of mail. In addition, several factors were identified as predicting behavioral changes in the handling of household mail. The findings relative to our primary research questions will be discussed and then followed by a discussion of the implications for criminological theory and homeland security preparedness.

The first research question of this study sought to examine if perceptions of bio-victimization vary by gender. The results of the independent sample *t*-tests found differences in several key areas suggesting that women may have greater levels of fear and concern regarding anthrax, more faith in government's ability to handle the threat of bio-victimization and take more action in response (in this case take more caution when handling the mail). These findings support the vulnerability perspective and idea that women have higher levels of altruistic fear.

The gender-based differences in fear, concern, confidence in the government and responses to anthrax, however, may add to challenges of the sexual victimization view. Being that intentional exposure to anthrax is a form of victimization that has no sexual component, it is likely that women's fear of bioterrorism may be influenced by other factors. On the other hand, it could be argued that gender role socialization may also play a role with female responses to a bioterrorism threat. As women are socialized to be the primary caregivers of children, they may be more apt than males to exhibit greater levels of concern, confidence in the government's ability to deal with a bioterrorism threat and be more responsive to the danger posed by anthrax. The vulnerability perspective, however, remains a viable explanation.

If women have a greater sense of physical and social weakness with regard to criminal victimization, then this sense of vulnerability may apply to anthrax victimization as well. This may also explain why women took greater measures to protect themselves compared to men who are socialized to be less expressive of fear. Gender role socialization may likewise provide explanations of these findings if women are typically socialized to be more expressive and communicative while males tend to internalize and repress fear (see Parsons, 1954; Williams-Reid and Konrad, 2004). Thus, women may be more likely to admit their concerns and fears regarding anthrax, as well as take more protective measures to prevent bio-victimization as a result of differing gender roles.

This study also found that women have more confidence in the federal government's ability to respond to a large-scale chemical or biological attack compared to men. This finding may reflect gender role socialization, as discussed by Smith and Torstensson (1997) with women being socialized to be weaker and males socialized to be protectors. Scholars have suggested that there is a 'gender-gap' that may influence support for government actions and policies, with males and females having differing responses based on several factors including emotional response, awareness of threats posed to their family, perceptions of fairness in social institutions and perceptions of efficacy of programs (Schlesinger and Heldman, 2001). This study may support the notion that there may be a 'gender-gap' regarding perceptions of bioterrorism threats as well. Women may perceive greater threat levels posed to their families and be more willing to amend their behaviors based on government policies to increase levels of protection for their families as part of their 'nurturing' roles.

In regard to the second research question: does gender influence behavioral responses to the anthrax threat, we found initial support in model 1; with being female predicting greater levels of mail-based responses to anthrax. However, when controlling for other factors



(see models 2 and 3) the effect of gender was moderated, suggesting that gender may be muted when controlling for other factors (gender did approach significance at the $P < 0.10$ in model 2). Likewise, the results of this study found a similar result with region, with those living in the West having lower scores on the mail response to anthrax (model 2), but those effects being moderated when other factors were introduced (model 3), suggesting that region may interact with other factors that decrease the overall level of concern and fear regarding bio-victimization in 2001. However, future researchers may want to explore the role of region relative to fear and concern regarding bio-victimization as some areas of the country (for example, New York City, Washington DC) may be more likely to be targets. Studies may want to collect more specific information regarding demographics (such as which large city/metropolitan area does a respondent live near, rather than the more general region variable utilized here).

Other significant findings of the regression models included: (a) those who had greater levels of fear of anthrax, and those who feared anthrax more took more action when handling the mail, and those who felt the United States needed to do more to prevent further biological attacks had higher scores on the mail response to anthrax scale. These findings were not related to gender, but do suggest that individual fear (versus altruistic fear) may be a factor that predicts how individuals will comply with FEMA instructions on bioterrorism preparedness. This may suggest that individuals consider their individual health, well-being and safety over that of those they care for (for example, spouses, children and friends). Further, findings may suggest those with less faith in the government may be more likely to take self-protective measures against bio-victimization. A finding that provides a troubling dilemma for FEMA campaigns and initiatives. These findings, however, should be interpreted with caution owing to the limitations of these data and this study. Future studies may want to explore both the role of individual and altruistic fear relative to bio-victimizations, as well as the role of faith in the government's ability to cope with a bioterrorism attack.

The results of the regression models also found that who felt the media did not exaggerate the danger posed by anthrax scored higher on the response scale. As with the abovementioned findings, gender was not significant in model 3 where these findings were revealed, nonetheless this may provide future researchers an area of exploration as those who perceive media reports as accurate and unexaggerated may be more likely to take self-protection actions when faced with a bio-victimization.

An additional finding that approached statistical significance was related to those who felt that the United States should have been more prepared, that is, scoring higher on the mail response to anthrax scale, relative to those who felt that the United States was adequately prepared for a biological attack. This finding may suggest that faith in government is a factor that may alter behavioral responses and self-protective behaviors. Future studies should continue to explore the influence of faith in the government's ability to cope with a biological attack and any effect it may have on disaster preparedness compliance.

Theoretical, policy and security implications

This study applied the gender-based fear of crime literature to a bioterrorism threat. Findings suggest that gender does seem to be a factor in bio-victimization. These findings are consistent with much of the gender-based fear of crime research and fear of terrorism literature.



Women reported more fear, concern, faith in the government and behavioral responses to anthrax victimization than men. Interestingly, from a theoretical perspective, women arguably face the same likelihood of being a victim of a bioterrorism attack as men, yet there were differences based on gender. These findings may suggest that theoretical examinations of bio-victimizations need to include a gender-based component. Future studies in this area should consider gender of paramount concern as it may influence levels of fear, perceptions of government efficacy and behavior responses. Theoretical explanations such as gender role socialization and sense of vulnerability may be utilized to explain how gender 'works' within the context of bioterrorism. Further, the extant criminological and terrorism literature appears to explain gender-based perceptions of bioterrorism.

From a policy perspective, the results of this study suggest that women have greater confidence in the government's ability to deal with a bioterrorist-based attack. This suggests that women may possibly be more compliant with government directives or public health precautions in anticipation of a bioterrorist attack from anthrax or other agents. Further, women were also found to take greater protective measures in response to anthrax, suggesting that women may be more amenable to take recommended precautions to avoid anthrax contamination compared to males. These findings may be of particular value as experts (see Graham *et al*, 2008; Sullivan, 2008; Thompson, 2011) have stated a bioterrorist attack is likely to occur in the United States in the coming years.

Finally, in regard to security, gender should be considered as a vital factor for preparation and response to potential chemical, biological and terrorist-based attacks. Federal agencies such as FEMA involved in prevention and preparedness strategies may want to target females as they are more likely to be compliant and follow government-issued directives. First respondents may also benefit from targeting women as they may be more likely to follow orders and implement treatment and prevention strategies.

Limitations

The study data were collected after the September 11 terrorist attacks (October 2001) providing information about the public's response to an unresolved and continuing bioterrorism attack. However, while we have addressed our research questions, it is important to discuss limitations of this study. To start, as stated above, data were collected after 9/11 (in October 2001), providing information about public response to the post 9/11 anthrax attacks that resulted in the death of five individuals. Thus, these data capture insights on a terrorist attack at a unique and unprecedented point in time. That very same advantage, however, limits the applicability of these findings. The historical effect, which captured a moment of crisis in this instance, may lead to different results at times distant from a terrorist event. Thus, it is possible that gender-based perceptions of fear of anthrax may be different today, despite ongoing interest and concern about anthrax in both academic and medical circles. Further, while the data used in the study included information on gender, political affiliation and geographic region, these data did not include important demographic information about age, race/ethnicity, education, income, occupation, or other important demographic characteristic such as marital status and having children. More expansive demographic information could have allowed for more robust exploration of the relationship between gender and anthrax concerns. Future research could replicate this study and include more expansive



demographic information at a time when public concern about anthrax is not as prevalent for comparison to responses from an unfolding national event.

Conclusions

Decades of criminological literature have found that females tend to fear crime at greater levels than males. In like manner, the emerging fear of terrorism literature has found that women tend to be more fearful of terrorism than males consistent with fear differentials over property and violent crime. The present study examined whether or not women had different levels of fear in relation to a largely unexplored form of terrorism, that is bioterrorism, and found that women do have different levels of fear than men. This study added to the literature by finding that gender-based fear of crime and fear of terrorism differences exist with regard to bioterrorism in the midst of a national crisis. Moreover, this study found that while females reported greater fear of bioterrorism, they were also more likely to engage in certain disaster preparedness behaviors. In sum, the findings suggest that certain disaster preparedness and outreach campaigns may have a more receptive audience in the female population due to higher fear of crime, greater confidence in the government and more frequent disaster response activities.

Notes

- 1 Jenkins GAO testimony report at www.gao.gov/products/GAO-10-193.
- 2 While these data were collected from across the different regions of the United States, the small N (508) may limit the national representativeness of these data and as such for the purposes of this study 'national' is conceptualized as descriptive only, rather than fully representative and generalizable to the population of the United States.
- 3 Coefficient α is one of the most commonly used measures of reliability. Not only is it influenced by the average correlation among items (internal consistency), but also by the number of items in the scale (Nunnally, 1978). As a result, it may be difficult to obtain a high α , especially in longitudinal data where variables present at one wave may not be present at the next. Psychometricians (for example, Cronbach, 1970) have warned of this limitation, but it is often overlooked (Welsh, 2001). Further, α coefficients in the 0.40–0.50 range have generally been considered acceptable for etiological research (Thorndike, 1971).
- 4 To minimize the risk of α inflation a Bonferroni correction of $P < 0.025$ was employed for this series of tests.
- 5 Because the results of the independent sample t -test using the 'other responses to anthrax scale' did not reveal a statistically significant difference between males and females on that scale results of the regression analysis for that outcome are omitted. Results of four models run are available upon request.

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Appendix A

Table A1: Listing of survey questions used for this study

<i>Question 1</i>	How concerned are you about the chance that you personally, or a close friend or relative, might be the victim of an anthrax attack – does that worry you a great deal, somewhat, not too much or not at all?
<i>Question 2</i>	Apart from a friend or relative, what about the chance that you yourself might get anthrax – does that worry you a great deal, somewhat, not too much or not at all?
<i>Question 3</i>	How would you describe your own personal reaction to the anthrax situation – on a personal level would you say you're scared about it, concerned about it but not scared, or not concerned?
<i>Question 4</i>	Are you satisfied or dissatisfied with the way government authorities have been handling the anthrax situation? Very satisfied, somewhat satisfied, somewhat dissatisfied, very dissatisfied, don't know/refused.
<i>Question 5</i>	Given what you know about it, do you think of the anthrax situation as (a few isolated cases limited to a small number of people), or as (the first of an ongoing series of cases that could affect a large number of people)?
<i>Question 6</i>	How confident are you in the federal government's ability to respond effectively to a large-scale biological or chemical attack in the United States – very confident, somewhat confident, not too confident or not confident at all?
<i>Question 7</i>	Overall, do you think the mail you receive at home is safe, or unsafe?
<i>Question 8</i>	Do you think the United States government was as prepared as it reasonably could have been to deal with a biological attack like this anthrax situation, or do you think it should have been better prepared? – The United States did all it could, the United States should have done more.
<i>Question 9</i>	Do you think the United States is doing all it reasonably can do to try to prevent further biological attacks like this anthrax situation, or do you think it should do more?
<i>Question 10</i>	Generally speaking, do you think the news media ...? – Exaggerated danger of the situation, Did not exaggerate danger
<i>Question 11</i>	Since September 11, have you or has anyone in your household done the following ... Yes, no but have considered it, no and have not considered it, don't know/no opinion ...
<i>Question 11a</i>	Brought a supply of antibiotics in case of biological attack?
<i>Question 11b</i>	Spoken with a doctor about anthrax or some other biological attack?
<i>Question 11c</i>	Started to exercise caution in exercise caution in opening your mail?
<i>Question 11d</i>	Gathered information about what to do in case of anthrax or other biological attack?
<i>Question 11e</i>	Started avoiding crowded places such as shopping malls because of the chance of anthrax or other biological attack?
<i>Question 11f</i>	Tried to reduce the amount of mail you handle by asking people to send you e-mail instead?
<i>Question 12</i>	As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Yes, no, don't know
<i>Question 12a</i>	Looking it over more carefully than usual?
<i>Question 12b</i>	Throwing away unfamiliar mail without opening it?
<i>Question 12c</i>	Wearing clothes or a mask when handling mail?
<i>Question 12d</i>	Washing your hands after handling the mail?
<i>Question 12e</i>	Doing anything else with your mail?



Appendix B

Items contained in outcome scales

Mail handling response to anthrax scale

Question 11c: Since September 11, have you or has anyone in your household done the following ... Started to exercise caution in exercise caution in opening your mail?

Question 12a: As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Looking it over more carefully than usual?

Question 12b: As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Throwing away unfamiliar mail without opening it?

Question 12d: As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Washing your hands after handling the mail?

Other responses to anthrax scale

Question 11a: Since September 11, have you or has anyone in your household done the following ... Brought a supply of antibiotics in case of biological attack?

Question 11b: Since September 11, have you or has anyone in your household done the following ... Spoken with a doctor about anthrax or some other biological attack?

Question 11d: Since September 11, have you or has anyone in your household done the following ... Gathered information about what to do in case of anthrax or other biological attack?

Question 11e: Since September 11, have you or has anyone in your household done the following ... Started avoiding crowded places such as shopping malls because of the chance of anthrax or other biological attack?

Question 11f: Since September 11, have you or has anyone in your household done the following ... Tried to reduce the amount of mail you handle by asking people to send you e-mail instead?

Question 12c: As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Wearing clothes or a mask when handling mail?

Questions 12e: As far as exercising caution with your mail, are you or is someone in your housing (done the following) ... Doing anything else with your mail?

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