Fall 2019

# Are Chronic Inflammatory Diseases Associated with Trauma Exposure and Gender? An Empirical Analysis of Self-Reported Trauma and Health Histories of Men and Women

Meghan Lacienski

ARE CHRONIC INFLAMMATORY DISEASES ASSOCIATED WITH TRAUMA

EXPOSURE AND GENDER? AN EMPIRICAL ANALYSIS OF SELF-REPORTED

TRAUMA AND HEALTH HISTORIES OF MEN AND WOMEN

by

MEGHAN LACIENSKI

(Under the Direction of Dorthie Cross)

ABSTRACT

A growing body of research indicates an association between trauma, inflammation, and chronic inflammatory disease; however, the mechanisms of this relationship are not fully understood, and the salience of potential risk factors, such as cumulative effects of trauma, trauma type, and gender, remain unclear. Trauma is associated with poor mental and physical health, such as PTSD, depression, and chronic inflammatory conditions, and this association may be stronger when certain risk factors are considered (Brody, Pratt, & Hughes, 2018; Groer, Kane, Williams, & Duffy, 2014; Husky, Mazure, & Kovess-Masfety, 2018; Kilpatrick et al., 2013). For example, sexual trauma and multiple traumatic exposures are both associated with higher risk of developing chronic inflammatory conditions (Ayaydin et al., 2016; D'Elia et al., 2018). Furthermore, women are at greater risk than men for exposure to sexual trauma, PTSD, and chronic inflammatory conditions (Kilpatrick et al., 2013; Sledjeski, Speisman, & Dierker, 2008). The current study examined the relationship between lifetime chronic inflammatory diseases and lifetime trauma; gender differences in trauma, PTSD symptoms, and chronic inflammatory disease; and potential interaction of gender and trauma type in predicting chronic inflammatory disease. Participants ($N = 453$; 267 women, 186 men) were recruited via MTurk and completed self-report questionnaires of childhood trauma, lifetime trauma, PTSD symptoms, health history,

and demographics. Data were analyzed using two hierarchal regression analyses with number of chronic inflammatory diseases endorsed as the criterion in both. In the first regression, childhood trauma and gender (first step) and an interaction term (childhood trauma × gender; second step) were entered as predictors, and neither the individual predictors nor the interaction term accounted for significant variance in number of chronic inflammatory diseases. In the second regression, lifetime interpersonal trauma, lifetime non-interpersonal trauma, and gender (first step) and two interaction terms (lifetime interpersonal trauma × gender; lifetime non-interpersonal trauma × gender; second step) were entered as predictors, and, again, none of the individual predictors and neither of the interaction terms accounted for significant variance in number of chronic inflammatory diseases. Results did not support study hypotheses. Implications of these findings and limitations are discussed.

INDEX WORDS: Trauma, Gender, PTSD, Inflammation

ARE CHRONIC INFLAMMATORY DISEASES ASSOCIATED WITH TRAUMA

EXPOSURE AND GENDER? AN EMPIRICAL ANALYSIS OF SELF-REPORTED

TRAUMA AND HEALTH HISTORIES OF MEN AND WOMEN

by

MEGHAN LACIENSKI

A.A., East Georgia State University, 2015

B.S., Georgia Southern University, 2017

A Thesis Submitted to the Graduate Faculty of Georgia Southern University

in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

STATESBORO, GEORGIA

ARE CHRONIC INFLAMMATORY DISEASES ASSOCIATED WITH TRAUMA

EXPOSURE AND GENDER? AN EMPIRICAL ANALYSIS OF SELF-REPORTED

TRAUMA AND HEALTH HISTORIES OF MEN AND WOMEN

by

MEGHAN LACIENSKI

| | |
|---|---|
| Major Professor: | Dorthie Cross |
| Committee: | Nicholas S. Holtzman |
| | C. Thresa Yancey |

Electronic Version Approved:
December 2019

DEDICATION

I dedicate this thesis to my son, Simon, and my husband, Stephen. Thank you both for believing in me, no matter what. I am so grateful for your love and support. I truly could not have done this without my wonderful boys <3

ACKNOWLEDGMENTS

I would like to express my most heart-felt thanks to my committee chair, Dr. Dorthie Cross. It is through her guidance and unwavering support that this project was made possible. Dorthie, thank you for keeping an open chair for me in your office. Whether I had an academic question or was experiencing a passing moment of existential crisis, you were always there to listen. Thank you for the advice, the laughter, and for your friendship.

I would also like to thank Dr. Thresa Yancey. Dr. Yancey's profound knowledge of trauma and social issues has been an incredible source of inspiration. Thresa, thank you for always taking the time to answer my ceaseless stream of questions. You stand as a shining example of what it means to be psychological researcher and teacher.

Finally, I would like to thank Dr. Nicholas Holtzman. He has been a continually positive presence throughout my time at Georgia Southern. It is thanks to his support and encouragement that I am where I am, today. Nick, thank you for believing in me before I knew how to believe in myself.

I am beyond grateful to have had the opportunity to work with these remarkable, talented, and passionate people. I truly hope that I have made them proud.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

In recent years, what is known about the relationship between trauma and physical health has grown considerably; however, there remain substantial gaps in the literature regarding not only understanding the specific mechanisms of this relationship, but also identifying risk factors. The purpose of this research is to gain a better understanding of the relationship between trauma and chronic inflammatory disease, as well as explore the potential value of risk factors, namely: gender, specific trauma type, and overall cumulative effects of exposure to traumatic events.

In psychology, the term "trauma" refers to real or threatened death, injury, or sexual violence in ways that are direct, secondary, or culminate from the repeated or extreme exposure to details of traumatic events (American Psychiatric Association, 2013). A recent nationwide survey of the prevalence of trauma exposure found that 89.7% of Americans have experienced at least one potentially traumatic event in their lifetimes (Kilpatrick et al., 2013). A global study found that over 30% of people who experienced a traumatic event had experienced four or more subsequent events (Benjet et al., 2016). Compared to non-interpersonal trauma (e.g., motor vehicle collision), interpersonal trauma (e.g., assault) is more predictive of exposure to subsequent traumatic events (Benjet et al., 2016). Child abuse is associated with revictimization and exposure to intimate partner violence and sexual assault later in life, and individuals who experience interpersonal trauma are more likely to experience subsequent interpersonal trauma, such as intimate partner violence and sexual assault (Benjet et al., 2016). Globally, women are more likely to experience intimate partner and sexual violence than men; however, men are more likely to be exposed to traumatic events across all other categories (Benjet et al., 2016).

**Trauma and Health**

Traumatic exposure is associated with incidence of several health conditions, both psychological and physiological. Associated psychological conditions include posttraumatic stress disorder (PTSD), depression, anxiety, and alcohol and substance use disorders (Brody et al., 2018; Cross, Crow, Powers, & Bradley, 2015; Groer et al., 2014; Husky et al., 2018; Kilpatrick et al., 2013). For example, a large meta-analysis of risk factors associated with PTSD found exposure to traumatic events is a reliable predictor of PTSD (Brewin, Andrews, & Valentine, 2000). Furthermore, a recent longitudinal study that followed participants from age nine to age thirty showed the rate of anxiety and depressive disorders increases with number of traumatic event exposures (Copeland et al., 2018). Another longitudinal study found a bidirectional relationship between certain symptom clusters of PTSD (mainly hyperarousal) and major depressive disorder in a sample of chronically trauma-exposed individuals living in urban Detroit (Horesh et al., 2017).

Physical health conditions also appear to be associated with trauma exposure. Research shows that experiencing a traumatic event is associated with multiple chronic inflammatory conditions, including allergies, asthma, diabetes, multiple sclerosis, psoriatic and rheumatoid arthritis, and thyroid disease (Arenson & Cohen, 2017; Porcelli et al., 2016; Sledjeski et al., 2008; Vitale et al., 2018), suggesting that inflammation is an important part of the association between trauma and physical health. Inflammation is an immune response that protects against potentially harmful stimuli or substances (e.g., pathogens, toxins, injury) but can become dysregulated or overactive in response to chronic physical and psychological stress, causing damage to healthy tissue (Liu, Wang, & Jiang, 2017; Pahwa & Jialal, 2018). A systematic review of literature assessing the relationship between childhood maltreatment and elevated

inflammatory markers found child abuse is associated with higher levels of key inflammatory markers, such as c-reactive proteins (CRP), fibrinogen, and pro-inflammatory cytokines (Coelho, Viola, Walss-Bass, Brietzke, & Grassi-Oliveira, 2014).

PTSD is also associated with physical health in both cross-sectional and longitudinal research (Husky et al., 2018; Turner, Neylan, Schiller, Li, & Cohen, 2013), which could mean that effects for trauma are really explained by PTSD, not by trauma itself. However, some research shows trauma effects are seen even when PTSD is accounted for (e.g., Sledjeski et al., 2018). A longitudinal twin study found twins who experienced PTSD had higher levels of CRPs than twins without PTSD and that the association was particularly strong among twins who had active PTSD symptoms, although, this could be explained by shared family environment, rather than genetics (Plantinga, et al., 2013). There is compelling evidence suggesting certain experiences potentially increase risk for both PTSD and chronic inflammatory disorders (Coelho et al., 2013).

Importantly, not everyone who experiences trauma develops psychological or physiological disease. Although an estimated 90% of adults in the United States have experienced at least one traumatic event, lifetime prevalence of PTSD is roughly 8% (Kilpatrick et al., 2013). Moreover, lifetime prevalence of any mental health condition is 47%, and lifetime prevalence of any chronic physical health condition is 60% (Kessler et al., 2007; Pahwa & Jialal, 2017). This means many individuals who experienced trauma do not go on to develop psychological or physical health conditions.

Nevertheless, the potential costs of trauma-related health problems are high. For example, healthcare resource utilization is estimated to be considerably higher for individuals with PTSD than any other mental illness, and annual costs associated with PTSD average $18,753 and

$10,960 among individuals on Medicaid and private insurance, respectively (Ivanova et al., 2011). It is possible some of the increased healthcare cost for individuals with PTSD is due to the added expense of managing comorbid chronic physical disease. As of 2015, estimated annual per individual disease-related costs were as follows: $3,968–$6,491 for chronic obstructive pulmonary disease, $3,219–$4,674 for diabetes, and $989–$3,069 for asthma. Estimated total annual healthcare costs were $29,271–$51,937 per individual with heart failure and $29,384–$46,194 for cancer (6 months following diagnosis; Chapel, Ritchey, Zhang, & Wang, 2017). Furthermore, estimated healthcare costs increase with each additional chronic health condition (Buttorff, Ruder, & Bauman, 2017). Understanding risk factors for these compounded burdens is important.

**Risk Factors for Associated Health Conditions**

**Demographic Risk Factors.** Demographic risk factors for trauma-related mental health conditions include age at time of trauma exposure and socioeconomic status (SES), in that younger age and lower SES are each associated with higher likelihood of experiencing mental illness following traumatic exposure (Goldmann & Galea, 2014). Gender is also a risk factor for chronic physical health conditions. One longitudinal twin study found higher levels of inflammatory markers associated with certain chronic health conditions in young women who had experienced trauma than those who did not. This relationship is one of the focuses of the current study (Baldwin et al. 2018; Brewin, Andrews, & Valentine, 2000; Sledjeski et al., 2008)

*Gender.* Despite higher levels of trauma exposure in men compared to women, women appear to be more likely to develop PTSD (Brewin et al., 2000; Sledjeski et al., 2008). According to Kilpatrick et al. (2013), lifetime PTSD is more prevalent in women (12.8%) than men (5.7%). One study shows both men and women with PTSD experience similar

psychological comorbidities (e.g., depression and anxiety; Olff, 2017). In contrast, two recent studies found the prevalence rates for comorbid anxiety disorders and severe PTSD was 27% for women compared to 20% for men. The same study suggests that women who report high rates of trauma exposure exhibit a bidirectional association between symptoms of PTSD and MDD, whereas men do not (Horesh et al., 2017; Husky et al., 2018). In addition, men with PTSD are more likely to report comorbid substance abuse than women with PTSD (Cross, Crow, Powers, & Bradley, 2015), which suggests there are gender differences in trauma-related coping styles. These differences mirror the broader population, regardless of trauma exposure, in that depression and anxiety are more prevalent in women than men and that alcohol and substance misuse is more prevalent in men than women (Beery & Zucker, 2011; Cross et al., 2015; Sen & Ostlin, 2008; Vlasoff, 2007).

Gender differences in trauma-related physical health follow a similar pattern. Women are more likely than men to suffer from chronic disease, including many chronic inflammatory diseases, such as thyroid conditions, rheumatoid arthritis, inflammatory bowel disease, systemic lupus erythematosus, and multiple sclerosis (Beery & Zucker, 2011; Ngo, Steyn, McCombe, 2014; Vlassof, 2007). In fact, a cross-sectional study found women make up two-thirds of all cases of multiple sclerosis (Ngo et al., 2014), but a longitudinal study found men with multiple sclerosis deteriorate more quickly and have a lower survival rate than women with multiple sclerosis (Cottrell et al., 1999). Inflammation is a major contributor to the health conditions outlined above (Sledjeski et al., 2008; Weiss et al., 2011), and inflammatory processes appear to be more active in women (Casimir & Duchateau, 2011), potentially accounting for some of the increased risk of chronic inflammatory disease in women.

Moreover, inflammation and inflammatory disease are higher not only in women, but also in individuals exposed to chronic stress and trauma (Sledjeski et al., 2008; Weiss et al., 2011). A systematic review of literature on the association between childhood maltreatment and inflammatory response found strong evidence in support of the association between trauma exposure and inflammation; not only were baseline inflammation levels greater in adults with a history of childhood maltreatment, but inflammatory response to psychosocial stress was also found to be increased (Coelho et al., 2013). A recent longitudinal twin study also looked at potential associations between victimization in childhood (e.g., witnessing domestic violence, peer bullying, physical maltreatment by an adult, sexual or emotional abuse and neglect) and inflammation in young adulthood (Baldwin et al., 2018). Results also indicated individuals exposed to victimization in childhood have higher levels of CRPs by the time they are 18 years of age. Notably, when the gender of the participants was considered, the positive linear relationship between childhood victimization and higher CRP levels at 18 was only maintained in girls exposed to childhood maltreatment multiple times (Baldwin et al. 2018).

**Event-Related Risk Factors**. There are not only demographic risk factors for trauma-related health conditions, but also event-related factors, particularly in terms of frequency and type of trauma. Specifically, repeated traumatic exposure and interpersonal events are more predictive of mental and physical health problems than single traumatic exposure and non-interpersonal events (Copeland et al., 2018; Dube, Fairweather, Pearson, Felitti, Anda, & Croft, 2009; Liebermann, 2018; Sledjeski et al., 2008; Vlasoff, 2007).

*Trauma frequency.* Frequent, repeated exposure to trauma predicts poor psychological health outcomes. For example, one study found experiencing multiple traumatic events is associated with greater risk of developing PTSD than experiencing a single event or no event

(Sledjeski et al., 2008). Another study found frequency of trauma also increases the risk of anxiety and depressive disorders (Copeland et al., 2018). In the latter study, exposure to four or more traumatic events before the age of 16 roughly tripled the rate of anxiety and depressive disorders in both childhood and adulthood (Copeland et al., 2018). Repeated trauma exposure further predicts poor physical health outcomes such that number of traumatic events predicts higher likelihood of having several chronic mental and physical health conditions (Sledjeski et al., 2008). Number of childhood maltreatment events is associated with worse adult health outcomes (Liebermann, 2018; Vlasoff, 2007). For example, a longitudinal study found a positive association between adverse childhood experiences and hospitalizations with diagnosis of an autoimmune disease in adulthood (Dube et al., 2009). These studies, taken together, provide powerful evidence that exposure to repeated traumas and adverse events have a cumulative impact on future mental and physical health.

*Trauma type.* Type of trauma exposure is another predictor of negative health outcomes. Research shows that, compared to non-interpersonal trauma, interpersonal trauma is associated with increased likelihood of developing PTSD and depression (Heath et al., 2013; Kessler et al., 2017). One study assessed the relationship between PTSD symptoms and interpersonal trauma and found that occurrence of PTSD was predicted by both overall frequency of trauma and type of trauma, with witnessing maternal domestic violence and experiencing childhood abuse carrying higher risk (Griffing et al., 2006). In addition, interpersonal trauma appears to predict physical health. For example, endometriosis is associated with exposure to interpersonal trauma, including sexual abuse, emotional abuse, and neglect (Liebermann, 2018).

More specifically, sexual trauma is a strong predictor of psychological illnesses, such as PTSD, anxiety, and depression (Pico-Alfonso et al., 2006). A recent review of literature

regarding associations between type of trauma and PTSD using WHO Mental Health (WMH) data found rape and sexual assault were significantly more predictive of PTSD than any other type of trauma (proportions were 13.1% and 15.1%, respectively; Kessler et al., 2017). Another longitudinal study focusing on adolescents found exposure to multiple instances of sexual abuse (alone or combined with physical abuse) demonstrated greater immune system dysregulation compared to adolescents who had experienced a single incident of sexual abuse (Ayaydin et al., 2016). Finally, a recent meta-analysis found childhood sexual abuse is associated with higher levels of key inflammatory markers (D'Elia et al., 2018).

**Overlapping Risk Factors**. Fully separating the effects of gender, trauma frequency, and trauma type is impossible. Some trauma types occur more frequently than others (Benjet et al., 2016; Kilpatrick et al., 2008). In addition, men are more likely than women to report having experienced any traumatic event and to experience more overall events, but women are more likely than men to experience negative mental and physical health effects of trauma (Brewin et al., 2000; Ngo et al., 2004; Tolin & Foa, 2006). This elevated risk for women may be due, in part, to differences in type of trauma exposure. A large meta-analysis found women are more likely to experience childhood sexual abuse and adult sexual assault, while men are more likely to experience accidents, non-sexual abuse or assault, combat, or to witness death or disaster (Tolin & Foa, 2006). Sexual trauma confers disproportionate risk of PTSD (Kessler et al., 2017) and in some studies is associated with greater immune system dysfunction (Ayaydin et al., 2016; D'Elia et al., 2018).

**Inflammation, Stress, and Gender**

**Inflammation.** Despite a growing body of research demonstrating relationships between trauma exposure and physical disease risk, the mechanisms driving the relationship remain less

understood. One proposed potential mechanism is inflammation. The inflammatory process is complex and can be difficult to study. In simple terms, inflammation is an immune response to exposure to adverse stimuli, such as pathogens, injury, and chemicals (Pahwa & Jialal, 2018). When tissue becomes injured, infected, or encounters an irritant, the body's immune system produces inflammatory mediator hormones (e.g., histamine, bradykinin, and prostaglandins). These inflammatory mediators expand blood vessels and increase their permeability, which allows lymphocytes, or white blood cells, to access the injured tissue (Straub & Schradin, 2016). Inflammatory mediators also irritate the nerves surrounding the affected tissue while white blood cells release fluid into the tissue, which results in swelling that isolates the damage, protects healthy tissue, and creates a stable environment in which white blood cells can attack damaged cells. This process is vital to health and survival, but it can become dysregulated, resulting in inefficient immune responses in which white blood cells mistake the body's healthy cells for aversive stimuli, causing intermittent or chronic inflammation of the affected tissue and contributing to the development of chronic inflammatory disease (Straub & Schradin, 2016). Chronic inflammatory disease is a broad category including autoimmune disease, such as rheumatoid arthritis and multiple sclerosis, and other diseases characterized by chronic inflammation, such as asthma and allergies (Pahwa & Jialal, 2018; Punchard, Whelan, Adcock, 2004).

**Stress.** When the immune system becomes chronically dysregulated, inflammatory responses can begin to cause damage to healthy tissue. One proposed pathway by which chronic inflammation can occur is through exposure to stressors (Liu et al., 2017). Stressors can include physical threats (e.g., pathogens, extreme temperature, exertion, pain, starvation, assault) or threats to the self or social status (e.g., emotional abuse, social rejection; Liu et al., 2017).

Research finds trauma and PTSD positively associate with levels of CRPs and other immune biomarkers reflecting chronic inflammatory activity (Arenson & Cohen, 2017; Michopoulos et al., 2015; Sledjeski et al., 2008; Weiss et al., 2011).

When an individual encounters a stressful situation, the brain produces stress hormones via the hypothalamic-pituitary-adrenal (HPA) axis, triggering allostasis, which are automatic physiological and behavior responses meant to ensure survival (Liu et al., 2017). For example, when an individual encounters a dangerous animal (or social threat), their heart rate and blood pressure temporarily increase, preparing them for fight or flight. Acute stress is common; its symptoms are typically manageable and do not result in lasting damage to physical systems. It can even enhance the immune system in moderation; however, when stress occurs repeatedly (i.e., episodic acute stress) or over a long period of time (i.e., chronic stress), the stress response can become dysregulated not only behaviorally (e.g., excessive worry, agitation, negativity, need for control), but also physiologically. An overactive stress response can initially suppress the immune response and inflammation, but over time the stress response system can become less able to signal the immune response to slow down, leading to dysregulated immune response and chronic inflammation (Segerstrom & Miller, 2004). This chronically elevated state of allostasis can lead to pathological outcomes such as cardiovascular, metabolic, and neurodegenerative diseases (Liu et al., 2017).

**Gender.** Women are at higher risk than men for chronic inflammatory diseases, such as thyroid conditions, rheumatoid arthritis, inflammatory bowel disease, lupus, and multiple sclerosis, as well as for stress-related mental health problems, such as PTSD and depression (Beery & Zucker, 2011; Brewin et al., 2000; Ngo et al. 2014; Sledjeski et al., 2008; Vlassof, 2007). Part of the risk may be due to the pro-inflammatory nature of female sex hormones like

estrogen. Women tend to have more efficient immune responses than men, but the system can more easily become overactive and chronically pro-inflammatory, interfering with mental and physical well-being (Ngo et al., 2014; Segerstrom & Miller, 2004). Furthermore, some studies found sexual trauma, which women are more likely to experience than men, is associated with greater immune system dysfunction than other kinds of trauma (Ayaydin et al., 2016; D'Elia et al., 2018). It is possible that the association between trauma and chronic inflammatory disease is especially relevant for women who have experienced sexual trauma.

**Current Study**

 **Purpose.** Whether gender or trauma type interact to predict chronic inflammatory diseases remains unknown. To provide a fuller understanding of the relationship between trauma and chronic illness, the current study aimed to examine: a) the relationship between lifetime history of inflammatory diseases and childhood and lifetime exposure to trauma; b) gender differences in trauma exposure, PTSD symptoms, and chronic inflammatory disease; and c) potential interaction of gender and trauma type in predicting chronic inflammatory disease. Given the previously mentioned gaps in research regarding the relationship between gender, trauma, and chronic inflammatory diseases, the intended purpose of this study was to contribute to a more enriched conversation on trauma and health and inform a growing effort to promote trauma-informed medical care, particularly for women patients (Machtinger, Cuca, Khanna, Rose, & Kimberg, 2015).

 **Hypotheses**. Based on research findings that women are more likely than men to experience interpersonal trauma and to develop PTSD, are more prone to inflammation, and may experience greater stress-related increase in inflammation (Kessler et al., 2014; Slopen, Koenen,

& Kubzansky, 2012; Tolin, 2007), it was hypothesized that women would report higher levels of interpersonal trauma, PTSD symptoms, and chronic inflammatory disease than men (H1).

Based on previous research finding positive correlations between trauma and PTSD symptoms (Copeland, et al., 2018; Kessler et al., 2014), between trauma and chronic inflammatory disease (Sledjeski et al. 2017), between trauma and PTSD symptoms and CRP levels (Michopoulos et al., 2015), and between CRP levels and chronic inflammatory disease (Groer, Kane, Williams, & Duffy, 2015), it was hypothesized that trauma exposure, PTSD symptoms, and number of chronic inflammatory diseases would positively correlate with one another (H2).

Less is known about potential differences in inflammation across different types of trauma, but prior research finds women are more likely than men to experience interpersonal trauma, interpersonal trauma is particularly predictive of PTSD, women experience more inflammatory health problems, and PTSD is associated with inflammation (Kessler et al., 2014; Slopen et al., 2012; Weiss et al., 2011). Thus, it was hypothesized that number of chronic inflammatory diseases will correlate more strongly with interpersonal vs. non-interpersonal trauma, and the association between chronic inflammatory diseases and interpersonal trauma will be stronger in women than in men (H3).

CHAPTER 2

METHOD

**Participants**

Six hundred eighty-four participants were recruited via Amazon's Mechanical Turk

(MTurk) workforce. Participants were MTurk workers who were least 18 years old, had a record

of completing at least 1,000 HITs (MTurk tasks) with at least 95% approval, and consented to be

in the study. From the total sample, data from 231 (33.8%) of participants were excluded from

analyses. Consistent with the preregistered data analytic plan, although transgender and non-

binary persons (or others who declined to answer) were not excluded from study participation,

their data were not included in the current analyses, and some participants' data were excluded

due to validity concerns or incompleteness. Participants' data were excluded if they did not meet

the minimum study duration (6 minutes), failed the attention check, self-reported poor attention

during the study, or skipped measures. Two additional unregistered exclusions were applied:

Participants' data were excluded if there was too little variation (relative standard deviation <.30)

in their answers on the CTQ or if they reported more than 11 health conditions on the HCC. The

CTQ includes items keyed in both directions, so, for example, if a participant "clicked through"

the questionnaire, they could (and some did) answer that it was *Always True* that their parents

wished they had never been born, that someone in their family hated them, and that they had the

best family in the world. Low relative standard deviation suggests an overall tendency to not

adjust the direction of their answers appropriately. Research shows that roughly 12% of

Americans have more than five chronic conditions (Buttorff, Ruder, & Bauman, 2017). A

preliminary analysis of the data showed the percentage of participants who endorsed multiple

chronic conditions fell sharply at greater than five chronic conditions and again at greater than

eleven chronic conditions. Out of an abundance of caution, it was decided that participants who

endorsed greater than 11 chronic conditions would be excluded. In total, 231 participants' data

were excluded from analysis. See Table 1 for a more detailed breakdown of exclusions.

Table 1
*Number of Participants Excluded for Each Type of Exclusion*

| Reason for Exclusion | N | Percent |
| --- | --- | --- |
| Transgender, Non-binary, or No Data | 49 | 7.2 |
| Incomplete (skipped measures) | 5 | 0.7 |
| Validity Concerns | | |
| Study duration < 6 minutes | 88 | 12.9 |
| Failed attention check | 139 | 20.3 |
| Self-reported poor attention | 4 | 0.6 |
| Reported > 11 health conditions on HCC | 17 | 2.5 |
| Showed < .30 relative standard deviation on CTQ responses | 96 | 14 |

NOTE: Many participants met criteria for multiple exclusions, so column total exceeds number of participants excluded; HCC = *Health Conditions Checklist*; CTQ = *Childhood Trauma Questionnaire*

Pearson Chi-Square tests revealed participants excluded for low relative standard

deviation on the CTQ were significantly more likely to have also been excluded for the

following reasons: below minimum study duration, $\chi^2(1) = 71.11$, $p < .001$; failed attention

check, $\chi^2(1) = 94.27$, $p < .001$; self-reported poor attention during study, $\chi^2(1) = 24.64$, $p < .001$;

and above maximum number of endorsed health conditions, $\chi^2(1) = 79.55$, $p < .001$. However,

there was not a difference for incompleteness, $\chi^2(1) = .82$, $p < .36$.

Of the remaining 453 participants, 186 (41%) identified as men, and 267 (59%) identified

as women. This gender ratio is consistent with prior demographic analysis of MTurk workers

(Difallah, Filatova, & Ipeirotis, 2018). Three hundred twenty-seven (72.2%) participants self-

identified as White, non-Hispanic; 38 (8.4%) as Black/African American, non-Hispanic; 27

(6.0%) as Hispanic/Latinx; 25 (5.5%) as Asian, non-Hispanic; 4 (.9%) as multiracial/multiethnic;

and 1 (.2%) as Middle Eastern or North African. Thirty-one (6.8%) participants did not indicate their race or ethnicity. The average age of the participants was 39.98 years (*SD* = 13.03).

**Materials**

**Demographics Form.** Participants completed a 14-item general demographics form developed for the current study. The demographics form included items about age, gender, sexual orientation, race and ethnicity, and other demographic characteristics (see Appendix A). Wording for items about gender and sexual orientation were based on Human Rights Campaign (2019) survey wording recommendations.

**Health Conditions Checklist** (HCC). Participants completed a checklist developed for the current study of 36 lifetime medical diagnoses (see Appendix B). In a study comparing a similar self-report checklist of diagnoses to medical records, self-reported diagnoses showed excellent validity (Miller, et al., 2008). The HCC includes *autoimmune diseases*, *other chronic inflammatory diseases*, *diseases exacerbated by inflammation*, and *mental health conditions*. Study analyses are primarily based on a summed total of the number of *other chronic inflammatory diseases* endorsed.

**Childhood Trauma Questionnaire** (CTQ; Bernstein, Fink, Handelsman, & Foote, 1994) The CTQ is a 28-item self-report questionnaire measuring total childhood maltreatment, as well as specific domains of maltreatment: emotional, sexual, and physical abuse and emotional and physical neglect. In previous studies with in-person and online community samples, CTQ total maltreatment had excellent (α >.90) internal consistency (Kolacz, Hu, Gesselman, Garcia, Lewis, & Porges, 2019; Scher, Stein, Asmundson, McCreary, & Ford, 2001) and correlated with self-reported mental and physical health symptoms (Binder et al., 2008; Kolacz et al. 2019). The current study used the CTQ total score, and internal consistency was excellent (α = .94).

**Life Events Checklist for DSM-5** (LEC-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013). The LEC-5 is a 17-item self-report inventory of lifetime exposure to traumatic events. Participants indicated whether they experienced, witnessed, learned about, or encountered as part of their job different types of events. For the current study, only events that were either experienced or witnessed were counted. The current study examined lifetime total interpersonal and lifetime total non-interpersonal scores. Lifetime interpersonal trauma scores (physical assault, assault with a weapon, sexual assault, and other unwanted sexual experience) and lifetime non-interpersonal trauma scores (all other trauma types) were based on Jaffe, DiLillo, Gratz, and Messman-Moore's (2019) scoring.

**PTSD Checklist for DSM-5** (PCL-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013). The PCL-5 is a 20-item self-report questionnaire of current symptoms of PTSD and has been validated via the *Clinical Administered PTSD Scale for DSM-5* (Weathers, Blake, Schnurr, Kaloupek, Marx, & Keen, 2013). The current study included a modified version of the PCL-5 that included one additional item (sense of foreshortened future) from the PCL for DSM-IV (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). This measure will be used for future analyses but was not used in the current study's analyses. For this study, the PCL-5 total score was used for analyses, and internal consistency was excellent ($\alpha = .96$).

**Additional Measures**. In addition to the measures described above, participants completed the 10-item *Adverse Childhood Experience Questionnaire* (ACE; Felitti et al., 1998), 20-item *Center for Epidemiologic Studies Depression Scale Revised* (CESD-R; Radloff, 1977; Van Dam & Earleywine, 2011), and the *36-Item Health Survey Version 1.0* (36-SF; Hays, Sherbourne, & Mazel, 1993; Ware & Sherbourne, 1992). The 36-SF is drawn from the *Medicare Health Outcomes Survey Questionnaire Version 3.0* (HOS; National Committee for Quality

Assurance, 2019), a 68-item questionnaire widely used for evaluating the impact of a variety of physiological and psychological illnesses on a diverse population of American adults. ACE, CESD-R, and 36-SF data were collected for future analyses but were not analyzed for the current study.

**Attention Checks**. One attention check item and one self-rating of seriousness was also included in the survey (see Appendix C). The self-rating of seriousness was based on Aust, Diedenhofen, Ullrich, and Musch (2013).

## Procedure

Participants were sampled from MTurk workers, survey-takers who are registered with Amazon. Eligible MTurk workers had the opportunity to review a brief study description ("Participants needed for a survey study on stressful experiences and mental and physical health") and, if interested, were redirected to Qualtrics (through which the actual survey was administered) where they read the informed consent document (see Appendix D) and chose whether to participate. If they agreed to participate, they completed the SF-36, HCC, CTQ, LEC-5, ACE, PCL-5, and CESD-R in random order. The attention check item was embedded in the PCL-5. After all other study questionnaires were complete, participants completed the Demographics Form. Finally, after completing the survey, participants provided a self-rating of their seriousness in taking the survey, were debriefed (see Appendix E), and were provided a completion code to claim $1.00 in compensation, in accordance with the MTurk agreement. The mean duration for the included sample was 14.07 minutes (SD = 7.99 minutes). To protect participant privacy, participation was anonymous and IP addresses were not collected.

All study materials and procedures were approved by the IRB prior to data collection. Study hypotheses and analyses were preregistered on Open Science Framework.

CHAPTER 3

RESULTS

Descriptive statistics were generated for all study variables: CTQ total childhood

maltreatment ($M = 45.49$, $SD = 17.59$), LEC-5 lifetime total interpersonal trauma ($M = 1.37$, $SD$

$= 1.21$), LEC-5 lifetime total non-interpersonal trauma ($M = 3.44$, $SD = 2.30$), PCL-5 PTSD total

symptom severity ($M = 19.08$, $SD = 17.04$), and HCC total number of chronic inflammatory

diseases endorsed ($M = .57$, $SD = .78$).

To test the hypothesis that, compared to men, women would report higher levels of

interpersonal trauma, PTSD symptoms, and chronic inflammatory disease, a between-subjects

MANOVA was performed to compare men and women on these study variables, and results

revealed significant group differences, Pillai's Trace $= .063$, $F (5, 447) = 6.01$, $p < .001$, partial

$\eta2 = .06$. As hypothesized, post-hoc tests revealed that women scored higher than men on

childhood maltreatment, $F (1, 451) = 4.81$, $MSE = 1475.21$, $p = .03$, partial $\eta2 = .02$, and on

lifetime interpersonal trauma, $F (1, 451) = 12.47$, $p = .003$, partial $\eta2 = .02$. In addition, men

scored higher than women on lifetime non-interpersonal trauma, $F (1, 451) = 5.83$, $p = .02$,

partial $\eta2 = .01$. Contrary to study hypotheses, however, there was not a significant difference

between men and women in PTSD symptoms or number of lifetime chronic inflammatory

conditions reported.

Table 2
*Means and Standard Deviations of CTQ childhood maltreatment, LEC-5 Interpersonal Trauma,
and LEC-5 Non-interpersonal Trauma Scores by Participant Gender*

| Gender | CTQ | LEC-5 Interpersonal | LEC-5 Non-interpersonal |
|--------|-----|---------------------|-------------------------|
| Men | 43.33 (15.58) | 1.17(1.12) | 3.75 (2.51)* |
| Women | 47.00 (18.74)* | 1.1751 (1.25)* | 3.22 (2.12) |

CTQ = *Childhood Trauma Questionnaire*, LEC-5 = *Life Events Checklist for the DSM-5*

To test the hypothesis that trauma exposure, PTSD symptoms, and number of chronic inflammatory diseases would positively correlate with one another, Pearson correlation analyses were performed. As expected, all trauma variables correlated positively with PTSD symptoms; however, results contradicted the hypothesis that trauma and PTSD symptoms would be correlated with number of chronic inflammatory disease. Number of chronic inflammatory diseases endorsed on the HCC did not correlated with any other study variable.

Table 3
*Study Variables*

|  | CTQ | LEC-5 Interpersonal | LEC-5 Non-Interpersonal | PCL-5 |
|---|---|---|---|---|
| CTQ | - |  |  |  |
| LEC-5 Interpersonal | .42** | - |  |  |
| LEC-5 Non-Interpersonal | .20** | .42** | - |  |
| PCL-5 | .50** | .40** | .31** | - |
| HCC | .01 | .07 | .08 | .09 |

NOTE: CTQ = *Childhood Trauma Questionnaire*, LEC-5 = *Life Events Checklist for the DSM-5*, PCL-5 = *PTSD Symptom Checklist for the DSM-5*, HCC = *Health Conditions Checklist*; *\*\*p < .01*

These Pearson correlation analyses also showed that the hypothesis that the number of chronic inflammatory diseases would correlate more strongly with interpersonal trauma than non-interpersonal was not supported. Pearson correlations were recalculated with the sample split by gender to explore potential gender differences in the relationships between number of chronic inflammatory diseases endorsed, CTQ Total, LEC-5 Interpersonal Trauma, LEC-5 Non-interpersonal, and PCL-5 Total scores. As with both genders together, number of chronic inflammatory diseases was not correlated with trauma or PTSD symptoms in either men or women (see Table 4). Again, study hypotheses were not supported.

Table 4
*Pearson Correlations between Number of Chronic Inflammatory Diseases Endorsed, Split by Participant Gender*

|  | Men and Women | Men | Women |
|---|---|---|---|

| | | | |
|---|---|---|---|
| CTQ | 0.013 | 0.047 | -0.015 |
| LEC-5 Interpersonal | 0.071 | 0.124 | 0.027 |
| LEC-5 Non-Interpersonal | 0.078 | 0.139 | 0.043 |
| PCL-5 | 0.088 | 0.045 | 0.117 |

NOTE: CTQ = *Childhood Trauma Questionnaire*, LEC-5 = *Life Events Checklist for the DSM-5*, PCL-5 = *PTSD Symptom Checklist for the DSM-5*

To further explore the hypothesis that an interaction between trauma and gender would be associated with a higher number of chronic inflammatory diseases endorsed, the data were analyzed using hierarchal regression analysis with chronic inflammatory diseases as the criterion. The variables CTQ total childhood maltreatment and gender were entered as predictors in the first step, and an interaction term (CTQ × gender) was entered in the second step. The regression model with CTQ and gender did not account for a significant amount of variance in number chronic inflammatory conditions endorsed $F (2, 450) = .782$, $R^2 = .003$, $p = .458$, and when the interaction term (CTQ × Gender) was added to the model, the model did not account for significant variance or for additional variance above what was found in the first step, $F (3, 449) = .666$, $R^2 = .004$, $R^2_{change} = .001$, $p < .573$ (see Table 5).

Table 5
*Results of Regression of Childhood Trauma, Gender, and Childhood Trauma × Gender (Predictor Variables) on Number Chronic Inflammatory Diseases (Criterion Variable)*

| | Model 1 | | Model 2 | | |
|---|---|---|---|---|---|
| $R^2_{Change}$ | 0.003 | | 0.001 | | |
| $F$ | 0.782 | | 0.666 | | |
| $F_{Change}$ | 0.782 | | 0.435 | | |
| df1 | 2 | | 1 | | |
| df2 | 450 | | 449 | | |
| $p$ | 0.458 | | 0.51 | | |
| | Gender | CTQ | Gender | CTQ | Gender X CTQ |
| $B$ | 0.091 | 0 | 0.222 | 0.005 | -0.003 |
| $SE^b$ | 0.075 | 0.002 | 0.213 | 0.008 | 0.004 |
| $B$ | 0.058 | 0.007 | 0.141 | 0.119 | -0.149 |
| $t$ | 1.219 | 0.154 | 1.046 | 0.676 | -0.659 |

| | | | | | |
|---|---|---|---|---|---|
| *p* | 0.223 | 0.878 | 0.296 | 0.499 | 0.51 |

NOTE: CTQ = *Childhood Trauma Questionnaire*

To further explore the hypothesis that the relationship between chronic inflammatory disease and interpersonal trauma would be stronger in women than men, a second hierarchal regression was performed with chronic inflammatory diseases as the criterion. This time, LEC-5 interpersonal trauma, LEC-5 non-interpersonal trauma, and gender were entered as predictors in the first step and two interaction terms (LEC-5 interpersonal trauma × gender, LEC-5 non-interpersonal trauma × gender) were entered in the second step. The second regression model was also not a significant predictor of number of chronic inflammatory conditions endorsed $F$ (3, 449) = 1.735, $R^2$ = .011, $p < .159$. When the two interaction terms were added, the regression model, once again, did not account for significant variance or for additional variance above what was found in the first step $F$ (5, 447) = 1.238, $R^2$ = .014, $R^2_{change}$ = .002, $p < .607$ (see Table 6).

Table 6
*Results of Regression of Interpersonal Trauma, Non-Interpersonal Trauma Gender, Interpersonal Trauma × Gender, and Non-Interpersonal Trauma × Gender (Predictor Variables) on Number Chronic Inflammatory Diseases (Criterion Variable)*

| | | $R^2$ | $R^2$ Change | $F$ | $F$ Change | df1 | df2 | *p* |
|---|---|---|---|---|---|---|---|---|
| Model 1 | | .011 | .011 | 1.735 | 1.735 | 3 | 449 | .159 |
| Model 2 | | .014 | .002 | 1.238 | 1.238 | 2 | 447 | .607 |
| | | *B* | $SE^b$ | *B* | *t* | *p* | | |
| | Gender | .98 | .076 | .062 | 1.286 | .199 | | |
| Model 1 | LEC-5 INT | .021 | .034 | .032 | .610 | .542 | | |
| | LEC-5 NON-INT | .024 | .018 | .071 | 1.353 | .177 | | |
| | Gender | .209 | .139 | .132 | 1.501 | .134 | | |
| | LEC-5 INT | .88 | .127 | .137 | .699 | .485 | | |
| Model 2 | LEC-5 NON-INT | .048 | .059 | .143 | .823 | .411 | | |
| | LEC-5 INT × Gender | -.040 | .073 | -.116 | -.556 | .579 | | |
| | LEC-5 NON-INT × Gender | -.017 | .036 | -.085 | -.474 | .636 | | |

NOTE: LEC-5 = *Life Events Checklist for the DSM-5*, INT = Interpersonal Trauma, NON-INT = Non-Interpersonal Trauma

CHAPTER 4

DISCUSSION

The goal of this study was to explore the relationships among lifetime history of chronic inflammatory diseases and exposure to trauma and symptoms of PTSD, gender differences in trauma exposure, PTSD symptoms, and chronic inflammatory disease; and the potential interaction of gender and trauma and trauma type in predicting chronic inflammatory disease. Though some hypotheses were supported, most were not.

Consistent with study hypotheses, women reported higher levels than men of childhood and lifetime interpersonal trauma. In addition, consistent with previous studies, men reported higher levels than women of lifetime non-interpersonal trauma. Contrary to study hypotheses, however, men and women did not differ in terms of PTSD symptoms or number of lifetime chronic inflammatory conditions reported. Moreover, although childhood trauma, lifetime interpersonal trauma, and lifetime non-interpersonal trauma correlated positively with PTSD symptoms and each other as expected, results contradicted the more central hypothesis that trauma and PTSD symptoms would be correlated with number of chronic inflammatory diseases. They were not, and the strengths of the relationships did not differ for men and women.

The results of this study are surprising. Given that prior research demonstrates that women tend to experience higher frequencies of interpersonal violence and that this type of trauma is associated with the development of PTSD and chronic illnesses, it was expected that women who experience this type of trauma would show higher rates of chronic inflammatory illness than their men counterparts. That the results showed no difference in the rate of chronic inflammatory illnesses between men and women who have experienced multiple interpersonal traumatic events suggests there may be factors not accounted for by this study.

**Implications**

Though the hypotheses specific to chronic inflammatory disease were not supported by the current study, results showed that, compared to men, women reported experiencing more childhood maltreatment and lifetime interpersonal trauma, both of which are powerful predictors of negative mental and physical health outcomes. It is clear there is a need for more exploration of the relationship between trauma and gender and their potential separate and overlapping relationships with health.

Gender disparity in both medical research and clinical healthcare settings can be devastating for those effected. In research, biased practices (e.g., sampling and collection bias, lack of funding for female specific disease research, gender inequality on committees and advisory bodies) increase the likelihood that women who suffer from both physiological and psychological illness will continue to go undiagnosed and untreated (Beery & Zucker, 2011; Sen & Ostlin, 2008; Vlasoff, 2007). One study suggests women who are victims of domestic violence are less likely to seek appropriate care for health conditions than women who have not experienced domestic violence (Vlasoff, 2007). Given that interpersonal trauma is associated with negative health outcomes, it is imperative that women who experience this type of trauma have access to health services that are free of bias. One study revealed multiple barriers between women and access to and quality of healthcare, including providers with limited awareness of women's health concerns and basic female anatomy, too few women providers, disproportionate costs associated with women's health services, gender bias in patient-provider interactions, and absence of quality care oversight (Sen & Ostlin, 2008).

Despite there being a higher prevalence of trauma among civilians (Brewin, Andres, & Valentine, 2000), the current body of trauma research largely focuses on active duty members of

the military and combat veterans. The participants of these studies tend to be all or mostly male, which is potentially one of the reasons for the limited understanding of gender differences in exposure to trauma (Brewin et al., 2000). Similarly, until recently, medical and psychological research relied on a "male as norm" perspective, with findings generalized to women (Vlassoff, 2007; Weisstein, 1993), and although this perspective has changed in research, residual influences remain in clinical settings. Despite women's increased risk of both PTSD and chronic diseases, women with a history of trauma and symptoms of chronic illness continue to be neglected in clinical settings (Tolin & Breslau, 2007; Vlassoff, 2007).

Women experience not only higher rates of many psychological and physical health conditions, but gender is so highly associated with health outcomes that outcomes can differ significantly for women and men experiencing the same illness (Vlassof, 2007). One potential explanation for this is women tend to have access to fewer resources than men; including social support, nutrition, and healthcare (Sen & Ostlin, 2008; Vasloff, 2007). One study surveyed women with chronic muscular pain and found that gender inequality in healthcare may have a negative influence on the psychological state of chronically ill women (Werner & Malterud, 2003).

Additionally, lack of awareness among medical professionals regarding women's health and treatment options can delay or even prevent appropriate diagnosis and treatment for whole host of illnesses (Sen & Ostlin, 2008). For example, endometriosis is one of the most widespread gynecological diseases, effecting an estimated 10-15% of women (Vitale, et al., 2018). Despite its high prevalence rate, women with endometriosis wait an average of 4.4 years from onset of symptoms to diagnosis (down from the previous estimate of 7 years) (Soliman, Fuldeore, Snabes, 2017). Women are less likely to receive guideline-based diagnostic procedures and testing for

multiple conditions, including myocardial infarction and heart failure. Women also tend to

receive less or delayed treatment for conditions such as stroke and atrial fibrillation (Regitz-

Zagrosek, 2012). In another study, researchers found, on average, women are prescribed less

pain medication in emergency room settings, as well as after abdominal surgery, coronary artery

bypass, and metastatic cancer treatment. Women with chest pain were also found to be less likely

to be admitted to the hospital than their male counterparts (Hoffman & Tarzian, 2001).

**Limitations**

       **Retrospective Self-Report of Trauma**. Research shows limitations to retrospective self-

report methods for measuring trauma exposure, particularly in terms of underreporting (Craner,

Martinson, Sigmon, & McGillicuddy, 2015; Widom, Spatz, & Morris, 1997; Wilson, 2016). For

example, studies of sexual trauma show it is underreported by both women and men, but that

men are especially likely to underreport compared to women, although method of assessment

may make a difference (Craner et al., 2015; Widom et al., 1997; Wilson, 2016). Moreover, in a

recent meta-analysis, Wilson (2016) found higher estimates of sexual assault among male

veterans when using self-report questionnaires and interviews than when using chart reviews

(i.e., the veterans were more likely to disclose to researchers than to their providers).

Furthermore, while examining disclosure of military sexual trauma in online surveys, Burgess,

Lee, and Caretta (2016) found men were significantly less likely than women to have ever

disclosed their experience prior to taking the online survey. Another study involving college

students found self-report questionnaires produced higher disclosure among male college

students when behaviorally specific questions were asked rather than labeling questions (e.g., "I

was touched on my genitals" vs. "I was sexually abused"; Craner et al, 2015). The online nature

of the current study could have potentially increased disclosure among men, but the true rates are

likely still be lower than what was reported. Furthermore, some of the current study

questionnaires used labeling items which could have decreased disclosure.

**Retrospective Self-Report of Medical History**. Another possible limitation of the

current study was its reliance on a retrospective self-report of diagnostic history. A study

comparing another self-report checklist of diagnoses to medical records found self-reported

diagnoses correlated with medical records (Miller, et al., 2008). Even so, it is possible

participants did not accurately recall their diagnoses or may have underreported some conditions.

It is also possible participants reported wrong diagnoses. Women are more likely than men to

experience multidetermined symptoms, complicating diagnosis. Due to bias, multidetermined

symptoms in women are often mislabeled by medical professionals, leading to more functional

and psychological diagnoses in women than men who exhibit the same symptoms (Mobini,

2015). This could contribute to a delay in diagnosis in women for a variety of illness, including

chronic inflammatory diseases (Sen & Ostlin, 2008). Thus, it is possible that the rate of chronic

inflammatory conditions endorsed by women in this study is inaccurate.

**Validity Concerns**. It is also possible some participants overreported reported

conditions. A cutoff was created to minimize extreme responses. There were also other validity

concerns noted in the CTQ with many participants showing a very low relative standard

deviation of their individual item responses, suggesting many had likely just "clicked through."

Adjustments to data exclusion criteria were made when the issue was noticed, but the cutoff

(<.30) was ultimately arbitrary. Both in the initial study design and after additional problems

were found, efforts were made to protect against low quality data, but they may not have been

enough. A study published in the last month reported MTurk data quality dropped significantly

during the previous year (Chmielewski & Kucker, 2019). Additionally, a post-analysis review of

materials revealed potential reliability concerns regarding the items included in the HCC. While a few of the included conditions could be assumed to be intercorrelated, a formal analysis of conditions was not performed prior to the current study. Therefore, the results of this study must be taken with caution, as unreliability of the HCC could undermine efforts to identify correlations between the study variables. the Further exploration is needed.

**Conclusion**

It was expected that PTSD symptoms would positively correlate with trauma, but none of the study variables correlated with number of chronic inflammatory conditions endorsed. It was also expected that number of chronic inflammatory diseases would correlate with trauma or PTSD symptoms, however, this was not the case with either gender. It was hypothesized that an interaction between trauma and gender would be associated with a higher number of chronic inflammatory diseases endorsed, but this hypothesis was not supported by the interactions in either the first (CTQ × Gender) or second (LEC-5 interpersonal trauma × gender, LEC-5 non-interpersonal trauma × gender) regression model. In general, the expectation that women who experience higher frequencies of interpersonal trauma would be the most likely of all participants to endorse a higher number of chronic inflammatory conditions was not supported. More research is needed to tease out the nuanced details of the complex relationship among trauma, chronic health conditions, and gender.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Arenson, M., & Cohen, B. (2017). Posttraumatic stress disorder and cardiovascular disease. *PTSD Research Quarterly, 28*(1), 1–9. https://dx.doi.org/10.2174%2F1874192401105010164

Aust, F., Diedenhofen, B., Ullrich, S., & Musch, J. (2013). Seriousness checks are useful to improve data validity in online research. *Behavior Research Methods, 45*(2), 527-535. https://doi.org/10.3758/s13428-012-0265-2

Ayaydin, H., Abali, O., Akdeniz, N. O., Kok, B. E., Gunes, A., Yildirim, A., & Deniz, G. (2016). Immune system changes after sexual abuse in adolescents. *Pediatrics International, 58*(2), 105-112. https://doi.org/10.1111/ped.12767

Baldwin, J. R., Arseneault, L., Caspi, A., Fisher, H. L., Moffitt, T. E., Odgers, C. L., … Danese, A. (2018). Full-length Article: Childhood victimization and inflammation in young adulthood: A genetically sensitive cohort study. *Brain Behavior and Immunity, 67*, 211-217. https://doi.org/10.1016/j.bbi.2017.08.025

Beery, A. K., & Zucker, I. (2011). Sex bias in neuroscience and biomedical research. *Neuroscience and Biobehavioral* Reviews *35*, 565–572. https://doi-org.libez.lib.georgiasouthern.edu/10.1016/j.neubiorev.2010.07.002

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., … Lepine, J. P. (2016). The epidemiology of traumatic event exposure worldwide: results from the World Mental Health Survey Consortium. *Psychological Medicine, 46*(2), 327–343. https://doi.org/10.1017/S0033291715001981

Bernstein, D. P., Fink, L., Handelsman, L., & Foote, J. (1994). Childhood Trauma

Questionnaire. *PsycTESTS*. https://doi-org.libez.lib.georgiasouthern.edu/Sample; Full

text; 999902080pass:[_]sample_001.pdf

Binder, E. B., Bradley, R. G., Liu, W., Epstein, M. P., Deveau, T. C., Mercer, K. B., ... &

Schwartz, A. C. (2008). Association of FKBP5 polymorphisms and childhood abuse with

risk of posttraumatic stress disorder symptoms in adults. *JAMA*, *299*(11), 1291-1305.

https://doi.org/10.1001/jama.299.11.1291

Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric

properties of the PTSD Checklist (PCL). *Behavioral Research & Therapy, 34*, 669-673.

https://doi.org/10.1016/0005-7967(96)00033-2

Blodgett, C., & Lanigan, J. D. (2018). 10-Item Adverse Childhood Experience

Survey. *PsycTESTS.* https://doi-org.libez.lib.georgiasouthern.edu/Full; Full text;

999966834pass:[_]full_001.pdf

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for

posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and

Clinical Psychology, 68*(5), 748–766. https://doi.org/10.1037/0022-006X.68.5.748

Briere, J., & Elliott, D. M. (2003). Prevalence and psychological sequelae of self-reported

childhood physical and sexual abuse in a general population sample of men and

women. *Child Abuse & Neglect, 27*(10), 1205-1222.

https://doi.org/10.1016/j.chiabu.2003.09.008

Brody, D. J., Pratt, L. A., & Hughes, J. P. (2018). Prevalence of depression among adults aged

20 and over: United States, 2013–2016. *NCHS Data Brief*, (303), 1–8.

Burgess, A. W., Lee, W. J., & Carretta, C. M. (2016). Online reporting of military sexual trauma. *Military Medicine, 181*(4), 350-355. https://doi.org/10.7205/MILMED-D-15-00026

Buttorff, C., Ruder, T., & Bauman, M., (2017) Multiple chronic conditions in the United States. *RAND Corporation.* Available at https://www.rand.org/pubs/tools/TL221.html.

Casimir, G. J., & Duchateau, J. (2011). Gender differences in inflammatory processes could explain poorer prognosis for males. *Journal of Clinical Microbiology, 49*(1), 478. https://doi.org/10.1128/JCM.02096-10

Chapel, J. M., Ritchey, M. D., Zhang, D., & Wang, G. (2017). Prevalence and medical costs of chronic diseases among adult Medicaid beneficiaries. *American Journal of Preventive Medicine, 53*(6S2), S143-S154. https://doi.org/10.1016/j.amepre.2017.07.019

Chmielewski, M., & Kucker, S. C. (2019). An MTurk Crisis? Shifts in Data Quality and the Impact on Study Results. Social Psychological and Personality Science, 1948550619875149. https://doi.org/10.1177%2F1948550619875149

Clark, C. B., Perkins, A., McCullumsmith, C. B., Islam, M. A., Hanover, E. E., & Cropsey, K. L. (2012). Characteristics of victims of sexual abuse by gender and race in a community corrections population. *Journal of Interpersonal Violence*, *27*(9), 1844-1861. https://doi.org/10.1177%2F0886260511430390

Coelho, R., Viola, T. W., Walss-Bass, C., Brietzke, E., & Grassi-Oliveira, R. (2014). Childhood maltreatment and inflammatory markers: A systematic review. *Acta Psychiatrica Scandinavica, 129*(3), 180-192. https://doi.org/10.1111/acps.12217

Coker, A. L., Davis, K. E., Arias, I., Desai, S., Sanderson, M., Brandt, H. M., & Smith, P. H. (2002). Physical and mental health effects of intimate partner violence for men and

women. *American Journal of Preventative Medicine*, *23*(4), 260-268.

https://doi.org/10.1016/S0749-3797(02)00514-7

Copeland, W. E., Shanahan, L., Hinesley, J., et al. (2018). Association of childhood trauma

exposure with adult psychiatric disorders and functional outcomes. *JAMA Network Open,*

*1*(7), e184493. https://doi.org/10.1001/jamanetworkopen.2018.4493

Cottrell, D. A., Kremenchutzky, M., Rice, G. P. A., Koopman, W. J., Hader, W., Baskerville, J.,

Ebers, G. C., (1999). The natural history of multiple sclerosis: A geographically based

study: 5. The clinical features and natural history of primary progressive multiple

sclerosis, *Brain*, *122(*4), 625–639, https://doi.org/10.1093/brain/122.4.625

Craner, J. R., Martinson, A. A., Sigmon, S. T., & McGillicuddy, M. L. (2015). Prevalence of

sexual trauma history using behaviorally specific methods of assessment in first year

college students. *Journal of Child Sexual Abuse, 24*(5), 484-505.

https://doi.org/10.1080/10538712.2015.1026014

Cross, D., Crow, T., Powers, A., & Bradley, B. (2015). Childhood trauma, PTSD, and

problematic alcohol and substance use in low-income, African-American men and

women. *Child Abuse & Neglect, 44*, 26–35. https://doi.org/10.1016/j.chiabu.2015.01.007

Curran, P. G. (2016). Methods for the detection of carelessly invalid responses in survey

data. *Journal of Experimental Social Psychology, 66*, 4–19.

https://doi.org/10.1016/j.jesp.2015.07.006

D'Elia, A. T. D., Matsuzaka, C. T., Neto, J. B. B., Mello, M. F., Juruena, M. F., & Mello, A. F.

(2018). Childhood sexual abuse and indicators of immune activity: A systematic review.

*Frontiers in Psychiatry, 9*, 1-20. https://doi.org/10.3389/fpsyt.2018.00354

Difallah, D., Filatova, E., & Ipeirotis, P. (2018). Demographics and dynamics of Mechanical

    Turk workers. *Proceedings of the Eleventh ACM International Conference on Web*

    *Search and Data Mining - WSDM* 18. https://doi.org/10.1145/3159652.3159661

Dube, S. R., Fairweather, D., Pearson, W. S., Felitti, V. J., Anda, R. F., & Croft, J. B. (2009).

    Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic*

    *Medicine, 71*(2), 243-250. https://doi.org/10.1097/PSY.0b013e3181907888

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using

    G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods,*

    *41*, 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., &

    Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many

    of the leading causes of death in adults: The Adverse Childhood Experiences (ACE)

    Study. *American Journal of Preventive Medicine, 14*(4), 245-258.

    https://doi.org/10.1016/S0749-3797(98)00017-8

Garson, D. (2015). Missing value analysis and data imputation. Asheboro, NC: Statistical

    Associates Publishing.

Goldmann, E., & Galea, S., (2014). Mental health consequences of disasters. *Annual Review of*

    *Public Health, 35*(1), 169-183. https://doi.org/10.1146/annurev-publhealth-032013-

    182435

Griffing, S., Lewis, C. S., Chu, M., Sage, R. E., Madry, L., & Primm, B. J. (2006). Exposure to

    interpersonal violence as a predictor of PTSD symptomatology in domestic violence

    survivors. *Journal of Interpersonal Violence, 21*(7), 936-954.

Groer, M. W., Kane, B., Williams, S. N., & Duffy, A. (2015). Relationship of PTSD symptoms with combat exposure, stress, inflammation in American soldiers. *Biological Research for Nursing, 17*(3), 303-310. https://doi.org/10.1177%2F1099800414544949

Hays, R. D., Sherbourne, C. D., & Mazel, R. M. (1993). The RAND 36-item health survey 1.0. *Health Economics, 2*(3), 217-227. https://doi.org/10.1002/hec.4730020305

Heath, N. M., Chesney, S. A., Gerhart, J. I., Goldsmith, R. E., Luborsky, J. L., Stevens, N. R., & Hobfoll, S. E. (2013). Interpersonal violence, PTSD, and inflammation: Potential psychogenic pathways to higher C-reactive protein levels. *Cytokine, 63*(2), 172-8. https://doi.org/10.1016/j.cyto.2013.04.030

Hoffmann, D. E., & Tarzian, A. J. (2001). The girl who cried pain: A bias against women in the treatment of pain. *The Journal of Law, Medicine & Ethics: A Journal of the American Society of Law, Medicine & Ethics, 29*(1), 13–27. https://doi.org/10.1111/j.1748-720X.2001.tb00037.x

Horesh, D., Lowe, S. R., Galea, S., Aiello, A. E., Uddin, M., & Koenen, K. C. (2017). An in-depth look into PTSD-depression comorbidity: A longitudinal study of chronically-exposed Detroit residents. *Journal of Affective Disorders, 208*, 653–661. https://doi.org/10.1016/j.jad.2016.08.053 https://doi.org/10.1177/0886260506288938

Human Rights Campaign (2016). Collecting transgender-inclusive gender data in workplace and other surveys. Retrieved from https://www.hrc.org/resources/collecting-transgender-inclusive-gender-data-in-workplace-and-other-surveys

Husky, M. M., Mazure, C. M., & Kovess-Masfety, V. (2018). Gender differences in psychiatric and medical comorbidity with post-traumatic stress disorder. *Comprehensive Psychiatry, 84,* 75–81. https://doi.org/10.1016/j.comppsych.2018.04.007

Ivanova, J. I., Birnbaum, H. G., Chen, L, Duhig, A. M., Dayoub, E. J., Kantor, E. S., Schiller, M. B., & Phillips, G.A., (2011). Cost of post-traumatic stress disorder vs major depressive disorder among patients covered by Medicaid or private insurance. *Am J Manag Care, 17(*8), e314-e323. https://www.ajmc.com/journals/issue/2011/2011-8-vol17-n8/ajmc_11julaug_ivanova_e314to23

Jaffe, A. E., DiLillo, D., Gratz, K. L., & Messman-Moore, T. L. (2019). Risk for revictimization following interpersonal and noninterpersonal trauma: Clarifying the role of posttraumatic stress symptoms and trauma-related cognitions. *Journal of Traumatic Stress*, *32*(1), 42-55. https://doi.org/10.1002/jts.22372

Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., ... & Florescu, S. (2017). Trauma and PTSD in the WHO world mental health surveys. *European Journal of Psychotraumatology, 8*(sup5), 1353383. https://doi.org/10.1080/20008198.2017.1353383

Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R., Demyttenaere, K., Gasquet, I., DE., … Ustün, T. B. (2007). Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA), 6*(3), 168-176.

Kessler, R. C., Rose, S., Koenen, K. C., Karam, E. G., Stang, P. E., Stein, D. J., … Carmen Viana, M. (2014). How well can post-traumatic stress disorder be predicted from pre-

trauma risk factors? An exploratory study in the WHO World Mental Health

Surveys. *World Psychiatry: Official Journal of the World Psychiatric Association
(WPA), 13*(3), 265–274. https://doi.org/10.1002/wps.20150

Kilpatrick, D. G., Resnick, H. S., Milanak, M. E., Miller, M. W., Keyes, K. M., & Friedman, M.
J. (2013). National estimates of exposure to traumatic events and PTSD prevalence using
DSM-IV and DSM-5 criteria: The changed face of PTSD diagnosis. *Journal of
Traumatic Stress,* (5), 537-547. https://doi.org/10.1002/jts.21848

Kim, D., Bae, H., Han, C., Oh, H. Y., & MacDonald, K. (2013). Psychometric properties of the
Childhood Trauma Questionnaire-Short Form (CTQ-SF) in Korean patients with
schizophrenia. *Schizophrenia Research, 144*, 93–98.
https://doi.org/10.1016/j.schres.2012.12.020

Kolacz, J., Hu, Y., Gesselman, A. N., Garcia, J. R., Lewis, G. F., & Porges, S. W. (2019). Sexual
function in adults with a history of childhood maltreatment: Mediating effects of self-
reported autonomic reactivity. *Psychological Trauma: Theory, Research, Practice, and
Policy*. Advance online publication. https://doi.org/10.1037/tra0000498

Liebermann, C., Schwartz, A. S. K., Charpidou, T., Geraedts, K., Rauchfuss, M., Wölfler, M.,
von Orelli, S., Haberlin, F., Eberhard, M., Imesch, P., Imthurn, B., Leeners, B. (2018).
Maltreatment during childhood: A risk factor for the development of
endometriosis? *Human Reproduction, 33*(8), 1449–1458.
https://doi.org/10.1093/humrep/dey111

Liu, Y. Z., Wang, Y. X., & Jiang, C. L. (2017). Inflammation: The common pathway of stress-
related diseases. *Frontiers in Human Neuroscience, 11*, 1-11.
https://doi.org/10.3389/fnhum.2017.00316

Machtinger, E. L., Cuca, Y. P., Khanna, N., Rose, C. D., & Kimberg, L. S. (2015). From

 treatment to healing: The promise of trauma-informed primary care. *Women's Health*

 *Issues*, *25*(3), 193-197. https://doi.org/10.1016/j.whi.2015.03.008

Michopoulos, V., Rothbaum, A. O., Jovanovic, T., Almli, L. M., Bradley, B., Rothbaum, B. O...

 Ressler, K. J. (2015). Association of CRP genetic variation and CRP level with elevated

 PTSD symptoms and physiological responses in a civilian population with high levels of

 trauma. *American Journal of Psychiatry,* (4), 353.

 https://doi.org/10.1176/appi.ajp.2014.14020263

Miller D. R., Rogers W. H., Kazis L. E., et al, (2008). Patients self-report of diseases in the

 Medicare Health Outcomes Survey based on comparisons with linked survey and medical

 data from the Veterans Health Administration. *J Ambul Care Manag, 31*:161–177.

 https://doi.org/10.1097/01.JAC.0000314707.88160.9c

Mobini, S. (2015). Psychology of medically unexplained symptoms: A practical review. *Cogent*

 *Psychology, 2*(1), 1033876. https://doi.org/10.1080/23311908.2015.1033876

Molnar, B. E., Berkman, L. F., & Buka, S. L., (2001). Psychopathology, childhood sexual abuse

 and other childhood adversities: Relative links to subsequent suicidal behaviour in the

 US. *Psychol Med, 31*(6), 965-977. https://doi.org/10.1017/S0033291701004329

National Committee for Quality Assurance (2019). Medicare Health Outcomes Survey

 Questionnaire, Version 3.0. Centers for Medicare and Medicaid Services. Retrieved from

 https://www.hosonline.org/en/survey-instrument/

Ngo, S. T., Steyn, F. J., & McCombe, P. A. (2014). Review: Gender differences in autoimmune

 disease. *Frontiers in Neuroendocrinology, 35*, 347–369.

 https://doi.org/10.1016/j.yfrne.2014.04.004

Olff, M. (2017). Sex and gender differences in post-traumatic stress disorder: An

update. *European Journal of Psychotraumatology, 8*(4), 1-5.

https://doi.org/10.1080/20008198.2017.1351204

Pahwa, R., & Jialal, I. (2018, October 27). Chronic Inflammation. Retrieved March 20, 2019,

from https://www.ncbi.nlm.nih.gov/books/NBK493173/

Pico-Alfonso, M. A., Garcia-Linares, M. I., Celda-Navarro, N., Blasco-Ros, C., Echeburúa, E.,

& Martínez, M. (2006). The impact of physical, psychological, and sexual intimate male

partner violence on women's mental health: Depressive symptoms, posttraumatic stress

disorder, state anxiety, and suicide. *Journal of Women's Health, 155*, 599-611 .

Plantinga, L., Bremner, J. D., Miller, A. H., Jones, D. P., Veledar, E., Goldberg, J., & Vaccarino,

V. (2013). Association between posttraumatic stress disorder and inflammation: A twin

study. *Brain Behavior and Immunity, 30*, 125–132.

https://doi.org/10.1016/j.bbi.2013.01.081

Porcelli, B., Pozza, A., Bizzaro, N., Fagiolini, A., Costantini, M. C., Terzuoli, L., & Ferretti, F.

(2016). Association between stressful life events and autoimmune diseases: A systematic

review and meta-analysis of retrospective case–control studies. *Autoimmunity Reviews,

15(*4), 325-334. https://doi.org/10.1016/j.autrev.2015.12.005

Punchard, N. A., Whelan, C. J., & Adcock, I.M. (2004). The Journal of Inflammation. *Journal of

Inflammation (London, England), 1*, 1. https://doi.org/10.1186/1476-9255-1-1

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general

population. *Applied Psychological Measurement, 1*(3), 385-401.

https://doi.org/10.1177/014662167700100306

Regitz-Zagrosek V. (2012). Sex and gender differences in health. *Science & Society Series on Sex and Science. EMBO reports, 13*(7), 596–603. https://doi.org/10.1038/embor.2012.87

Scher, C. D., Stein, M. B., Asmundson, G. J., McCreary, D. R., & Forde, D. R. (2001). The childhood trauma questionnaire in a community sample: psychometric properties and normative data. *Journal of Traumatic Stress*, *14*(4), 843-857. https://doi.org/10.1023/A:1013058625719

Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychological Bulletin, 130*(4), 601-630. https://doi.org/10.1037/0033-2909.130.4.601

Sen, G., & P. Östlin (2008). Gender inequity in health: Why it exists and how we can change it. *Global Public Health, 3*(sup1), 1-12. https://doi.org/10.1080/17441690801900795

Sledjeski, E. M., Speisman, B., & Dierker, L. C. (2008). Does number of lifetime traumas explain the relationship between PTSD and chronic medical conditions? Answers from the National Comorbidity Survey-Replication (NCS-R). *Journal of Behavioral Medicine, 31*(4), 341-349. https://doi.org/10.1007/s10865-008-9158-3

Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017). Factors associated with time to endometriosis diagnosis in the United States. *Journal of Women's Health, 26*(7), 788–797. https://doi.org/10.1089/jwh.2016.6003

Straub, R. H., & Schradin, C. (2016). Chronic inflammatory systemic diseases: An evolutionary trade-off between acutely beneficial but chronically harmful programs. *Evolution, Medicine, and Public Health, 2016*(1), 37-51. https://doi.org/10.1093/emph/eow001

Turner, J. H., Neylan, T. C., Schiller, N. B., Li, & Cohen, B. E. (2013). Objective evidence of

myocardial ischemia in patients with posttraumatic stress disorder. *Biological Psychiatry*

*74,* 861-866. https://doi.org/10.1016/j.biopsych.2013.07.012

United States Department of Health and Human Services. Centers for Medicare and Medicaid

Services. (2017). Medicare Health Outcomes Survey (HOS), 1998-2014.

https://doi.org/10.3886/ICPSR23380.v3

Van Dam, N. T., & Earleywine, M. (2011). Validation of the Center for Epidemiologic Studies

Depression Scale—Revised (CESD-R): Pragmatic depression assessment in the general

population. *Psychiatry Research, 186*(1), 128-132.

https://doi.org/10.1016/j.psychres.2010.08.018

Vitale, S. G., Capriglione, S., Peterlunger, I., La Rosa, V. L. L., Vitagliano, A., Noventa, M.,…

(2018). The role of oxidative stress and membrane transport systems during

endometriosis: A fresh look at a busy corner. *Oxidative Medicine and Cellular Longevity,*

(2018), 1-15. https://doi.org/10.1155/2018/7924021

Vlassoff, C. (2007). Gender differences in determinants and consequences of health and

illness. *Journal of Health, Population, and Nutrition, 25*(1), 47–61.

https://www.ncbi.nlm.nih.gov/pubmed/17615903

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I.

Conceptual framework and item selection. *Medical Care, 30*(6), 473-483.

https://doi.org/10.1097/00005650-199206000-00002

Weathers, F. W., & Keane, T. M. (2007). The criterion, a problem revisited: Controversies and

challenges in defining and measuring psychological trauma. *Journal of Traumatic*

*Stress, 20*(2), 107–121. https://doi.org/10.1002/jts.20210

Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5).* Interview available from the National Center for PTSD at www.ptsd.va.gov.

Weathers, F. W., Litz, B. T., Keane, T. M., Palmierie, P. A., Marx, B. P., & Schnurr, P. P. (2013). The PTSD Checklist for DSM-5 (PCL-5)- LEC-5 and Extended Criterion A [Measurement instrument]. Available from https://www.ptsd.va.gov/

Weiss, T., Skelton, K., Phifer, J., Jovanovic, T., Gillespie, C. F., Smith, A., Umpierrez, G., Bradley, B., & Ressler, K. J. (2011). Posttraumatic stress disorder is a risk factor for metabolic syndrome in an impoverished urban population. *General Hospital Psychiatry, 33*(2), 135-142. https://doi.org/10.1016/j.genhosppsych.2011.01.002

Werner, A., & Malterud, K. (2003). It is hard work behaving as a credible patient: Encounters between women with chronic pain and their doctors. *Social Science & Medicine (1982),* (8), 1409-1419. https://doi.org/10.1016/S0277-9536(02)00520-8

"What Is an Inflammation?" *Informed Health Online [Internet],* U.S. National Library of Medicine, 22 Feb. 2018, www.ncbi.nlm.nih.gov/books/NBK279298/

Widom, C. S., & Morris, S. (1997). Accuracy of adult recollections of childhood victimization, part 2: Childhood sexual abuse. *Psychological Assessment, 9*(1), 34-46. https://psycnet.apa.org/doi/10.1037/1040-3590.9.1.34

Wilson, L. C. (2016). The prevalence of military sexual trauma: A meta-analysis. *Trauma, Violence, & Abuse, 19*(5), 584-597. https://doi.org/10.1177/1524838016683459

APPENDIX A: Demographics Form

1) How old are you? [ ]

2) What is your gender?
    o *Female*
    o *Male*
    o *Non-binary/third gender*
    o *Prefer to self-describe: [ ]*
    o *Prefer not to say*

3) Do you identify as transgender?
    o *Yes*
    o *No*
    o *Prefer not to say*

4) How would you describe your racial/ethnic background? Check all that apply.
    *American Indian or Alaskan Native*
    *Asian*
    *Black or African American*
    *Hispanic, Latino, or Latin Origin*
    *Middle Eastern or North African*
    *Multi-racial/Ethnic*
    *Native Hawaiian or Other Pacific Islander*
    *White*
    *Other: [ ]*
    *Prefer not to say*

5) What is your sexual orientation?
    o *Straight/heterosexual*
    o *Gay or lesbian*
    o *Bisexual*
    o *Prefer to self-describe: [ ]*
    o *Prefer not to say*

6) How many adults (age 18 years and older) live with you? (If you live alone, type 0). [ ]

7) How many children (age 17 years or younger) live with you? (If you do not live with any children, type 0). [ ]

8) What is your highest level of education?
    o *Did not attend high school*
    o *Attended high school*
    o *Completed high school (or earned certificate of high school equivalency, GED)*
    o *Attended college*
    o *Completed two-year college degree*
    o *Completed four-year college degree*
    o *Attended graduate or professional school*
    o *Completed graduate or professional degree*

9) Are you currently employed?

    o *No, and not looking for employment – retired*
    o *No, and not looking for employment – disabled*
    o *No, and not looking for employment – student*
    o *No, and not looking for employment – other reason*
    o *No, but looking for employment*
    o *Yes, part-time*
    o *Yes, full-time*

10) Are you a current or former member of the United States Armed Forces?
    o *No, never*
    o *Yes, retired or discharged*
    o *Yes, currently*

11) What is your total household income before taxes in the past 12 months?
    o *Less than $15,000*
    o *$15,000 – $24,999*
    o *$25,000 – $34,999*
    o *$35,000 – $49,999*
    o *$50,000 – $ 74,999*
    o *$75,000 – $99,999*
    o *$100,000 – $149,999*
    o *$150,000 – $199,999*
    o *$200,000 or more*

12) What is your mother's highest level of education?
    o *Did not attend high school*
    o *Attended high school*
    o *Completed high school (or earned certificate of high school equivalency, GED)*
    o *Attended college*
    o *Completed two-year college degree*
    o *Completed four-year college degree*
    o *Attended graduate or professional school*
    o *Completed graduate or professional degree*
    o *Not sure*
    o *Not applicable*

13) How would you describe the town or city where you currently live?
    o *Urban/large city*
    o *Suburban,*
    o *Small city/small town*
    o *Rural*

14) How would you describe the town or city where you grew up? (If you moved while growing up, think about the kinds of towns or cities you lived the longest.)
    o *Urban/large city*
    o *Suburban,*
    o *Small city/small town*
    o *Rural*

APPENDIX B: Health Conditions Checklist

Has a doctor ever told you that you had any of the following health conditions? Check all that apply.

[*Mental Health Conditions*]
−  Alcohol or substance use disorder
−  Anxiety disorder
−  Depression
−  Manic episode or bipolar disorder
−  Posttraumatic stress disorder (PTSD)

[*Autoimmune Disease*]
−  Addison's disease
−  Celiac disease
−  Grave's disease
−  Hashimoto's disease
−  Inflammatory bowel disease (IBD), Crohn's disease, or ulcerative colitis
−  Lupus
−  Multiple sclerosis
−  Pernicious anemia
−  Psoriasis
−  Psoriatic arthritis
−  Rheumatoid arthritis
−  Scleroderma
−  Sjogren's syndrome
−  Type I diabetes
−  Vitiligo

[*Other Chronic Inflammatory Disease*]
−  Allergies
−  Asthma
−  Chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis
−  Dermatitis or eczema
−  Endometriosis [*women only*]

[*Diseases Likely Exacerbated by Inflammation*]
−  Chronic kidney disease
−  Heart disease, congestive heart failure, or heart attack
−  Hypertension or high blood pressure
−  Liver disease
−  Osteoarthritis ("wear-and-tear arthritis")
−  Stroke or transient ischemic attack
−  Type II diabetes

[*Other Conditions*]
−  Cancer
−  Chronic pain
−  Fibromyalgia
−  Irritable bowel syndrome (IBS)

APPENDIX C: Attention Check Items

- **Attention Check**—embedded in the PCL-5

  Skip this question, and leave it blank. It is only here to check your level of attention.

    *0 Not at all*
    *1 A little bit*
    *2 Moderately*
    *3 Quite a bit*
    *4 Extremely*

- **Self-Rating of Seriousness (Aust et al., 2013)**—completed at the end of the survey

  It would be very helpful if you could tell us at this point whether you have taken part seriously, so that we can use your answers for our scientific analysis, or whether you were just clicking through to take a look at the survey?

    *I have taken part seriously.*
    *I have just clicked through, please throw my data away.*

APPENDIX D: Study Consent

**Informed Consent**
**Trauma and Health Survey Study**

I am Meghan Lacienski, an experimental psychology master's student at Georgia Southern University (GS), and I am conducting a survey study of the relationship between trauma and mental and physical health. The goal of this study is contribute to a more enriched conversation on trauma and health.

Participation in this study includes completing 8 questionnaires, including demographics. Upon completion of the questionnaires, participants will receive a unique code that they may enter into Mechanical Turk to receive compensation for their participation. Participating in this study could cause discomfort for some individuals, such as when responding to questions regarding history of trauma exposure. Participants or potential participants who feel any degree of distress or discomfort are not obligated to complete the study and are welcome to contact the researchers for further information. Participating in this study may be personally beneficial in terms of gaining familiarity with psychological research and receiving monetary compensation. The benefits to society include potentially informing a growing effort to promote trauma-informed medical care, particularly for women patients.

This study should take about 20 minutes to complete. The survey is administered through Qualtrics, and all study data will initially be maintained on Qualtrics servers. Once the study ends, study data will be transferred from Qualtrics to a secure, password-protected hard drive located within the psychology department at GS and will be deleted from Qualtrics. De-identified study data will be maintained indefinitely by the faculty advisor for use in future research. Only the principle investigator and faculty advisor will have access to the data. De-identified study data may be placed in a publicly available repository for study validation and further research. You will never be identified by name in a dataset or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at (912) 478 – 5465.

You will be compensated $1.00 for your participation in this study. To obtain compensation, you will receive a unique code at completion of the survey that you may enter into Mechanical Turk. Once the code is verified, you will receive your compensation via Mechanical Turk.

Participation in this study is voluntary, and you are under no obligation to participate or complete the survey. You may discontinue the survey at any time by exiting Qualtrics (closing the survey window). Additionally, you do not have to answer any questions you do not want to answer. You will not be penalized for skipping questions or ending the survey early. If you choose to withdraw, your data will not be used for the study, and your MTurk approval rating will not be impacted. If, however, you exit Qualtrics before reaching the end of the survey, you will not be able to receive a verification code to claim your compensation.

**All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities; however, we are not seeking this type of information in our study, nor will you be asked questions about these issues.**

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please select "I choose to participate" below. You may download a copy of this consent form to keep for your records. This project has been reviewed and approved by the GS Institutional Review Board under tracking number H19422.

Title of Project: Trauma and Health Survey Study
Principal Investigator: Meghan Lacienski
ml05246@georgiasouthern.edu
Faculty Advisor: Dorthie Cross, PhD
dcrossmokdad@georgiasouthern.edu
Brannen Hall 1010
Department of Psychology
Georgia Southern University
Statesboro, GA 30458-8041

┼ I choose to participate          ┼ I choose NOT to participate

APPENDIX E: Study Debriefing

You have just participated in a study conducted by Meghan Lacienski and Dr. Dorthie Cross at Georgia Southern University. Thank you for participating! We sincerely appreciate your time and thoughtfulness. Please feel free to ask any questions or to comment on any aspect of the study. Contact information is listed at the bottom of this form.

You may print a copy of this debriefing for your records. Contact information for the researchers and the Georgia Southern University IRB is listed in the informed consent document. If you would like a copy of the informed consent or if you have any other questions about the study, contact Meghan Lacienski, and she will reply promptly to your request.

If you experience psychological distress or other adverse reaction as a result of participating in this study, please contact the SAMHSA Treatment Referral Helpline at 1-877-726-4727, the National Suicide Prevention Lifeline at 1-800-273-8255, or other resources in your area.

> SAMHSA Treatment Referral Helpline
> https://www.samhsa.gov/find-help/national-helpline
> 1-877-726-4727

> National Suicide Prevention Lifeline
> https://suicidepreventionlifeline.org/
> 1-800-273-8255

Primary Investigator: Meghan Lacienski
ml05246@georgiasouthern.edu

Co-Investigator/Faculty Advisor: Dorthie Cross, PhD
dcrossmokdad@georgiasouthern.edu