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GENDER DIFFERENCES IN AFFECTIVE RATINGS TO NEUTRAL IMAGES AND THEIR  
RELATIONS TO SOCIOEMOTIONAL DIFFICULTIES

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## ABSTRACT

Gender differences in emotion are multifaceted and have implications for mental health during global stressors such as the COVID-19 pandemic. Previous research has primarily examined how men and women differ in their emotional responses to emotionally evocative stimuli; however, emotional responses to neutral stimuli may be better predictors of well-being during stressors (e.g., pandemic). As such, the primary aim of the present study was to examine whether gender differences in affective ratings are stronger when affective ratings are made to neutral relative to threatening images. A secondary aim was to investigate whether there are gender differences in socioemotional difficulties during the COVID-19 pandemic. To this end, the sample was recruited via Amazon Mechanical Turk (MTurk), where the participant underwent a task that encompassed 90 trials that were grouped into three conditions. During each trial, participants were asked to rate their levels of fear and disgust to the stimuli presented. Participants also reported their degree of pandemic disruption: a measurement representing the socioemotional difficulties experienced by the participant due to the COVID-19 pandemic. Two 2x3 factorial mixed ANOVAs were run to examine the gender differences in the affective emotional ratings of all three conditions. One ANOVA assessed the degree of self-reported fear to all image types and the second ANOVA assessed the degree of self-reported disgust to all image types. An independent samples t-test was then run to assess the gender differences in pandemic disruption. The ANOVA tests revealed that, on average, men exhibit significantly greater fear and disgust to neutral images than women. The t-test revealed that there is no gender difference in pandemic disruption. These results suggest that the belief that women experience greater negative emotion than men may not be a universal phenomenon, and that certain biological, psychological, and social determinants could play a role in these unexpected results.

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## **Chapter 1**

### **Introduction**

#### **Gender Differences in Psychopathology**

According to Afifi (2007), gender accounts for notable variance in the etiology, symptomatology, and manifestation of psychopathology. Specifically, women are more at risk for developing psychopathology (e.g., anxiety disorders, major depression) than men, for the most part. Gender could therefore be critical to improving etiological models of mental health disorders and key to enhancing early diagnosis and successful treatment of psychopathology.

A formal recognition of gender in existing clinical interventions and diagnostic tools is lacking. Instead, much of the healthcare industry solely focuses on women's reproductive health and disregards maladies in other realms, resulting in limited access to mental healthcare.

Ultimately, the implementation of policies that "promote and protect women's autonomy and mental health is crucial" (Afifi, 2007, p. 389). This is due to the mental health determinants of women remaining constantly threatened in the United States and around the world, from their universal subjection to gender inequality/inequity to merely being underrepresented in clinical trials studying mental illness.

Despite its importance, there is still a dire need to conduct basic research on gender differences in psychopathology due to the sheer lack of analysis and inclusion of gender difference criteria within prior studies (Hartung & Lefler, 2019). Hartung & Lefler (2019) state that studying and acknowledging the gender differences in psychopathology is necessary for the proper understanding of comprehensive etiological models and the advancement of the diagnosis and treatment of mental disorders. Furthermore, gender differences in psychopathology will

contribute to the explanation of variations in outcomes such as prevalence rates, comorbidity, and disease severity.

Although gender differences in psychopathology need further clarification, there are existing studies providing some insights on the topic. Several previous studies have shown that women are twice as likely to have depression than men (Kornstein, 1997). This significant difference can be due to a myriad of factors including help-seeking behavior, biological differences, and sociocultural influences. Firstly, women have been found to display more (and different) depressive symptoms than men; women tend to display more atypical symptoms like hyperphagia and hypersomnia whereas men tend to exhibit less physical anguish. Interestingly, men experience more internal depressive symptoms while women present not only a greater array of symptoms but more external ones. Severity of depression was deemed insignificant across studies; however, men have more completed suicides than women (although women have more attempted suicides). Former studies have also shown earlier onset, longer depressive episodes, and greater sensitivity to triggers of episodes in women than men. To accrue to the preponderant findings, women also display higher rates of psychopathology comorbidity than men, according to the National Comorbidity Survey and the Epidemiologic Catchment Area (ECA) Study (Kornstein, 1997). Taken together, these sources stress the prevalence of gender differences in psychopathology and the gravity behind acknowledging and understanding these differences in optimizing public mental health. It should be noted that much prior research lacks a clear distinction between sex and gender differences; sex refers to the biologically determined characteristics of a male and female while gender denotes the societal expectations and stereotypes of a man and woman. Therefore, gender differences in mental disorders, specifically depressive disorders, are rarely due solely to biology.



## **Gender Differences in Emotion**

Emotion is a fundamental contributor to the development and maintenance of mental disorders (Berking & Wupperman, 2012). In other words, the risk for and manifestation of mental illness is partially dictated by disruption in emotional responding (Kring & Bachorowski, 1999). Studying gender differences in emotion is therefore necessary for gaining a comprehensive understanding of gender differences in psychopathology. Emotional experience and expressivity are complex and have immense health and sociocultural implications. A crucial feature of this complexity to be explored are the gender differences in emotion and the socioemotional significance behind such differences.

There are a myriad of factors that contribute to gender differences; according to the biopsychosocial model on gender differences in emotional expression, the differences manifest as a result of a combination of intrinsic biology, socialization, and immediate environmental/cultural influences (Chaplin, 2014). The interaction between biology and socialization includes the gender stereotypes present in many Western cultures; women are expected to externalize (or outwardly manifest) positive emotions like happiness, sympathy, and empathy and internalize negative emotions like sadness and anxiety, whereas men are expected to show anger, aggression, and disgust and internalize “nurturing” emotions. From the biological perspective, previous studies have shown that women display lower arousal but have been socialized with age to adapt to the female gender role characterized by high emotional expression (Chaplin, 2014). Regarding the social context of the biopsychosocial model, Chaplin (2014) proposes that internalized gender roles may either be hindered or heightened depending on environmental interactions. The review emphasizes the complexities of gender differences in emotion and the gap in what these differences might imply in terms of the risk of

psychopathology. For instance, Chaplin (2014) communicates that females who succumb to externalizing empathy and internalizing anger can allude to depression and anxiety while the limited expression of sadness, anxiety (Nolen-Hoeksema & Hilt, 2006), and lack of “mental toughness” can contribute to antisocial behaviors and the abuse of alcohol (Chaplin et al., 2008).

Research also suggests that women are more expressive in their negative self-reported emotions than men (e.g., Schienle et al., 2005). One study investigated the gender differences in emotional expression to fear and disgust-inducing images; in line with previous research, women self-reported greater fear and disgust than men (Scheinle et al., 2005). McRae et al. (2008) explored a similar concept by addressing the gap in prominent gender stereotypes and previous empirical findings of gender differences in emotional reactivity and regulation. The majority of prior literature examining gender differences in emotions merely utilizes self-reported emotional reactivity to stimuli which is vulnerable to stereotypic self-biases. In other words, men and women might possess systematically false perceptions of themselves as a result of gender stereotypes and project these views in study results. Thus, the authors used neuroimaging to investigate the hypothesis that gender differences in emotion merely result from regulation. To assess emotional reactivity, unregulated responses to negative versus neutral stimuli were compared, while emotional regulation was manipulated by asking the participants to utilize a cognitive emotion regulation strategy, known as reappraisal, to down-regulate (i.e., lessen or suppress) their emotional responses to negatively valenced pictures. The main results indicated that males have less prefrontal activity (associated with reappraisal) than females and females have greater ventral striatal activation (associated with reward processing) than men (McRae et al., 2008). The authors suggested two crucial psychopathological implications of the results; firstly, women may struggle more in down-regulating negative emotions. Secondly, women may

use positivity to reframe the impact of a situation more than men when attempting to down-regulate negative emotions. Both results could potentially designate that in terms of mental disorder therapies, women may learn reappraisal with more difficulty than men or may remain unsuccessful in therapies that require arousal reduction (McRae et al., 2008).

Emotion plays a particularly important role in the implication of psychopathology and other socioemotional difficulties. Nolen-Hoeksema & Aldao (2011) investigated the gender differences in self-reported use of adaptive and maladaptive emotion regulation strategies when controlling for depression and the relation of these strategies to depressive symptoms. The researchers found that maladaptive strategies were significantly related to depressive symptoms while adaptive strategies were completely unrelated and actually promote well-being and mental health in the individual (Gross et al., 2019), suggesting that the utilization of unhealthy emotional coping strategies are heavily indicative of psychopathology. Moreover, women reported to use both adaptive and maladaptive strategies more than men, further implying that women are at greater risk for psychopathology (Nolen-Hoeksema & Aldao, 2011).

Prior research also reveals higher levels of arousal and a larger startle response to unpleasant images in women than in men. However, both males and females displayed greater neural processing of emotional high-arousing stimuli with respect to the neutral images (Bianchin & Angrilli, 2012). Perhaps this enhanced response to emotionally-evoking images in women suggests that women would also experience heightened negative emotion to neutral images, signaling an emotional bias that may contribute to risk for socioemotional difficulties. Evidently, psychopathology can result from the overexpression and dysregulation of negative emotions. Understanding gender differences in emotional expression and regulation could

signify one gender being more vulnerable to socioemotional difficulties over another. This knowledge is pivotal in the maintenance of public health and well-being.

### **The Significance of Hyperactivity to Neutral Stimuli**

Most of the above research on gender differences in emotion focuses on emotional responses to emotionally evocative images, such as those depicting threatening scenes. As such, gender differences in these studies can be said to reflect responses to negative stimuli with neutral stimuli (e.g., images) often serving as a baseline. The brain's sensitivity to perceived threats is an innate survival mechanism in humans; however, classifying an unthreatening (i.e., neutral) stimulus as threatening is abnormal and may contribute to psychopathology (Brosschot et al., 2017). Moreover, the Generalized Unsafety Theory of Stress (GUTS) proposes the idea that one's stress response will only be inhibited when safety is detected, regardless of the presence of threat or not. This inability to inhibit the stress response is a hallmark of pathology and could contribute to a failure of emotional regulation (Brosschot et al., 2017). A greater emotional bias to neutral images in women (versus men), which can be conceptualized as a situationally inappropriate response, may explain why women have an increased risk for many psychopathological disorders relative to men. Neutral stimuli are primarily utilized in studies as the control condition when examining responses to negative stimuli. However, these neutral cues may be more than controls, in that gender differences in emotional ratings to the neutral images could suggest an emotional bias indicative of psychopathological risk in one gender over another. For example, Lemaire et al. (2015) found that people with bipolar disorder demonstrated increased affective emotional reactivity to neutral stimuli relative to healthy individuals. Likewise, Abercrombie et al. (2005) investigated the effects of cortisol levels (which are associated with elevated stress and anxiety) on affective response to neutral and negative stimuli.

Ninety normal, healthy men were recruited and assigned to 3 groups regarding drug administration: a placebo group, a 20 mg cortisol group, and a 40 mg cortisol group. Saliva samples were analyzed to assess the association between cortisol levels and psychological measures. The results indicated that the 40mg cortisol group displayed higher levels of arousal to neutral words and pictures than the placebo and 20mg groups. However, cortisol levels were unrelated to the ratings of and the affective self-reported response to negative stimuli (Abercrombie et al., 2005). Being that many anxiety disorders are associated with elevated cortisol levels, those with higher anxiety experience enhanced affective responses to neutral stimuli. The authors additionally concluded that individuals with heightened anxiety show greater amygdala activation to neutral stimuli, as the amygdala is vital regarding the psychological effects of cortisol. Schizophrenia patients have also displayed greater limbic and prefrontal region activation (regions associated with emotional processing) than the control while viewing neutral images. Additionally, those with schizophrenia have rated neutral stimuli as more emotionally significant than healthy individuals (Lakis & Mendrek, 2013) and exhibited brain hyperactivity to neutral stimuli (Potvin et al., 2016) . Regarding gender differences, schizophrenic men exhibited enhanced emotional responses to neutral images than schizophrenic women (Lakis & Mendrek, 2013). These findings support the argument that increased negative emotional response to neutral stimuli implies risk for psychopathology but the gender differences in sensitivity to neutral stimuli may not be as clear.

### **Pandemic Disruption**

While gender differences in emotion may be of critical importance to health across contexts, it may be especially important when individuals face stress. Notably, the profound impact of the COVID-19 pandemic likely exacerbated the pre-existing gender disparity in

emotional experience and psychopathology. The COVID-19 pandemic brought on immense emotional distress and uncertainty to citizens across the globe, whether it was from fear of contracting the infection itself, financial anxiety due to unemployment, intense social isolation, and more. A cataclysmic alteration in the environment will inevitably disturb the internal peace of the individual and the external equilibrium of the environment, thus, the distress induced by the pandemic can manifest in a myriad of ways. Perrin et al. (2009) state that hypervigilance can result from prolonged fear and anxiety; in this case, the pandemic is the stressor inducing this unnecessary yet heightened state of threat assessment. Not only do the drastic societal changes from the COVID-19 pandemic have the potential to exacerbate the mental health of the general population, but the COVID-19 (SARS-CoV-2) infections can also induce neuropsychiatric conditions as a result of the initial infection (Penninx et al., 2022). Regarding the overall impact of the pandemic on the mental health of the population, a sample of about 50,000 individuals from a conglomeration of studies revealed a small yet statistically significant increase in mental health problems. Additionally, the Global Burden of Disease Study, a systematic review reporting the prevalence of depression and anxiety during the pandemic, estimated a 28% increase in major depressive disorders and a 26% increase in anxiety disorders (Santomauro et al., 2021).

The neuropsychiatric consequences in individuals with COVID-19 include milder symptoms like fatigue and impaired sleep to more severe symptoms like cognitive impairment which, in urgent cases, can be characterized by delirium which is experienced in about  $\frac{1}{3}$  of hospitalized COVID-19 patients. Delirium also falls under post-intensive care syndrome, enhancing the patient's susceptibility to sepsis and inflammation which is associated with

cognitive impairment, and thus mental disorders like anxiety, depression, and even psychosis (Penninx et al., 2022).

Does this increased prevalence in mental disorders as a result of the COVID-19 pandemic exacerbate the emotional and psychopathological gender disparity? A meta-analytic effect of women reporting higher rates of mental health problems than men was observed; this effect could be a result of many biological, psychological, or sociological factors. These findings are consistent across research, where Prowse et al. (2021) examine the effect of the COVID-19 pandemic on the mental health of undergraduate students. Out of 366 university students, females experienced greater stress levels and negative mental health consequences from the pandemic. Regarding emotion, women experienced greater negative emotions and fear about health consequences regarding COVID-19 than men (Alsharawy et al., 2021). These results emphasize the dire need to decipher how men and women differ in their emotional responses in order to understand its impact on psychological well-being, including those whose mental health and socioemotional experience is negatively impacted by the COVID-19 pandemic (Prowse et al., 2021).

### **Present Study**

The purpose of this thesis is to examine gender differences in affective ratings to neutral images and their relations to socioemotional difficulties relating to the COVID-19 pandemic. This aim was addressed through the analysis of secondary data. In these data, participants reported their negative emotional experiences to controlled image stimuli depicting threat of bodily harm, threat of infection, or neutral scenes. They also completed a questionnaire that assessed socioemotional disruption by the pandemic. Based on my review of previous literature, I hypothesize that (H1) women will experience more negative emotion (i.e. fear and disgust) than

men in response to all image types: threat of bodily harm, threat of infection, and neutral images. However, this gender difference in negative emotion (i.e., higher fear/disgust in women) will be stronger when rating neutral images compared to threat of bodily harm or threat of infection images (H2). Additionally, I hypothesize that women will experience greater pandemic disruption than men (H3).

## **Chapter 2**

### **Methods**

#### **Participants and Recruitment**

The recruitment process and task administration took place from the Summer of 2021 to the Winter of 2022. Participant responses were recruited via Amazon Mechanical Turk (MTurk), a crowdsourcing marketplace that allows for individuals or groups to outsource their materials. MTurk is a ubiquitous tool in advertising online research studies with the purpose of recruiting and compensating research participants who successfully complete the study task. To warrant the reliability of responses, the majority of the participants had to be “Master Workers”; they were required to have completed over 5,000 HITs and have a 95% or greater HIT approval rate. Eligible participants had to be a United States resident, 18 years of age or older, and have no current or previous diagnosis of anxiety, mood, phobia, or personality disorder which was verified through a screening questionnaire. Another means of eliminating faulty participant responses was the administration of three attention checks throughout the core part of the study (image questionnaire). Additionally, a cutoff for task responses ( $SD < 10$ ) was implemented to induce a voluntary mindset in respondents and screen out the bots and careless responding prior to data analysis. The last eligibility criterion was the input of a valid survey code and proper



responses to the demographic surveys. The final sample consisted of 734 English-speaking adults living in the United States (56.27% male; 83.8% white;  $M_{\text{age}} = 39.57$  years,  $SD_{\text{age}} = 11.12$ ).

### **Procedure**

All study procedures were conducted online through the participants' electronic device of choice. MTurk workers were able to identify the study as a paid research opportunity, listed as a HIT on Amazon MTurk. If the participant was interested, they clicked on the study and proceeded with the eligibility questionnaire where they were redirected to the Penn State Qualtrics platform and provided with the consent form. The remainder of the study transpired within Penn State Qualtrics. If the individuals fit the criteria for eligibility and consented to the study, the Workers were successfully enrolled in the study. The participant was randomly assigned one of three Qualtrics links upon the successful completion of the eligibility questionnaire. The link contained the demographics survey, the COVID-19 pandemic disruption survey, and the affective image rating task. The study procedure occurred in the following order: eligibility questionnaire, demographics survey, pandemic disruption survey, image rating task. The entirety of the study took 1 hour. The participant received a random 5-digit survey code to input into MTurk to receive a compensation of \$6. If the study was completed honestly and entirely, the compensation was electronically delivered through Amazon.

The current study utilized the data collected through the Amazon MTurk study to test hypotheses 1, 2, and 3 listed in "The Present Study" section.

### **Affective Image Rating Task**

The task encompassed 90 trials that were grouped into three conditions: threat of infection, threat of bodily harm, and neutral. Prior to each trial, a crosshair was presented for 500ms followed by an image stimulus for 3000ms. The participants were directed to rate the

image on four statements that measured degrees of fear, disgust, harm, and sickness. The statements read, “The image made me feel scared”, “The image made me feel disgusted”, “The scene and/or object in the image could hurt someone”, and “The scene and/or object in the image could make someone sick”. The first item measured experienced fear, the second measured experienced disgust, the third measured experienced harm risk appraisals, and the last measured experienced sickness risk appraisals. The participants were asked to rate all four statements on a Likert scale from 0 to 100; zero represented “Not at all” and 100 represented “Very much” in the fear and disgust scales. Zero corresponded to “Strongly disagree” and 100 corresponded to “Strongly agree” in the risk of harm and sickness scales. To physically rate the images, the participant dragged a button on the desired rating, with the lowest score being on the left and the highest on the right. The images utilized in the study were derived from Dreamstime and Shutterstock which are companies that provide high-quality stock photographs for public use.

## **Measures**

### **Demographics**

Participants were asked questions about their age, gender, ethnicity, monetary income within the past 12 months, and the highest educational degree earned.

### **Pandemic Disruption**

The participants executed a self-report questionnaire assessing the degree to which emotions and typical social behaviors were disrupted prior to and during the COVID-19 pandemic. These components were represented through 10 statements that the participants rated on a Likert scale of 1-5, with 1 corresponding to “Strongly disagree” and 5 corresponding to “Strongly agree”. A complete list of the items is shown in the Appendix. Of the 10 statements, 9 statements were averaged to develop the construct *pandemic disruption*: a measurement

representing the overall socioemotional difficulties experienced by the participant as a result of the COVID-19 pandemic. One item was removed because it did not sufficiently intercorrelate with the other items, casting doubt on whether the item indexed the single underlying construct of pandemic disruption.

### **Emotional Response**

The degree of fear and disgust were measured via a Likert scale, where the participant selected a number of 0-100 in response to the image types. Zero represented “Not at all [scared/disgusted]” and 100 represented “Very much [scared/disgusted]”.

### **Statistical Analysis**

In order to precisely assess the gender differences in emotional ratings to the image types (H1), only the ratings of fear and disgust were included. Two 2x3 factorial mixed ANOVAs were run to examine the gender differences in the affective emotional ratings of all three conditions: threat of bodily harm, threat of infection, and neutral. The between-subjects factor was Gender (male and female) and the within-subjects factor was Condition (threat of bodily harm, threat of infection, and neutral). Three follow-up t-tests were conducted (one per condition) following each ANOVA to delineate the directionality of the interactions (H1,2). The first ANOVA tested fear and the second ANOVA tested disgust as the dependent measure. An independent samples t-test tested the gender difference in pandemic disruption (H3). Throughout the statistical analysis,  $p < 0.05$  was deemed significant. Participants who identified as “other” as opposed to “male” or “female” were excluded from the present study, as the sample merely contained one individual. This decision was made due to the inability to make statistically significant comparisons between the three gender categories with such a small sample size as “other”. The statements regarding sickness and harm were also excluded from this study, as the

current hypotheses were solely examining emotion. The statistical analyses were conducted using the statistical software, RStudio.

## Chapter 3

### Results

#### Descriptive Statistics

The characteristics of the sample used in this study are presented in Table 1.

#### Mixed ANOVA: Effects of Gender and Condition on Reported Fear

The mixed ANOVA examining fear revealed a statistically non-significant main effect of Gender on fear across all Conditions (i.e., image types),  $F(1, 731) = 2.10, p = 0.15$ . However, there was a significant main effect of Condition (i.e., threat of infection, threat of bodily harm, neutral),  $F(2, 1462) = 952.66, p < 0.001$ . Finally, the mixed ANOVA indicated a statistically significant interaction between Gender and Condition,  $F(2, 1462) = 20.29, p < 0.001$  (see Table 2).

To clarify this interaction, three independent samples t-tests were conducted in each Condition separately: threat of bodily harm, threat of infection, and neutral. The threat of bodily harm t-test revealed a non-significant gender difference in reported fear  $t(731) = -1.69, p = 0.091$ , between females ( $M = 50.63$ ) and males ( $M = 47.30$ ). The threat of infection t-test displayed a significant difference in reported fear  $t(731) = 2.00, p = 0.046$ , with males reporting higher ratings of fear ( $M = 33.07$ ) than females ( $M = 29.22$ ). The neutral t-test exhibited a statistically significant difference in reported fear  $t(731) = 4.08, p < 0.001$ , with males reporting, on average, a higher rating of fear ( $M = 17.44$ ) to neutral images than females ( $M = 11.10$ ) (see Figure 1).

### **Mixed ANOVA: Effects of Gender and Condition on Reported Disgust**

The mixed ANOVA test examining the effects of Gender and Condition on self-reported disgust revealed a non-significant gender difference in the participant reports of disgust across all Conditions,  $F(1, 731) = 0.37, p = 0.54$ . However, there was a statistically significant main effect on Condition (i.e., threat of infection, threat of bodily harm, neutral),  $F(2, 1462) = 1327.59, p < 0.001$ . This main effect was qualified by a statistically significant interaction effect between Gender and Condition,  $F(2, 1462) = 18.29, p = <0.001$  (see Table 3).

To clarify the interaction, three independent samples t-tests were conducted to measure the degree of disgust to each Condition. The threat of bodily harm t-test exhibited a statistically non-significant difference in the reported level of disgust to the threat of bodily harm image stimuli  $t(731) = -0.68, p = 0.49$ , between females ( $M = 37.28$ ) and males ( $M = 36.04$ ). The threat of infection t-test revealed a non-significant gender difference in the reports of disgust to the threat of infection stimuli  $t(731) = -1.61, p = 0.11$ , between females ( $M = 55.89$ ) and males ( $M = 53.35$ ). Finally, the neutral stimuli t-test displayed a statistically significant difference in self-reported disgust  $t(731) = 4.15, p = <0.001$ , with males expressing greater disgust to neutral images ( $M = 16.93$ ) than females ( $M = 10.63$ ) (see Figure 2).

### **Independent Samples T-Test Measuring the Gender Differences in Pandemic Disruption**

An independent samples t-test was conducted to compare the pandemic disruption in males ( $M = 3.47$ ) versus females ( $M = 3.48$ ). The results displayed a non-significant effect for gender on pandemic disruption  $t(8794) = 0.50, p = 0.62$  (see Figure 3).

## Chapter 4

### Discussion

The purpose of this study was to examine the gender differences in the affective ratings to three types of image stimuli and its relation to socioemotional difficulties associated with the COVID-19 pandemic. A crucial feature of the study was to delve into the gender differences in emotional response to neutral stimuli, as perceiving seemingly neutral stimuli as threatening can be indicative of emotional dysregulation (i.e., various forms of psychopathology). Overall, men exhibited greater negative emotion to neutral images than women and there was no gender difference in experienced pandemic disruption.

#### *Hypothesis 1. Women Will Experience Greater Negative Emotions to Images than Men*

The results of the present study partially support my first hypothesis that women will experience more negative emotion (i.e., fear and disgust) than men in response to all conditions: threat of bodily harm, threat of infection, and neutral images. Regarding the fear responses to the image stimuli, the only image type that elicited higher fear expression from females than males was threat of bodily harm, although the difference was not significant. The other two conditions, threat of infection and neutral, revealed significant gender differences in fear reports, with males providing higher scores. As for the disgust responses to image stimuli, there was no gender difference in reported disgust to threat of bodily harm and threat of infection. Moreover, there was a significant gender difference in the disgust ratings to neutral stimuli, with males reporting greater disgust to neutral images than females. Contrary to the initial hypothesis, men expressed more negative emotion to the neutral stimuli than women. More generally, it was unexpected that men experienced more negative emotion than women to any condition.

*Hypothesis 2. The Gender Difference in Negative Emotion is Greatest in Response to Neutral Images than Threat of Infection Images and Threat of Bodily Harm Images, Respectively*

The results of this study partially align with this hypothesis, in that the gender difference in negative emotional response to neutral stimuli was of the greatest magnitude, followed by the threat of infection stimuli and threat of bodily harm stimuli. However, the results are contrary to my directional prediction that women would have higher ratings of fear and disgust to neutral images than men.

*Hypothesis 3. Women Will Experience Greater Pandemic Disruption Than Men*

The results of this study reveal that there is no significant gender difference in pandemic disruption.

### **Potential Explanations**

The gender differences in emotion remain a largely complex concept, as there are various biological, psychological, and social factors that contribute to these differences. A plethora of prior research finds that, generally, women express greater negative emotion than men (Deng et al., 2016). However, these findings may not represent a universal phenomenon. There are endless confounding variables contributing to gender differences in emotion, including individual personality, gender roles, social context, and familial/cultural upbringing. Thus, it is crucial to note the potential reasons behind men expressing greater negative emotions than women in not only the neutral stimuli, but also greater fear of the threat of infection stimuli in this study.

The first reason to account for is the power and influence of gender roles in society. The expression of positive emotions like happiness, excitement, and sensitivity are expected of- and desired for in women while the suppression of negative emotions like fear and anger are expected of- and more desired for in men (Lewis & Haviland-Jones, 2008). This incessant

pressure to conform to society's conjectures could often only apply depending on the environment. For instance, in a study done by Zeman & Garber (1996), children were more likely to express negative emotions alone or in the presence of a parent or guardian over a peer or unknown audience. This finding supports the argument that individuals' emotional expressivity is additionally driven by interpersonal interaction and the expectation of the present environment (Zeman & Garber, 1996). Being that the current study was completely online (via Amazon MTurk) and the participant was most likely alone while completing the task, it is probable that the societal expectations of gender roles did not apply. Perhaps, men expressing greater fear and disgust to neutral images and greater fear of threat of infection images could be due to the isolated environment and thus, lack of social pressure from others.

A concept in support of men expressing more negative emotion than women is the *Tend and Befriend Theory* versus the fight-or-flight stress response. Tend-and-befriend, defined by Taylor et al. (2000), is the inclination to tend to offspring and seek out the social support of others in direct response to threat. The authors propose, from an evolutionary perspective, that the predominant stress response in females is tend-and-befriend, as the woman was designated to foraging and caring for young while the man was assigned to protect and hunt (Taylor, 2012). Moreover, it is suggested that the "fight" aspect of fight-or-flight would pose physical danger to the mother and her offspring while the "flight" would be hindered by pregnancy or the caretaking role (Taylor et al., 2000). As such, it is noted that females are better adapted to experience tend-and-befriend and males are more adapted to experience fight-or-flight in response to imminent stress. In males particularly, the presence of androgens are responsible for development of the aggressor portion of the brain, where higher testosterone levels are associated with heightened expressivity of aggression, hostility in relation to acute physical and



psychological stress, and activation of the sympathetic nervous system (i.e., heightened cortisol levels) (Taylor et al., 2000). The neuroendocrine underpinnings in the stress response differ in females, however, as females exhibit lower levels of androgens and testosterone but higher levels of oxytocin than males. Oxytocin, a posterior pituitary hormone, is associated with the parasympathetic nervous system which promotes tranquility, reduced fear, and social affiliation tendencies. Moreover, Uvnas-Moberg et al. (1993) found that, in rats, oxytocin acts to inhibit the sympathetic nervous system and generate the opposite of the fight-or-flight response. Although these findings are not exactly replicated in humans, oxytocin, which is highly modulated by the presence of estrogen (the female sex hormone), has been found to pose homogenous effects on fear and anxiety reduction (Uvnas-Moberg et al., 1993). Ultimately, it is possible that the male tendency to exhibit fight-or-flight and the female tendency to exhibit tend-and-befriend is reflective of men expressing greater threat-related negative emotion (i.e., disgust and fear) than females in the context of this study. Perhaps, measuring the physiological response, such as cortisol and oxytocin levels, in the participants of the current study would provide a sensible explanation behind the results.

Another explanation behind the unexpected results could be the fact that Amazon MTurk does not disclose the geographical location of the participant while completing the image-rating task. The danger of this non-disclosure is the risk of the sample being confined to a narrow geographical location. Perhaps, the majority of the male participants in the study reside in a U.S. state that is more culturally accepting of men expressing “sensitive” emotions like fear, disgust, and anxiety which could potentially be a reason for men exhibiting more negative emotions to image stimuli than women, for the most part, in this study. A narrow geographical location also

poses the risk of sampling bias, as this is not representative of the general population across all regions of the United States.

As seen in the results of the current study, men reported significantly higher ratings of fear and disgust to neutral stimuli than women, antithetical to the original hypothesis and contrary to the majority of previous literature. However, another reason behind these unexpected results could be due to the fact that the bulk of prior studies examining the gender differences in emotion occurred prior to the COVID-19 pandemic, whereas the sample from the current study completed the image-rating task during the COVID-19 pandemic. It is inevitable that upon a global disease outbreak, the lives of the general public are substantially affected, from social isolation to economic instability to the imminent threat of contracting the disease itself. All of these determinants play a crucial role in the induction of emotional distress and the alteration of every-day behaviors in individuals. Stevenson et al. (2021) found that university students during Australia's COVID-19 pandemic lockdown displayed increased disgust sensitivity and perceived vulnerability to disease than a control cohort of earlier university students. Heightened negative responses as a result of the pandemic prevail across research, where Asmundson (2020) defines "COVID Stress Disorder" as a multifaceted ailment consisting of infection/threat-related fear, trauma, and obsessive behaviors experienced during and as a result of the pandemic. Discernibly, the pandemic is renowned for eliciting greater negative emotions and behaviors in the general public. Although prior literature denotes women expressing more negative emotion than men, the COVID-19 pandemic could explain why men expressed greater negative emotion to neutral stimuli in the context of this study.

This gender discrepancy in the negative emotional response to neutral images poses many implications for socioemotional difficulties such as negative experiences due to the pandemic as

described above, but also the risk of psychopathology in general. This significant negative response to neutral stimuli could be indicative of hypervigilance at play, where the individual is seeking for/experiencing a sense of threat that is not actually present. The overall stressors induced by the pandemic could be a reason for this and/or due to men being at more risk for hypervigilant behaviors and psychopathological disorders than women in certain contexts. In addition to previous findings confirming that women express more negative emotion than men, a plethora of prior studies suggest that there is generally a greater prevalence of mental illness in women than in men (Afifi, 2007). However, there is a growing concern in the underdiagnosis of mental illness in men, especially depression. Not only do men report far fewer depressive symptoms than women, but they practice fewer help-seeking behaviors, thus leading to the underdiagnosis (Call & Shafer, 2015). Perhaps, men are more at risk for mental illness than is currently known, and this heightened response to neutral stimuli could be an implication of this.

The gender difference in emotional expression is far more complicated than the ubiquitous stereotype that “women are more emotional than men”. A renowned misconception that society succumbs to is this one-dimensional definition of emotionality, where women are emotional and men are rational, emotionality is equivalent to relationality, and emotionality is the sum of all emotions (Fischer, 1993). A crucial feature to acknowledge in this shared definition is its failure to account for sociocultural context, which has been shown to heavily influence emotional experience and expression (Fischer, 1993). The bulk of previous literature has shown that, overall, women express more emotion than men. Specifically, women are more willing to manifest vulnerability, sadness, and fear, whereas men are more prone to suppress these emotions. However, these gender differences may be a function of socialized gender roles and are not representative of true sex differences. A potential conclusion could be made that men

and women possess comparable emotional experience, but the self-perceived stereotype drives the heightened emotional expression in women in most instances (Fischer, 1993). The gender differences in emotion are a complex interplay of biological, psychological, and social factors, heavily based on environmental context and individual experience. Thus, it is impossible to deduce a stationary conclusion that one gender is more emotional than the other.

The effects of the current study could be further explained by sex differences as opposed to solely gender. For instance, Chaplin et al. (2008) found that, in response to emotionally arousing stimuli, men experience higher blood pressure and cortisol levels than women. Regarding the effect of cortisol on emotion, the study of Wirth et al. (2011) revealed that those administered cortisol exhibited greater negative affect to neutral and unpleasant images. Evidently, it appears that cortisol is directly associated with negative emotional experience and expression. Antithetical to the gender stereotype that women are more emotional than men, the majority of prior literature reviewed by Chaplin et al. (2008) suggests that men manifest greater physiological biomarkers associated with emotion than women. Moreover, some prior research suggests that there are no significant sex differences in the autonomic response to fear. Thus, the notion women experience more fear than men could hold untrue (Chaplin et al., 2008).

### **Limitations and Future Direction**

The present study has a few limitations. Firstly, a crucial distinction to note when studying the gender differences in emotion is emotional experience versus expressivity; experience is defined as the degree of arousal evoked by how an individual comprehends a situation (Nogueira, 2014) while expressivity comprises the physical, visible behavioral changes that coincide with emotion (Gross et al., 2000). The experience and expressivity of emotion varies across individuals and may or may not cofunction to exhibit expressivity depending on the

type of emotion. Gross et al. (2000) examined this relationship through two consecutive studies and ultimately found that experience and expressivity work together to elicit a response for negative emotion but not positive. This result additionally held true for both sexes. The implications of both studies suggest that individuals with low expressivity may automatically suppress their emotions or be consciously aware of their emotional regulation. These particular findings must be considered when examining affective emotional responses to stimuli, as expressivity varies across the individual, whether that be a positive or a negative emotion. However, because the present study solely involves self-reported emotional responses to threat of infection, harm, and neutral images and does not measure physiology, the results only measure subjective emotional experience. Thus, emotional experience resides beyond the scope of this analysis.

Additionally, self-reported data threatens the validity of participant responses, as participants are vulnerable to response bias, specifically social desirability bias. Social desirability bias refers to the deliberate alteration of responses by the participant in order to appease the social norm (Furnham, 1986). Beyond the desirability effects, measuring the physiology of the sample along with the affective ratings could convey a clearer depiction of the emotional responses to the images in the task. Lang et al. (1993) assessed whether reports of certain emotions (e.g., fear and disgust) corresponded to respective physiological patterns. Physiology was measured by somatic (facial muscle responses) and visceral (heart rate and skin conductance) responses. The facial muscle responses were measured by the zygomaticus major which indicates positive affect (e.g. smiling) and the corrugator supercilii which indicates negative affect (e.g. frowning). Participants labelled the most unpleasant images as “disgusting” which were associated with increased zygomaticus major and corrugator supercilii muscle

activity. However, images that were labelled as “fearful” elicited even smaller corrugator supercillii activity than the reported low pleasure ratings by the participants. Relaxation of the corrugator supercillii muscles is representative of a fearful facial expression, thus indicating that the sample could generally be experiencing greater fear than reported. In terms of visceral response, disgusting images produced a reduced heart rate and increased skin conductance. Additionally, the degree of skin conductance to happy images was not consistent; erotic images generated greater skin conductance than human baby images (Lang et al. 1993). These results align with the idea that emotional response is not simple and that self-reported emotion and physiological response do not always directly agree. Additionally, self-reported data is characteristic of conscious processing of emotion whereas physiological data could capture non-conscious elements of the participant (Lang et al. 1993) which is crucial in gaining a comprehensive understanding of the gender differences in emotion.

Utilizing Amazon MTurk as the sample also poses a few drawbacks. Firstly, MTurk workers may not be completely representative of the general population, as they evidently all have access to and are comfortable with technology. This could imply that they most likely are of higher socioeconomic status and do not have intellectual disabilities or severe mental illness (which could impede technological fluency) (Chandler & Shapiro, 2016). Moreover, the mere participation in the study implies that the sample generally has free time which could influence the degree of fear and disgust reported in response to the images. Being that leisure time is associated with reduced overall stress and cortisol levels (Ewert & Chang, 2018), it could be that the MTurk sample reported lower negative emotion than the general population.

An aspect of the demographic that further threatens the representation of this study is the fact that the sample was majority white (83.38%). Emotional experience is a multifaceted

phenomenon and could vary across races. The results of preliminary research consistently show emotional dysregulation as a result of race-related stress and trauma in racial minorities (Roach et al., 2023). Furthermore, the risk for and manifestation of psychopathology, which is an implication of these emotional differences, also varies across races. While prior research supports the claim that white are more likely to endure acute depressive episodes, racial and ethnic minorities are more likely to experience severely debilitating and chronic depressive episodes that poorly influence daily quality of life (Bailey et al., 2019). Additionally, reactivity to environmental stressors may differ by race. For instance, studies have revealed ethnic minorities possessing greater psychological and physiological reactivity to stressful events than white people (Meyers & Hwang, 2004). Such differences continued to manifest during the COVID-19 pandemic; people of color reported higher rates of stressors and emotional affliction than white people (Bui et al., 2020). It is likely that a more ethnically representative sample would influence the self-reported fear and disgust, potentially contributing to higher ratings in minority ethnic and racial groups than white people.

Another critical aspect to acknowledge is the distinction between sex and gender. The term “sex” is typically defined by the biologically assigned features (i.e., reproductive organs) that deem an individual male or female, whereas gender usually refers to the social construct of masculine or feminine characteristics and the individual’s self-representation of male, female, or other (Mazure, 2021). The present study does not account for the biological sex of the participant, as gender is merely identified through the demographics survey with the question, “what is your gender?”, not “what is your biological sex?”.

Further research must be done to account for emotional experience and biological sex in order to assess the gender differences in emotion on a more holistic, scientifically sound level.

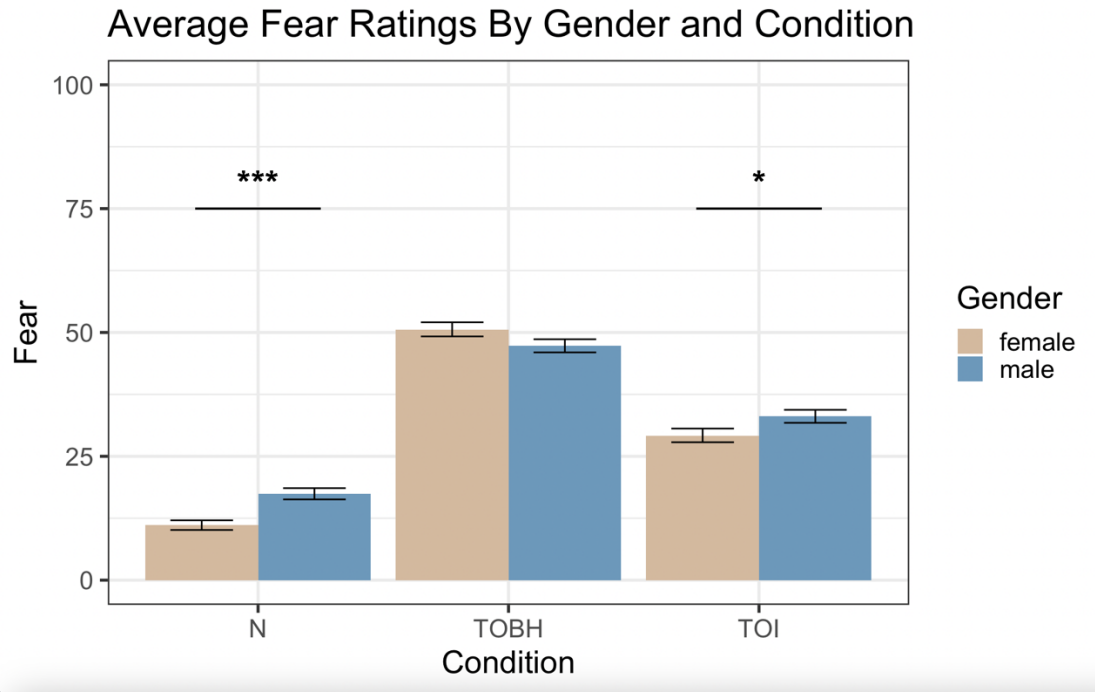
## **Conclusion**

My research suggests that, in the current sample, men report greater fear and disgust to neutral stimuli than women. Additionally, men and women are characterized by comparable levels of socioemotional disruption by the pandemic. The findings suggest that it may be necessary to consider the gender differences in the negative emotional responses to neutral stimuli when attempting to understand risk for psychopathology. There is a desperate need for not only the clinical communities, but society as a whole to recognize these differences so the proper gender-specific etiological models and treatments are designed and implemented. Such factors could minimize the prevalence of mental illness and enhance the overall health and well-being of the population.



### Figures

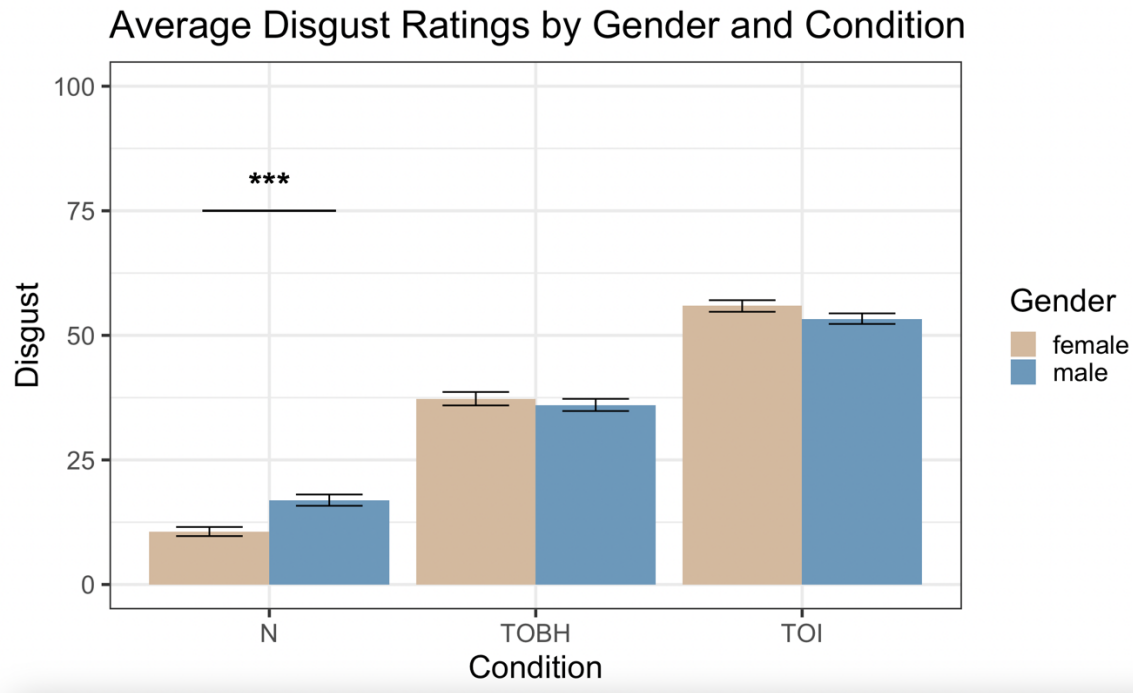
**Figure 1. Average Fear Ratings by Gender and Condition**



*Note.* N = neutral images, TOBH = threat of bodily harm images, TOI = threat of infection images

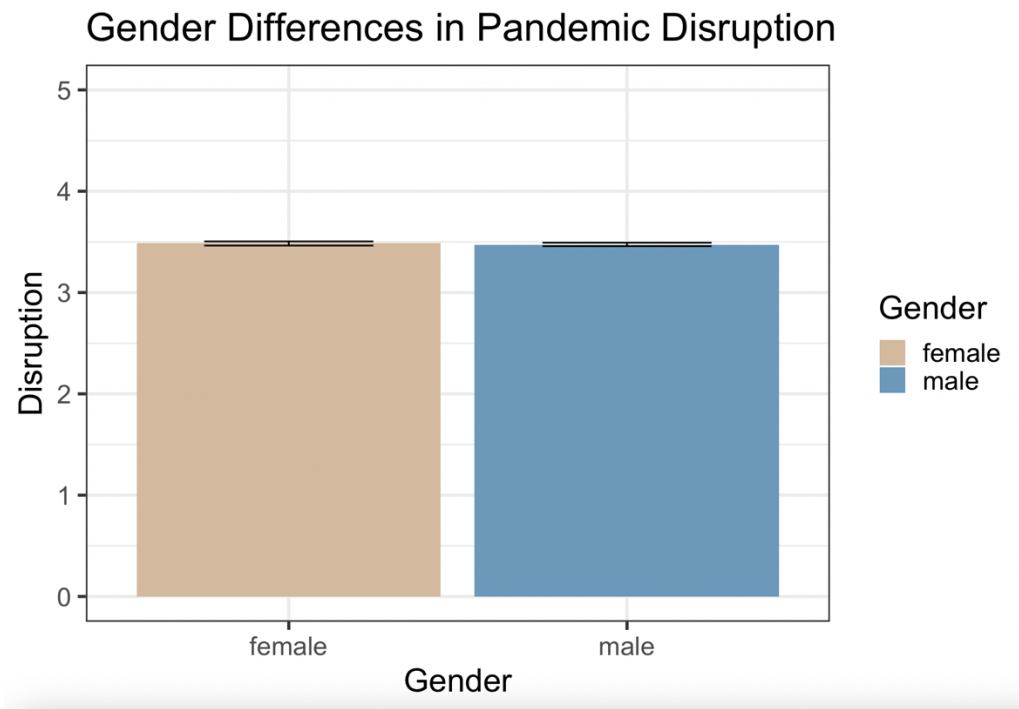
\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .005$

**Figure 2. Average Disgust Ratings by Gender and Condition**



*Note.* N = neutral images, TOBH = threat of bodily harm images, TOI = threat of infection images

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .005$

**Figure 3. Gender Differences in Pandemic Disruption**

## Tables

**Table 1. Descriptive Statistics for Participant Characteristics**

Variable	N	Mean	SD	Min	Median	Max
Age	734	39.57	11.12	18	37	78
Gender						
Male	413	56.27%				
Female	320	43.6%				
Non-binary	1	0.14%				
Race						
White	612	83.38%				
Non-White	122	16.62%				
Ethnicity						
Not Hispanic	652	88.83%				
Hispanic	82	11.17%				
Income						
less than \$5,000	27	3.68%				
\$5,000-\$11,999	50	6.81%				
\$12,000-\$15,999	30	4.09%				
\$16,000-\$24,999	74	10.08%				
\$25,000-\$34,999	114	15.53%				

\$35,000-\$49,999	140	19.07%
\$50,000-\$74,999	182	24.8%
\$75,000-\$99,999	89	12.13%
\$100,000 and greater	28	3.81%

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Education	734	
High school diploma or equivalency (GED)	2	0.27%
Associate degree (junior degree)	135	18.39%
Bachelor's degree	86	11.72%
Master's degree	385	52.45%
Doctorate	108	14.71%
Professional (MD, D, DDS, etc.)	18	2.45%

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Prior COVID

Diagnosis

No	597	81.34%
Yes	137	18.66%

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Pandemic Disruption	734	3.48	0.87	1	3.67	5
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**Table 2.***ANOVA Results Testing the Effects of Gender and Condition on Reported Fear*

Predictor	<i>F</i>	<i>df</i> <sub>Num</sub>	<i>df</i> <sub>Den</sub>	<i>SS</i> <sub>Num</sub>	<i>SS</i> <sub>Def</sub>	<i>p</i>	$\eta^2_g$
gender	2.10	1.00	731.00	2826.69	98526	0.15	0.00
					3.40		
condition	952.66	2.00	1462.00	425770.	32670	<0.001	0.25
				06	2.60		
gender x condition	20.29	2.00	1462.00	9068.46	32670	<0.001	0.01
					2.60		

**Table 3.***ANOVA Results Testing the Effects of Gender and Condition on Reported Disgust*

Predictor	<i>F</i>	<i>df</i> <sub>Num</sub>	<i>df</i> <sub>Den</sub>	<i>SS</i> <sub>Num</sub>	<i>SS</i> <sub>Def</sub>	<i>p</i>	$\eta^2_g$
gender	0.37	1.00	731.00	378.54	742909.	0.54	0.00
					80		
condition	1327.59	2.00	1462.00	597093.	328772.	<0.001	0.36
				30	90		
gender x condition	18.29	2.00	1462.00	8224.59	328772.	<0.001	0.01
					90		

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## Appendix

### *Pandemic Disruption Statements*

1. Since the COVID-19 pandemic, I have felt more anxious than usual.
2. Since the COVID-19 pandemic, I have been less social than usual.
3. Since the COVID-19 pandemic, I talk to strangers less.
4. Since the COVID-19 pandemic, I have felt more uneasy around people than usual.
5. Since the COVID-19 pandemic, I have been more likely to avoid physical contact with other people.
6. Since the COVID-19 pandemic, I have worked from home more often.
7. Since the COVID-19 pandemic, I have felt more stressed than usual.
8. Since the COVID-19 pandemic, I have felt more lonely than usual.
9. Since the COVID-19 pandemic, I take less risks than usual.
10. Since the COVID-19 pandemic, I am more worried that I will get sick.

## Academic Vita

# Madeline Brodsky

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### EDUCATION

**Pennsylvania State University, Schreyer Honors College** - State College, PA      May 2023  
Bachelor of Science in Health and Human Development

**Major:** Biobehavioral Health

- Dean's List
- Distinguished Member of Phi Eta Sigma
- Recipient of President Sparks Award
- Recipient of President's Freshman Award
- Member of Schreyer for Women
- Member of Pre-Physician Assistant Club
- Member of Kappa Alpha Theta Women's Fraternity
- Study abroad: Barcelona, Spain (January 2022 - April 2022)

### CLINICAL/RESEARCH EXPERIENCE

**The Pennsylvania State University,**      August 2022-Present  
**Department of Biobehavioral Health**

*Undergraduate Research Assistant in the Stress Psychophysiology Laboratory*

*Principle Investigator:* Dr. Derek Spangler

- Administered electrocardiographies and impedance cardiographies to acquire physiological data through Acknowledge computer software
- Cleaned secondary data on emotional response to image stimuli for honors thesis
- Recruited and scheduled participants through flyer postings and official laboratory emails
- Ran participant sessions in Threat of Infection and Heart Rate Variability-Cannabis Studies

**New England Institute of Neurology and Headache** - Stamford, CT      June 2022-August 2022

*Medical and Research Assistant Intern*

- Acquired vital signs training: blood pressure, temperature, height, and weight
- Took vital signs of new and follow-up patients for baseline measurements
- Shadowed/assisted neurologists and physician assistant in lumbar punctures, cosmetic/migraine botox, skin punch biopsies
- Mentored by research assistants on examining protocols and disposing of expired lab kits
- Observed care of at least 5 migraine and stroke patients per day by shadowing research assistants

**ONS Physical Therapy** - Mamaroneck, NY      June 2021-August 2021

*Orthopedic Surgeon Shadow*

- Observed orthopedic surgeon's daily duties: interactions with patients, simple procedures, recording patient notes
- Conducted research on responsibilities of an orthopedic surgeon

- Cultivated knowledge on typical ailments of orthopedics including osteo- and rheumatoid arthritis

### **WORK EXPERIENCE**

#### **Bedford Post Inn**

June 2019-August 2019

##### *Hostess*

- Managed reservations, recorded and distributed messages throughout the workplace, sat customers
- Strengthened my social skills by interacting and working with an array of people
- Adapted to working under pressure in a hospitality setting

#### **Pound Ridge Aquatic Facility**

June 2017-August 2019

##### *Lifeguard*

- Enforced pool regulations, warned swimmers of improper activity or behaviors, administered first aid in event of injury
- Augmented communication skills, alertness, collaborative abilities

### **SKILLS/INTERESTS**

\* GCP Certified \* Basic Language Skills: Spanish/French \* Microsoft Office Suite \* RStudio \* Skiing \*