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Sick of deviants: How the behavioral immune system may impact responses to violated norms

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SICK OF DEVIANTS:

HOW THE BEHAVIORAL IMMUNE SYSTEM MAY IMPACT RESPONSES TO VIOLATED NORMS

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

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ABSTRACT

In order to protect themselves from harmful pathogens, individuals have evolved a behavioral immune system (BIS) that is sensitive to disease cues (Schaller, 2006). At the cultural-level, there are variations in norms based on the prevalence of pathogens within a region (Schaller & Murray, 2008). Previous findings support the notion that the BIS promotes conformity (Murray & Schaller, 2012; Murray, Trudeau, & Schaller, 2011; Gelfand et al., 2011), as this produces an environment that is more protected against harmful pathogens. The current study attempted to provide experimental evidence for increased punishment for norm violations when the BIS was activated. Seventy-six participants were exposed to one of three photosets that were designed to elicit either BIS activation, general threat arousal, or a neutral affect. After viewing the photoset, participants took part in a fixed artificial group task in which fairness norms were violated. It was hypothesized that participants who were exposed to BIS activation would be more likely to reject unfair offers within that task. A main effect of offer fairness was found, where the more unfair an offer was, the more likely participants were to reject it. However, no significant interaction between prime and offer fairness emerged. This effect was neither moderated nor mediated by a measurement of perceived sensitivity to disease. Treating reaction time as the dependent variable, exploratory analyses revealed a similar main effect of offer fairness. Similarly, no significant interaction between prime and offer fairness emerged with reaction time as the dependent variable. Collapsing the BIS activation and general threat arousal groups did yield a moderately significant interaction between prime and offer fairness, suggesting that general threat arousal may

play a role in responses to norm violation. Further exploratory findings and alternative explanations are discussed.

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INTRODUCTION

Avoiding Potential Illnesses

One of the largest threats to a person's survival is infection from harmful pathogens. History is full of examples of plagues and epidemics that have wiped out considerable proportions of the global population. Motivation to prevent the spread of harmful illnesses has led to government departments dedicated to understanding more about diseases at the local, state, and national levels across different countries. These efforts to better understand and prevent the spread of disease have reduced the amount of deaths related to disease; however, illness still is a threat to human existence. From April 2009 to April 2010, the spread of H1N1 (also known as swine flu) infected approximately 61 million people in the United States alone (Centers for Disease Control; CDC, 2014). Additionally, cases of mumps have drastically increased in the United States, with 229 reported cases in 2012 to 5,311 in 2016 (CDC, 2017). On the more fatal end of the spectrum, Ebola outbreaks have spread across West Africa, infecting 28,616 individuals and claiming 11,310 lives in 2014 alone (CDC, 2016).

In order to protect themselves from disease, people engage in many preventative actions that reduce infectious pathogen transmission. A modern example of this pathogen prevention can be seen in the design of public restrooms. There are toilets that flush themselves, sinks and paper towel dispensers that are activated by a sensor, and handles that allow people to open the door with their feet. All of these features offer the opportunity for someone to walk in and out of the restroom without laying a hand on a

potentially infected surface, and therefore reduce the risk of acquiring harmful pathogens left behind by someone else. In cases where a sink and soap are not available, the advent of alcohol-based hand sanitizer allows users to disinfect their hands.

Despite more opportunities than ever to quash the spread of harmful pathogens, people still transfer illness to one another. Fortunately, humans do possess a physiological immune system (PIS) that works to fight off infection; however, the PIS may not be the only adaptation that has evolved in response to harmful pathogens. Given this long-standing relationship between disease and people, it seems reasonable that disease has impacted human psychology. Schaller (2006) proposed that humans have evolved a behavioral immune system (BIS) that acts as a line of defense against perceived pathogen threats in order to avoid enacting the PIS. The BIS encompasses a set of emotions, cognitions, and behaviors that work to detect and avoid disease. Thus, the BIS conserves resources by reducing the use of the PIS.

The Physiological Immune System: An Imperfect System

Activation of the PIS can be costly, and these costs can be both immediate (i.e., directly related to activation) and long term (i.e., related to genetic predisposition; Zuk & Stoehr, 2002). Short-term consequences include resource expenditure that is a direct result of PIS activation. Mice that have their PIS activated consume more oxygen than mice that have not had their PIS activated (Demas, Chefer, Talan, & Nelson, 1997); birds that have their PIS activated feed their offspring less (Råberg, Nilsson, & Ilmonen 2000), expend more energy, and experience more weight loss (Ots, Kerimov, Ivankina, Ilyina, & Horak, 2001) than birds that do not have their PIS activated; bees that have their PIS

activated are more likely to die when starved than bees that have not had their PIS activated (Moret & Schmid-Hempel, 2000). Aside from these specific outcomes, PIS activation within organisms expends a high amount of energy in general that could be spent on other functions, such as reproduction (Klein & Nelson, 1999)

In addition to the immediate effects of PIS response, there are long-term costs associated with increased resistance to disease. Biologists have documented that some plants with disease-resistant alleles are smaller and less reproductively fit compared with the same plants that do not contain those disease-resistant alleles (Brown, 2003); chickens that are bred for increased disease resistance have lower testosterone levels and develop smaller combs than randomly bred chickens (Verhulst, Dieleman, & Parmentiers, 1999); moths bred for increased disease resistance experience longer development times and decreased egg viability than other moths (Boots & Begon, 1993). Therefore, utilizing the PIS is not only immediately costly; there are also long-term evolutionary consequences in building resistances to disease.

Aside from using up resources, employment of the PIS can actually leave a person temporarily *more* vulnerable to disease. For example, in response to an invasion of harmful pathogens, both pro- and anti-inflammatory cytokines (i.e., small proteins inside the body) are employed. However this pro-inflammatory response temporarily leaves individuals more susceptible to illness (Le Vine, Koeningsknecht, & Stark, 2001). Within a healthy immune system, over stimulation of cytokine production can lead to a potentially fatal “cytokine storm,” which can cause tissue and organ damage even in non-fatal cases (Ferrara, Abhyankar, & Gilliland, 1993).

In addition to the costliness of the PIS, pathogens are constantly evolving, leaving the PIS at a disadvantage (van Vugt & Park, 2009). Given the imperfect nature of the PIS, a separate evolved system that works to avoid pathogens in the first place seems adaptive.

The Behavioral Immune System

The BIS refers to the behaviors, cognitions, and emotions that occur in response to perceived disease cues (Schaller, 2006). These cues can encompass a wide variety of perceptions that often elicit disgust in individuals, and may include offensive odors, unsightly blemishes on others, and behaviors performed by others that may imply illness (e.g., sneezing, coughing, a runny nose). When confronted with these cues, this system is activated. Upon activation, the perceiver may experience the emotion of disgust, followed by thoughts and behaviors that are consistent with avoiding disease. Consider a scenario where someone sneezes into their hand, and neglects to sanitize it. Others within view would likely experience some level of disgust, and in reaction to this event, most would likely avoid shaking hands with the sneezer if given the opportunity.

There is behavioral evidence for this relationship between disease cues and avoidance within the animal kingdom. Sheep avoid eating patches of grass where they have previously expelled waste (Cooper, Gordon & Pike, 2000), and female mice both detect and discriminate against infected male mice when looking for a mate (Kavaliers & Colwell, 1995). Additionally, there is a large body of evidence that suggests that many organisms will ostracize one of their group members if it presents signs of infection (see Neuberg, Kenrick, & Schaller, 2011, for a review). Chimpanzees, which are closely

related to humans, serve as a key example of this phenomenon, as they react violently towards other chimpanzees that show signs of illness (Goodall, 1986). If this type of behavior is observed among many other organisms, especially in species so closely related to humans from an evolutionary sense, it is reasonable to contest that humans may also operate under a system that is devoted to detecting and avoiding harmful pathogens.

Considering humans, there is evidence to support this proposed relationship of avoidance in response to disease cues. Extraversion is often characterized as a desire to be around others and thriving within social situations, whereas openness can be explained by a person's interest in experiencing novel events. Both of these traits can be highly beneficial in a safe setting, but they can also present negative consequences. Being socially gregarious is likely to put a person in contact with more people, which increases the chances that they will encounter an infected person. Having a desire to take risks and insert oneself into unfamiliar situations may also lead to situations that pose disease threat.

Correlational findings suggest that there are global patterns of avoidance behaviors and personality traits related to disease presence. Research utilizing a global sample has found that, historically, disease prevalence is negatively associated with extraversion and openness to experience (Schaller & Murray, 2008). Additionally, manipulating BIS activation and observing self-reported personality traits produces results consistent with disease-avoidance (Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010). Following a slideshow containing pictures and information regarding disease transmission, participants self-report less extraversion than participants who view

a slideshow containing architecture (Study 1). Furthermore, among those exposed to disease cues, a negative relationship emerges between perceived vulnerability to disease and self-reported openness to experience. Also demonstrating social avoidance following disease cues, McCarthy and Skowronski (2014) discovered that participants with an activated BIS avoided making social inferences about others, a process that facilitates social interaction, in comparison to participants who experienced neutral and threatening cues. Therefore, under the influence of an activated BIS, people are motivated to avoid situations that could involve increased risk of disease, and therefore participants exposed to disease cues consider themselves less socially gregarious and less interested in unfamiliar situations.

Observed body language in response to BIS activations also provides support for the notion that BIS activation is linked to avoidant behavior (Mortensen et al., 2010). After viewing the same disease cues described above, participants performed a task where they viewed faces and identified shapes. Shape identification required arm extension or contraction in order to press a corresponding button. Participants who experienced the disease primes were quicker to identify shapes that required arm contraction compared to those who viewed the control primes (Study 2). Therefore, participants with an activated BIS reacted in a more avoidant manner, as they were quicker to respond to shapes that required them to withdrawal from the stimulus following the picture of a face.

Similar to the PIS, the BIS process of disease-threat detection and avoidance behavior does not come without consequences. In order for such a system to be effective,

it must be conservative in that the likelihood of false-negatives (i.e., not detecting a disease threat when a disease threat is present) is reduced. However, this increases the likelihood of a false-positive (i.e., the detection of disease threat when there is no disease threat present). Unfortunately, false positives are not limited to misidentification of food that is believed to be spoiled and animals that are believed to be rabid.

False-positive detections can include humans, which in turn leads to discrimination toward individuals with physical appearances that deviate from what is considered normal. Individuals who believe themselves to be highly sensitive to disease report more negative attitudes toward obese people (Park, Schaller, & Crandall, 2007), less interaction with disabled others (Park, Faulkner, & Schaller, 2003), and less positive implicit cognitions about unfamiliar foreign immigrants (Faulkner, Schaller, Park, & Duncan, 2004). Similarly, women who are in their first trimester of pregnancy experience a compromised immune system, which is correlated to heightened disgust sensitivity (Żelaźniewicz & Pawlowski, 2015), and higher reports of xenophobia and ethnocentrism (Navarrete, Fessler, & Eng, 2007). Therefore, those who perceive themselves as being more vulnerable to infections are more likely to act in a discriminating manner towards those who have appearances that are different than the norm, even when those marginalized groups do not pose a greater risk of disease.

Furthermore, BIS activation among those that believe themselves to be especially vulnerable to disease (as indicated by a measure of perceived vulnerability to disease) also leads to discrimination. People who both indicate that they are particularly vulnerable to disease and are primed with disease cues report more implicit ageism

(Duncan & Schaller, 2009) and are less likely to endorse policies favoring unfamiliar immigrants than familiar immigrants (Faulkner et al., 2004). So while the BIS is beneficial in protecting individuals from disease, it consequentially promotes avoidance of those with appearances that deviate from the norm, even if others with those deviations do not pose a greater risk of infection. These false-positive responses both highlight the consequences of the BIS and support the assumption that when this system is activated, avoidance of perceived threats follows.

Distinguishing Disease Threats from Other Threats

It could be argued that disease cues cause general threat arousal and are no different from other, shocking stimuli. In other words, the results that are often attributed to the BIS may just be results of general threat arousal. Differentiating between these two hypotheses, researchers have demonstrated PIS responses as a result of BIS activation. Male participants primed with images that elicit disgust experienced a greater rise in indicators of PIS response (i.e., body temperature, TNF-a, and albumin) compared to males who viewed images that were either neutral or elicited negative affect (Stevenson, Hodgson, Oaten, Barouei, & Case, 2011; Stevenson et al., 2012). Pictures illustrating disease promote a more aggressive immune response (i.e., increased cytokine production) than do pictures of individuals wielding guns (Schaller, Miller, Gervais, Yager, & Chen, 2010). These studies provide evidence for the notion that disease cues have an effect beyond that of ordinary threat arousal. These cues appear to actually produce a PIS response. Additionally, compared to other men, men with biological indicators of a strong PIS (i.e., high testosterone levels, low cortisol levels) show less preference for

pictures of women whose pigmentation had been manipulated to look as though they had a strong immune system (i.e., more yellow or darker skin consistent with carotenoid pigmentation; Kandrik et al., 2017). This finding provides further evidence for a relationship between the BIS and PIS, as higher PIS is associated with a weaker preference for someone who appears to have a stronger PIS.

The BIS appears to activate a PIS system response, but there is also empirical evidence that activation of the PIS activates the BIS as well. Participants who reported being ill within the last week focused more on pictures of disfigured faces and displayed more avoidant behavior in response to those disfigured faces compared to those who had not been recently ill (Miller & Maner, 2011). Therefore, the relationship between the BIS and the PIS seems to be related such that activation of either one can lead to a response from the other.

The Behavioral Immune System's Relationship with Culture

While it appears that humans have evolved to avoid harmful pathogens, there seems to be disease avoidance variation among humans in different regions. More specifically, in areas of the world where disease is more prevalent, cultures have adapted cultural practices in response to those diseases. An example of this adaptation is found in cultural differences in food ingredients. A review of 93 different cookbooks from 36 different countries revealed that cooking spices, which naturally fight bacteria, are used more in regions where unrefrigerated food expires at a quicker rate (i.e., warmer climates where food is much more easily contaminated by bacteria; Sherman & Billing, 1999).

Apart from what is considered normal to consume within a culture, other variations related to historical pathogen prevalence have been documented. Members of countries with a historically high prevalence of pathogens have lower levels of extraversion and lower levels of openness to new experiences (Mortensen et al., 2010; Schaller & Murray, 2008). In other words, in areas where disease transmission is historically more likely, individuals are more likely to be less gregarious and less fond of novel events. Because these two traits could potentially increase the likelihood of encountering infectious pathogens, it is possible that these relationships are, in part, due to the BIS. Furthermore, a review of ethnographic data across cultures suggests that physical contact in greetings with strangers (r = -.18) and presence of romantic kissing (B = -.79), practices that could put one at an increased risk of pathogen transmission, are negatively associated with historical disease prevalence (Murray, Fessler, Kerry, White, & Marin, 2017).

The BIS also appears to also influence the degree to which norm violation is tolerated within a culture. Gelfand et al. (2011) posited that social norms within a culture evolve out of human and environmental threats, such as limited resources, natural disasters, hostile neighbors, and contagious diseases (Gelfand et al., 2011). In order for a society to survive these threats, its culture becomes “tight” by enforcing strong norms and punishing deviance from those norms. For instance, a group of individuals that competes with another tribe for resources would find it beneficial to cooperate in collecting and sharing those resources between one another, and punish those who do not comply. Therefore, in areas where these threats are present, societies may respond with strong

norms and very low tolerance for breaking these norms. Because contagious diseases have historically posed a threat to both individuals and societies, it is reasonable to suggest that disease prevalence has an impact on cultural norms, as these norms ultimately work to safeguard populations from threats. This relationship is especially salient when considering that many group norms include specific hygiene practices and food preparation techniques. People who deviate from these practices may be seen as more likely to carry infectious pathogens.

In light of this theory, it should be expected that, in a region with a historically high prevalence of pathogens, conformity would be more important than in regions with less of a history of disease. Using effect sizes drawn from a meta-analysis analyzing conformity studies across 17 countries, Bond and Smith (1996) found that conformist behavior was correlated with pathogen prevalence in a region (*r*'s between .49 and .88; Murray, Trudeau, & Schaller, 2011). Additionally, utilizing an item that ranks the importance of obedience within an 83-nation study, Murray and colleagues (2011) found that rankings of obedience were positively correlated with historical pathogen prevalence in a region (*r*'s between .48 and .67). These relationships between pathogen prevalence, conformity behaviors, and obedience rankings remained significant when controlling for gross domestic product and population density. Murray and Schaller (2012) also provide experimental evidence for conformity in relation to the BIS. Participants who were asked to write about a time in which they felt vulnerable to germs were more likely to conform to the majority opinion on changing their school's grading scale, compared to others who either wrote about a time they were in danger or simply described their previous day. In

other words, BIS activation lead to participant adherence to a majority opinion, supporting the idea of a link between the BIS and conformity.

Based on this emphasis on conformity within regions that have a historically high prevalence of pathogens, it should follow that deviation from normative practices are less likely to be tolerated in these areas. Creating an overall index for norm violation by country, Gelfand et al. (2011) found a positive correlation between tightness and historical threats (i.e., pathogen prevalence, conflict with neighboring nations, natural disasters, resource scarcity, population density). Providing support for this relationship between group cohesion and the BIS, Murray et al. (2011) found that the prevalence of pathogens within a country is negatively associated with left-handedness (owing to the fact that the majority of people are right-handed, left-handedness may be perceived as nonconforming) as well as tolerance for nonconformity.

An emphasis on conformity and a low tolerance for deviation from norms is consistent with the characteristics that make up collectivistic cultures. Consistent with other findings linking these factors with historical disease prevalence, pathogen prevalence predicts indicators of collectivism (Fincher, Thornhill, Murray, & Schaller, 2008). More specifically, these attributes embody the category of vertical collectivism (Singelis, Triandis, Bhawuk, & Gelfand, 1995), which is collectivism rooted in social hierarchies (as opposed to egalitarianism, which is the cornerstone of horizontal collectivism). Empirically testing these proposed similarities, Clay, Terrizzi Jr., and Shook (2012) found that out of six different measures of BIS sensitivity, five were significantly correlated (*r*'s between .20 and .31) with vertical collectivism.

Political conservatism is also associated with an emphasis on social norms and social hierarchy, and there is evidence to support a link between conservatism and the BIS. Individuals who reported being more sensitive to disgust are more likely to identify as politically conservative (Terrizzi Jr., Shook, & Ventis 2010; Inbar, Pizarro, Iyer, & Haidt, 2011). In addition to participants who experienced other, more general threats, participants for whom the existence of harmful pathogens has been made salient report higher political conservatism compared to those for whom disease is not made salient (Helzer & Pizarro, 2011). This effect is not only confined to Americans, as results from participants across 121 different countries show a significant, positive relationship between disgust sensitivity and conservatism (Inbar et al., 2011). However, in contrast to these findings, it should be noted that other research utilizing a scale designed to specifically measure disgust as it relates to pathogens, as well as multiple measures to identify political disposition, did not find a significant relationship between disgust and political conservatism (Tybur, Merriman, Hooper, McDonald, & Navarrete, 2010).

If a group places an emphasis on conformity, members of that group must do some form of policing in order to punish those who do not conform. Research on conformity and cooperation predicts that members of a group will go to great lengths in order to punish others for violating norms (Boehm, 1993; Fehr & Gachter, 2002). In a lab setting, cases of in-group derogation, the rare phenomena of preferring out-group members to in-group members, have been associated with higher perceived vulnerability to disease (Wu, Tan, Wang, & Zhou 2015). The term “altruistic punishment” has been used to describe the phenomenon where an individual will punish deviance, even at their

own expense. Fehr and Gachter (2002) conclude that altruistic punishment is a function that maintains group solidarity and cooperation. Considering that cooperative groups are more likely to survive, altruistic punishment becomes necessary within groups in order to cut down on members of the group who take advantage of the groups benefits without contributing. As long as the inflicted punishment is effective, and therefore defectors become more rare over time, groups become better coordinated (Boyd, Gintis, Bowles, & Richerson, 2003).

Considering the relationship between the BIS and conformity, it would be plausible to consider that individuals within groups where disease threats are more salient place a high priority on punishing non-conformers, and therefore would be more likely to punish violators at a cost to themselves. However, there is no known evidence that links BIS activation to this phenomenon, nor is there evidence that BIS activation would cause more altruistic punishment than other threats. Owing to the previously mentioned research that shows relationships between conformity, low tolerance for deviance, and prevalence of pathogens, members of these regions may be more likely to altruistically punish others to maintain cooperation and deter defectors. Experimental evidence of the BIS as a cause of conformity has been found (Murray & Schaller, 2012); however, a causal test between BIS activation and a lowered tolerance for deviance has not yet been identified in the literature.

CHAPTER 2

CURRENT STUDY

There is considerable evidence that supports the notion that BIS activation is related to behavior both at the individual and group levels. Following exposure to disease cues, individuals behave in a way that is consistent with avoiding other people (McCarthy & Skowronski, 2014; Mortensen et al., 2010;). This avoidance is even stronger when the person exposed to disease cues perceives themselves as being particularly vulnerable to disease and when they are presented with outgroup members (Duncan & Schaller, 2009; Faulkner et al., 2004; Navarrete et al., 2007; Park et al., 2003; Park et al., 2007). Previous correlational findings establish that there is a connection between the BIS and cultural differences (Clay et al., 2012; Gelfand et al., 2010; Helzer,& Pizarro, 2011; Mortensen et al., 2010; Murray et al., 2011; Murray & Schaller, 2012; Schaller & Murray, 2008). More specifically, the more disease within a region, the lower the tolerance of those violate the social norms of that region (Gelfand et al., 2011; Murray & Schaller 2012; Murray et al., 2011). Currently, there is no experimental evidence that connects BIS activation and punishment for norm violation. I attempted to support the theory that the threat of disease plays a role in causing cultural differences.

The goal of the current study was to provide evidence for a causal link between pathogens and cultures that promote conformity and punish deviance. By exposing some participants to disease primes and providing them with a paradigm in which others violate the social norm of fairness, I attempted to demonstrate that when disease is made salient individuals are more likely to punish norm violation. Participants experienced

three different offer types within the paradigm that ranged from fair to most unfair, with the expectation that individuals exposed to disease cues would be more critical of offers that fell below the standards of fairness.

Expanding on the relationship between conformity to social norms and the BIS, the current study was designed so that participants would be given the opportunity to either altruistically punish norm violators (i.e., punishing others at a loss for themselves) or not punish at all (i.e., allowing the norm violator to violate without consequence). To reiterate, I sought to provide evidence that the effect of the BIS on conformity is so strong that an individual would be motivated to punish a norm violator even when punishment was costly to the punisher.

To test this relationship between the BIS and conformity, I exposed participants to photosets designed to elicit BIS activation, general threat arousal, or a neutral affect. Following the primes, participants took part in a fairness paradigm in which they negotiated with others on a computer for a small amount of money. Within the paradigm, participants were given the opportunity to punish those who violated the norm of fairness; however, employing this punishment was costly, as it would reduce the chance that they would receive money within the game. Therefore, this action was conceptualized as altruistic punishment. Prior to the photosets and paradigm, participants completed a brief collection of measures of dispositional traits including the Perceived Vulnerability to Disease scale (Duncan, Schaller, & Park, 2009) and items from the Social Dominance Orientation scale (Pratto, Sidanius, Stallworth, & Malle, 1994) and the

Right Wing Authoritarianism Scale (Altemeyer, 1998) to better understand their relationships to the hypothesized effects.

To my knowledge, this is the only research designed to incorporate altruistic punishment within the study of the BIS's impact on the formation and persistence of social norms leading to larger processes of macro-level culture.

Additionally, the current study was designed to offer more experimental evidence to an area of research that is mostly supported by correlational findings. Consistent with previous research that has found individual differences in sensitivity to disease, these individual differences were measured and taken into account with the expectation that those who were most fearful of disease would be most critical of those who violated the norm of fairness. Therefore, my hypotheses were as follows:

Hypotheses

H_1: A main effect of fairness will emerge with the fairness paradigm, where participants, regardless of the primes they are exposed to, will be more likely to reject the most unfair offers, less likely to reject moderately unfair offers, and least likely to reject fair offers.

H_2: An interaction between prime and offer fairness will emerge, where participants who are exposed to disease cues will be more likely to reject unfair offers within the fairness paradigm than participants who were exposed to other primes.

H_3: Responses to a scale that measures perceived vulnerability to disease will moderate the interaction predicted in hypothesis two, where those who experienced the disease primes and are more sensitive to disease will be even more likely to reject unfair offers within the fairness paradigm.

CHAPTER 3

METHOD

Design

Initially this experiment was a 2 (prime: disease or gun) x 3 (offer fairness: fair, unfair, and most unfair). Prime was a between subjects variable, whereas offer fairness within the Ultimatum Game was a within subjects variable, with each participant receiving multiple offers at varying levels of fairness across sixteen trials. Due to a lack of difference between the two between-subjects conditions, a third, neutral condition was added mid-way through data collection. Therefore, the final design of the experiment was a 3(prime: disease, gun, or neutral) x 3 (offer fairness: fair, unfair, and most unfair). Scores on the Perceived Vulnerability to Disease Scale (PVD; Duncan et al., 2009; Appendix A) was treated as a moderator.

Participants

Seventy-six undergraduate students (55% female, mean age 19.6) were recruited through the University of Northern Iowa's PSPM system for course credit as partial fulfillment for an introductory psychology course. In addition to other measures, participants responded to demographic items that asked about religious beliefs, ethnicity, political party, and sex. For a breakdown of the sample's demographic makeup, see Table 1. Participants also received $3.15 for their participation in the study.

Table 1

Demographics

	n	%
Religious Beliefs		
Atheist or Agnostic	5	7
Catholic	21	28
Muslim	4	5
Protestant	34	45
None	8	11
Other	4	5
Ethnicity (Check all that apply)		
Arab	4	5
Asian	1	1
Black	4	5
Hispanic	5	7
White	68	90
Political Party		
Democrat	20	26
Republican	24	32
Libertarian	1	1
Independent	29	38
Other	2	3
Sex		
Female	42	55
Male	34	45

Measures

Demographics Items

Participants responded to a brief demographics questionnaire that included the items summarized in Table 1 above (i.e., religious beliefs, ethnicity, political party, and sex). The questionnaire also included a univariate measure of political orientation, where

on a seven-point scale ranging from very liberal to very conservative respondents were asked to indicate their political beliefs.

Perceived Vulnerability to Disease

Developed by Duncan et al. (2009), the Perceived Vulnerability to Disease (PVD) scale was designed to assess individual differences in perceptions of immune system strength (i.e., the believed likelihood of contracting an illness) and level of discomfort within scenarios where harmful pathogens may be transmitted. Based on these two interests, the 15-item scale is divided into two subscales: (1) Perceived infectability (PVD-PI; Chronbach's α = .75 within the current study), which measures perceived vulnerability to disease and (2) Germ aversion (PVD-GA; Chronbach's α = .71 within the current study), which measures discomfort with situations where there is a potential to pick up harmful pathogens.

Previous studies have reported modest correlations between the two subscales, however relationships with other variables distinguish the two. Duncan et al., (2009) found both measures were positively correlated (all *p's* < .05) with hypochondriacal fears and beliefs (PVD-PI, *r* = .72, Chronbach's α = .87; PVD-GA, *r* = .60, Chronbach's α = .74), thanataphobia (i.e., fear of death; PVD-PI, *r* = .49; PVD-GA, *r* = .38), and an illness attitude scale (PVD-PI, *r* = .46; PVD-GA, *r* = .26). Duncan and colleagues also found that PVD-PI had stronger correlations (significantly higher *r* values, all *p*'s < .001) with each subscale of disgust sensitivity and disgust sensitivity revised, than PVD-GA. See Appendix A for the full, 15-item version of the PVD scale.

Social Dominance Orientation

The Social Dominance Orientation (SDO) scale (Pratto et al., 1994) was designed to measure individual differences in tolerance of inequality, where higher scores represent more tolerance of inequality. In order to conserve participant session time, only 10 of the 16 SDO items were employed within the current study (Chronbach's α = .63 within the current study).

Right Wing Authoritarianism

The Right Wing Authoritarianism (RWA) scale (Altemeyer, 1998) measures an individual's willingness to conform to authority. Higher RWA scores indicate more submission to authority and adherence to social norms. Similar to the SDO items, only 10 RWA items were included within the current study (Chronbach's α = .69 within the current study) in order to conserve session time.

Manipulation Check Items

All participants viewed a set of pictures (the content of which depending on their prime condition) before participating in the fairness paradigm. Following the photoset, participants were asked to rate the pictures on how intense, disgusting, discomforting, and troubling they were on a five-point Likert scale. On the same sheet of paper, participants were also asked to describe, in 200 words or less, a time in which they experienced something similar to the pictures they viewed.

Procedure

Within the University of Northern Iowa's PSPM system, students were invited to participate in a study about negotiations. Once in the lab, participants were told that

researchers were interested in individual differences in negotiation styles, and therefore they would have to respond to a questionnaire that assessed personality before participating in negotiations with other participants.

Initially, participants were randomly assigned to either the disease or gun prime condition. When the neutral condition was added, all participants were assigned into the neutral condition until the neutral sample size matched that of the disease and gun prime groups. Once the sample size for each prime group was equal, participants were randomly assigned to one of the three between-subjects conditions. This approach did not influence the distribution of females and males for each between-subjects condition.

After signing a consent form, participants completed a questionnaire that contained all 15 PVD questions and 10 items each from SDO and RWA. Items from each scale were intermixed together. Two versions of the questionnaire, each with the same items, were used in order to counter balance the order in which items occurred for participants. Each questionnaire began with demographics questions concerning age, sex, ethnicity, religious beliefs, and political affiliation. Participants were told that the questionnaire was designed to assess different personality types, and that the researchers were interested in whether people with different personality types negotiated differently.

Following the questionnaire, the researcher explained that within the negotiation game (which is what the researcher called the Ultimatum Game within the experiment) the participant was about to play, she would see a picture of each person whose offer she would be evaluating. Thus, in order for future participants to be able to see her picture associated with her offers, the researcher was going to take her photograph. Participants

who consented to having their picture taken within the overall consent form were then asked to stand against a brown bookshelf and to provide an expressionless face for the camera. Two participants did not consent to having their photograph, and for these two cases the picture-taking step was skipped. After taking the picture, the researcher showed participants their photo on the digital screen within the camera, and asked if the picture was okay to use. In reality, these photographs were never used. The purpose of these photographs were to relieve any suspicion that the Ultimatum Game ("UG"; explained in detail later in this section) was under experimental control, as participants were expected to believe that they would be looking at pictures of other previous study participants within the game.

After having their picture taken, participants were told that it would take a few minutes to process their pictures and to upload them within the game. Therefore, in the meantime they would be viewing pictures for another researcher who wanted feedback on several pictures before using these pictures within a future study. However, there was no actual "other" researcher, and the content of the slideshows served as the between subjects prime. Individuals in the disease prime condition viewed images depicting infectious disease (e.g., a person coughing, a child with chicken pox, an ankle covered in boils; Schaller et al., 2010; example pictures can be found in Appendix B). These pictures were intended to activate the viewer's BIS by providing visual cues for a possibly contagious illness. Participants within the gun condition were exposed to images of individuals with guns who were posing in a threatening manner (example pictures can be found in Appendix C). These photos were meant to elicit threat arousal, and have been

used in past research comparing responses to general threat arousal with responses due to the BIS (Schaller et al., 2010). Within the neutral condition, participants viewed images of landscapes, train tracks, and architecture (example pictures can be found in Appendix D). The neutral primes were intended to both be non-threatening and non BIS activating. Each slideshow contained 15 randomly ordered pictures, and each picture was presented for 10 seconds, making each presentation block a total of 2 minutes and 30 seconds. While participants were viewing their primes, the researcher took the memory card out of the camera, as well as typed and clicked on the computer to maintain the illusion that participant photographs were being "processed and uploaded." This was done in a consistent manner for each experimental session.

After viewing the primes, participants within each condition completed a brief, five-item questionnaire that served as a manipulation check. The Likert-style items assessed the degree to which participants found the pictures to be intense, disgusting, uncomfortable, complicated, and troubling. Additionally, each participant wrote about a time in which they encountered something similar to the pictures within the slideshow (Appendix E). The writing prompt was included to make sure that participants were paying attention to the slide show, and therefore participants writing passages that were inconsistent with the content of the images viewed could be removed from analysis. The written passage was also intended to make the content of the primes more salient. For instance, those in the disease prime condition might plausibly write about a time in which they either experienced or witnessed a shocking and/or aversive consequence of an illness. It was believed that writing about an actual scenario that occurred to the

individual would strengthen the overall effect of the primes, as it may briefly cause the participant to relive the experience and the emotions that are tied to it.

Following the primes, participants were given further instructions on how to play the UG (Güth, Werner, Schmittberger, & Schwarze, 1983; Crockett, Clark, Tabibnia, Lieberman, & Robbinds, 2008). Within a typical UG, there are two participants. One is assigned to the role of the proposer; the other is assigned the role of the responder. Both participants are shown a sum of money, and the proposer is asked to offer a percentage of that money to the responder. If the responder accepts the offer, both parties receive the allocation of money agreed upon; however, if the responder rejects the offer, neither the proposer nor the responder receive anything. Within the current study, participants were told that they would be playing two rounds: in the first round they would assume the role of the responder and in the second round they would play the role of the proposer. Within the first round, participants were told that they would be responding to offers made by previous participants across several trials. They were told that in the second round, they would be playing as the proposer and making offers to which future participants would respond, and that further instructions on this portion of the game would come later.

In all actuality, there was no second round, and all participants responded to 48 proposals that were accompanied by a photograph of the supposed proposer. There were 24 photographs across the 48 proposal trials, each photograph appearing twice. Proposer pictures were collected the previous semester at the same university for research credit. Twelve proposer pictures were of men, whereas the other twelve were women. All individuals pictured as proposers provided consent to use their image in a future research

project. Each proposer image displayed was a headshot of student taken from the same position in the same location. Consistent with participant instructions, all proposers expressed neutral emotion.

Within each of the 48 UG trials, $7.00 was the amount of money at stake, and there were three different levels of proposal fairness that participants were exposed to: sixteen fair offers (i.e., 45% of the stake or $3.15), sixteen unfair offers (i.e., 30% of the stake or $2.10), and sixteen most unfair offers (i.e., 20% of the stake or $1.40). The computer randomly matched photographs with offers, and randomly created the order in which fair, unfair, and most unfair offers were presented for each participant. Each trial began with a blank screen that lasted for 0.5 seconds, followed by a picture of the proposer (1.5 seconds), the $7.00 stake (1 second), and the offer (which lasted until the participant indicated that they accepted or rejected the offer, M = 1.07 seconds).

Before beginning the actual game trials, participants read instructions on the computer that repeated important aspects of the game, and they then participated in two practice rounds in order to familiarize themselves with the game. Each practice round had 5 trials, each round had a $5.00 stake instead of a $7.00, and the (randomly selected) proposals were: $0.20, $1.00, and $1.50. A diagram of what participants experienced in the actual UG trials can be found in Appendix F.

Participants were told that one trial would be randomly selected from each of the two rounds, and the average amount of money collected between those two trials would be paid to the participant at the conclusion of the study. Before beginning the game, participants were asked for their email address in order for the researcher to contact them

in the future about their winnings. However, because there was actually only one round of play, all participants received the maximum amount of money that they could have possibly gained within one trial, $3.15. Additionally, participants were paid at the conclusion of their session (instead of at the conclusion of the entire study) and their email addresses and photographs were discarded.

Within debriefing, participants were probed for suspicion and asked what they thought the study was about. Following the suspicion probe, it was revealed to participants that they were not actually playing against other participants, that the proposals were fixed by the researcher, and that all participants within the study act as responders. At debriefing, six participants in the disease prime condition indicated that they thought the study had something to do with illness; however, none of the six correctly guessed the purpose of the study. Across all conditions, six participants disclosed that they believed the study had something to do with the faces they saw and their responses in the UG. Aside from these cases, no participant reported suspicions about the study. These participants were left in the dataset. After debriefing, participants were paid and thanked for their time.

CHAPTER 4

RESULTS

Manipulation Check

Open-ended responses to the writing prompt were examined to determine whether or not the primes had an effect on what participants wrote. Before reading through the responses, three key words were selected as they either related to the disease primes or gun primes, and these key words were counted across all writing prompt responses. The three key words related to disease primes were sick, disease, and gross. The key words related to the gun primes were gun, fight, and threat. None of the written passages were blatantly inconsistent with the content of the prime that the participants viewed. Eight of the 24 participants in the disease condition (33%) used disease-related words, whereas participants in either the gun or neutral prime groups did not use these disease-related words once. The three, pre-selected gun prime keywords appeared in the passages of 21 out of 25 participants (84%). The three gun prime keywords did not appear within any of the open-ended responses of participants who experienced either the disease or neutral primes.

Overall themes were interpreted from the open-ended responses. Twenty-nine percent of participants who experienced the disease primes wrote about a personal story of illness, whereas 46% of participants within the disease prime group reported a story of another person's illness. Other open-ended responses included experiences with other images or experiences that were deemed disgusting. Out of all the participants who experienced the gun primes, 26% wrote about an event that involved a gun and 7% wrote

about an altercation (that did not involve a gun). It should be noted that of the participants who wrote about an event that involved a gun, 57% of the stories were not threatening in nature (e.g., hunting, spending time at a shooting range). Other gun prime group responses included television and media portrayals of weapons.

The effect of each prime on respondent affect (i.e., how intense, disgusting, discomforting, complicated, and troubling the pictures were) was analyzed using an analysis of variance (ANOVA) with the Likert-style manipulation check items. The means and standard deviations for picture ratings by prime are displayed in Table 2.

Table 2.

Picture Rating Means and Standard Deviations by Prime

	Prime					
	Disease (n = 24)		Gun (n = 27)		Neutral (n = 25)	
Adjective	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Intense	4.00_a	.83	4.04_a	.59	2.20_b	1.41
Disgusting	4.29_a	.81	2.85_b	1.10	1.16_c	.47
Discomforting	3.46_a	.93	3.22_a	1.12	1.04_b	.20
Troubling	3.82_a	.89	3.78_a	.97	1.08_b	.28

Intensity

Ratings of picture intensity differed significantly across the three primes, $F(2,73) = 27.78$, $p < .001$, $\eta^2 = .432$. Tukey's post-hoc comparisons indicated that participants who experienced neutral primes ($M = 2.20$, 95% CI [1.62, 2.78]) rated pictures significantly less intense than did participants who experienced disease primes ($M = 4.00$, 95% CI [3.65, 4.35], $p < .001$, $d = 1.67$). Additionally, neutral prime group participants

also rated their pictures significantly less intense than did participants who experienced gun primes (M = 4.04, 95% CI [3.80, 4.27], $p < .001$, d = 1.87). There was no statistical difference between the disease prime and gun prime groups in how intense participants thought the images were, (p = .99). Ratings of picture intensity are displayed in Figure 1.

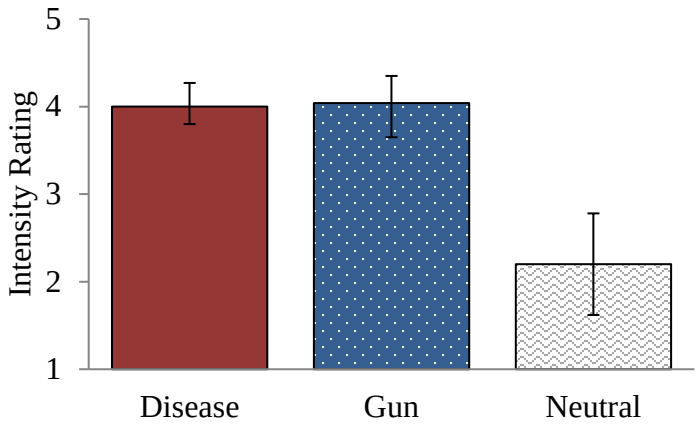

Figure 1. Self-Reported Picture Intensity Ratings by Condition with 95% CI Bars.

Disgust

Ratings of how disgusting the pictures were also differed significantly across the three prime groups ($F(2, 73) = 85.05$, $p < .001$, $\eta^2 = .670$). Tukey's post-hoc comparisons indicated that participants within the disease group (M = 4.30, 95% CI [3.95, 4.63]) rated pictures as significantly more disgusting than did participants in the gun condition (M = 2.85, 95% CI [2.42, 3.29], $p < .001$, d = 1.51). Those within the disease prime group also rated pictures as more disgusting than did participants in the neutral group (M = 1.16, 95% CI [0.96, 1.36], $p < .001$, d = 4.86). A significant difference in disgust ratings also emerged when comparing participants who experienced gun primes to participants who

experienced the neutral primes, $p < .001$, $d = 2.01$. Ratings of picture disgust are displayed in Figure 2.

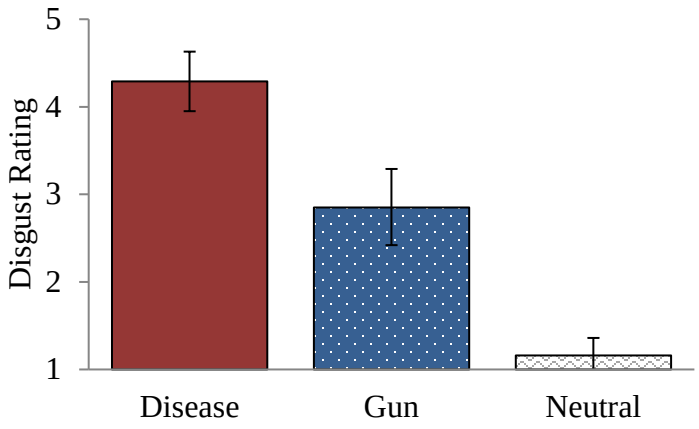

Figure 2. Self-Reported Ratings of Disgust by Condition with 95% CI Bars.

Discomfort

Ratings of how uncomfortable participants were when viewing the primes differed between the three conditions, $F(2, 73) = 60.58$, $p < .001$, $\eta^2 = .624$. Tukey's post-hoc comparisons indicated that participants in the disease condition ($M = 3.46$, 95% CI [3.07, 3.85]) reported being significantly more uncomfortable as a result of the prime than did those in the neutral condition ($M = 1.04$, 95% CI [0.96, 1.12] $p < .001$, $d = 2.80$). Those within the gun group ($M = 3.22$, 95% CI [2.78, 3.67]) also reported being significantly more uncomfortable as a result of the primes than did those in the neutral group, ($p < .001$, $d = 3.70$). There were no differences in ratings of how uncomfortable the primes made participants feel among those who experienced the disease primes and those who experienced the gun primes, ($p = .59$). Ratings of self-reported discomfort are displayed in Figure 3.

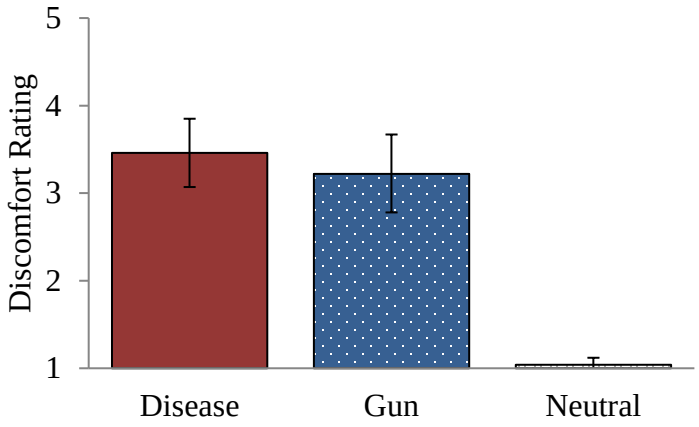

Figure 3. Self-Reported Ratings of Discomfort By Condition with 95% CI Bars.

Troubling

Finally, differences in how troubling the primes were differed across the three conditions ($F(2, 72) = 61.67$, $p < .001$, $\eta^2 = .738$). Tukey's post-hoc comparisons revealed that participants who were exposed to the disease primes ($M = 3.83$, 95% CI [3.44, 4.21]) rated the primes significantly more troubling than did participants who were exposed to the neutral primes ($M = 1.01$, 95% CI [0.97, 1.19], $p < .001$, $d = 4.35$). Furthermore, participants in the gun prime group ($M = 3.78$, 95% CI [3.39, 4.16]) rated the primes more troubling than did participants in the neutral prime group, ($p < .001$, $d = 3.78$). There was no statistical difference in ratings of how troubling the primes were when comparing the disease prime group to the gun prime group ($p = .97$). Self-reported ratings of how troubling the pictures were are displayed in Figure 4.

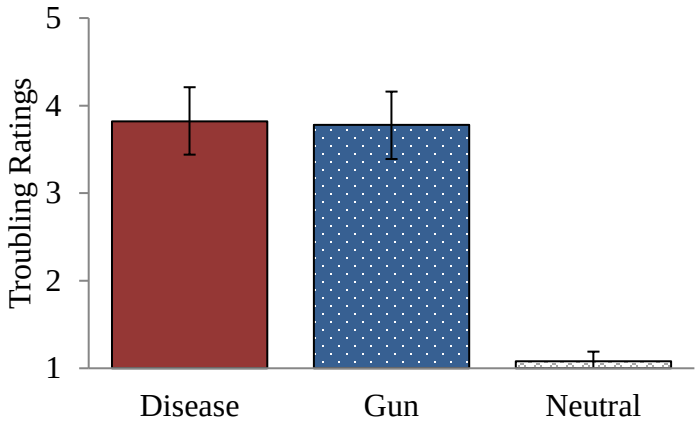

Figure 4. Self-Reported Ratings of How Troubling the Pictures Were by Condition with 95% CI Bars.

Outliers

Because the mean and the standard deviation, which are often used to detect outliers, are actually affected by outliers, a Median Absolute Deviation (MAD; Leys, Ley, Klein, Bernard, & Licata, 2013) approach was taken to identify outliers. This method is also unaffected by sample size, which is ideal considering the low number of participants within each condition ($n \leq 27$). The MAD was obtained by: (1) calculating the median number of rejections within each offer fairness level (i.e., fair, unfair, and most unfair) across the three conditions; (2) creating new variables that represented the absolute value of subtracting the obtained median score for each cell from each case within that cell; (3) calculating the median for each of these new variables, and (4)

multiplying each of those medians by 1.4826[1], assuming a normal distribution. Once the MAD was calculated for each level of fairness within each condition, the following criterion was used to create a range where numbers that fall outside of that range were regarded as outliers:

$$M - (2.5 * MAD) < x < M + (2.5 * MAD)$$

Using this approach, 13 out of a possible 228 aggregate number of rejected offers were identified as outliers and removed from further analyses. See Table 3 for a breakdown of outliers by prime and level of fairness (*n*s represent group sizes without the removal of outliers).

Table 3

Aggregate Number of Rejection Outliers by Prime and Offer Fairness

Prime	*Offer Fairness*		
	Fair	Unfair	Most Unfair
Disease (*n* = 24)	0	4	5
Gun (*n* = 27)	0	4	0
Control (*n* = 25)	0	0	0

The MAD approach was also used to identify outlier reaction times for individual trials. Using the same method outlined above, ranges were calculated for each level of

[1] Christophe Leys, the corresponding author of the cited MAD article, was contacted to clarify this step. According to him, the data may not be normal given outliers, however the suspected distribution of the population is expected to be normal, and therefore 1.4826 is the correct number to multiply by.

fairness within each condition. Therefore, there were nine different ranges that normal reaction times would fall into (e.g., disease condition/fair offer, disease prime/unfair offer, disease prime/most unfair offer, gun prime/fair offer, etc.). This approach identified 423 out of a possible 3,648 trials (11.6%) in which reaction times fell outside of the accepted range. Individual trials that fell out of their respective ranges were deemed outliers and treated as missing variables within the data set. The first run of analyses did not include these outliers, whereas the second run of analyses did include these analyses. Any reporting of analyses that include these outliers are noted as such. See Table 4 for a breakdown of reaction time outliers by prime and offer fairness.

Table 4

Reaction Time Outliers by Prime and Offer Fairness

Prime	*Offer Fairness*		
	Fair	Unfair	Most Unfair
Disease (*n* = 24)	66	43	46
Gun (*n* = 27)	52	35	35
Control (*n* = 25)	41	41	64

Note: There were 16 trials for each participant within each level of fairness

Univariate Analyses

Differences among men and women were analyzed across key variables. Two marginally significant differences emerged: PVD-PI ($t(74) = 1.88$, $p = .06$, $d = .440$) and overall PVD ($t(74) = 1.74$, $p = .09$, $d = .410$), where women reported higher scores on

each of these measures. There were no gender differences in political beliefs, RWA, SDO, or PVD-GA. Means for each of these measures by sex can be found in Table 5.

Table 5

Key Variable Means by Sex

	Sex			
	Women (*n* = 42)		Men (*n* = 34)	
Measure	*Mean*	*SD*	*Mean*	*SD*
PVD	3.68	.57	3.43	.67
PVD_GA	3.92	.95	3.79	.97
PVD_PI	3.43	.91	3.06	.76
RWA	3.67	.67	3.79	.80
SDO	3.41	.68	3.49	.78

Correlations were calculated between age and key variables. Significant relationships emerged between age and both SDO ($r(74) = .20$, $p < .05$) and political beliefs ($r = .23$, $p < .05$), where older participants were more likely to be higher in SDO and conservative. There were no significant relationships between age and RWA, PVD-GA, PVD-PI, and overall PVD.

To examine the possible differences across participants within the between subjects primes, an ANOVA was run with key variables treated as dependent variables. There were no significant differences in PVD, PVD subscales, SDO, or RWA among participants by the three prime groups, $F(2, 73) = .753$, $p = .48$; PVD-GA $F(2, 73) = 1.21$, $p = .305$; PVD-PI, $F(2, 73) = 2.02$, $p = .14$; SDO, $F(2, 73) = .19$, $p = .83$; and RWA, $F(2, 73) = .27$, $p = .77$.

Relationships Between Measures

Relationships between scale scores were examined. Given that past research has found relationships between PVD, SDO, RWA, and political beliefs, one-tailed correlations were calculated between these measures. Both SDO and RWA were significantly correlated with political beliefs (*rs* > .43, *ps* < .01). Additionally, PVD-GA was significantly related to both SDO ($r = .3$, $p < .01$) and RWA ($r = .41$, $p < .01$). Table 6 displays the correlation matrix including all measures.

Table 6

Pearson Correlations Between Measures

	1	2	3	4	5
1. PVD-GA	--				
2. PVD-PI	-.041	--			
3. SDO	.300*	.030	--		
4. RWA	.405**	.030	.551**	--	
5. Political Beliefs	.171	-.011	.428**	.470**	--

Note: **p <.001, *p < .01

Main Findings

In order to test the relationship between the different prime groups and outcomes within the UG, a 3 (prime: disease, gun, control) X 3 (offer fairness: fair, unfair, most unfair) mixed factorial ANOVA was run with the aggregate number of rejections as the dependent variable. Due to the nature of rejections based on offer fairness, the ANOVA assumption that the dependent variable is normally distributed was violated. This was the case for every ANOVA run that treated the aggregate number of rejections as a dependent variable.

It was hypothesized that there would be a main effect of offer fairness, where participants would be more likely to reject most unfair offers than unfair offers and more likely to reject unfair offers than fair offers. Mauchly's test of sphericity indicated that sphericity was not violated, $\chi^2(2) = 4.87$, $p > .05$. As predicted, the ANOVA revealed a

significant main effect of offer fairness, $F(2, 124) = 262.91$, $p < .001$, $\eta^2 = .800$. Post hoc pairwise comparisons revealed that most unfair offers ($M = 14.88$, 95% CI [14.19, 15.57]) were rejected more often than unfair offers ($M = 11.32$, 95% CI [10.07, 12.57), $p < .001$. Additionally, unfair offers were rejected more than fair offers ($M = 1.12$, 95% CI [.40, 1.85]), $p < .001$. Figure 5 provides graph that breaks down this main effect.

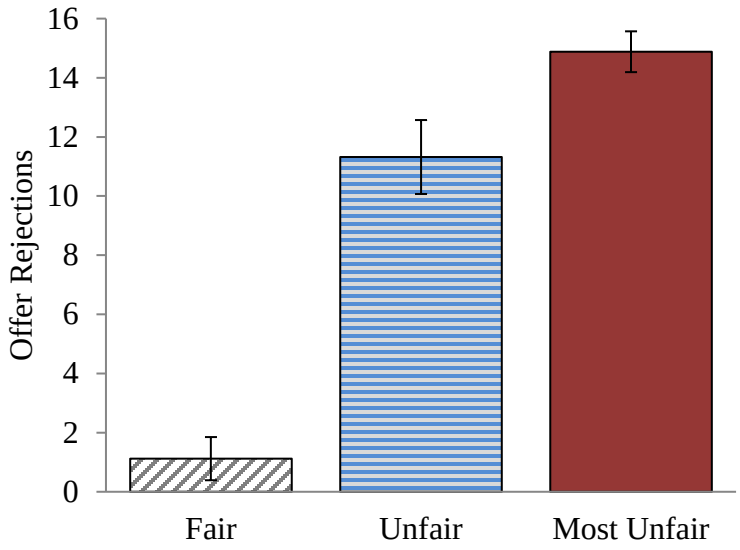

Figure 5. Overall Rejections by Offer Fairness with 95% CI Bars.

It was also hypothesized that individuals primed with disease cues would be more likely to reject unfair offers within the UG. With outliers removed, the ANOVA did not yield a significant interaction between prime and offer fairness, $F(4, 124) = 1.78$, $p = .14$, $\eta^2 = .011$. Offer rejection means by prime and offer fairness are plotted in Figure 6. The same ANOVA was run with the full data set (no outliers removed), and the results of that test were also not significant, $F(4, 146) = .192$, $p = .94$, $\eta^2 = .001$.

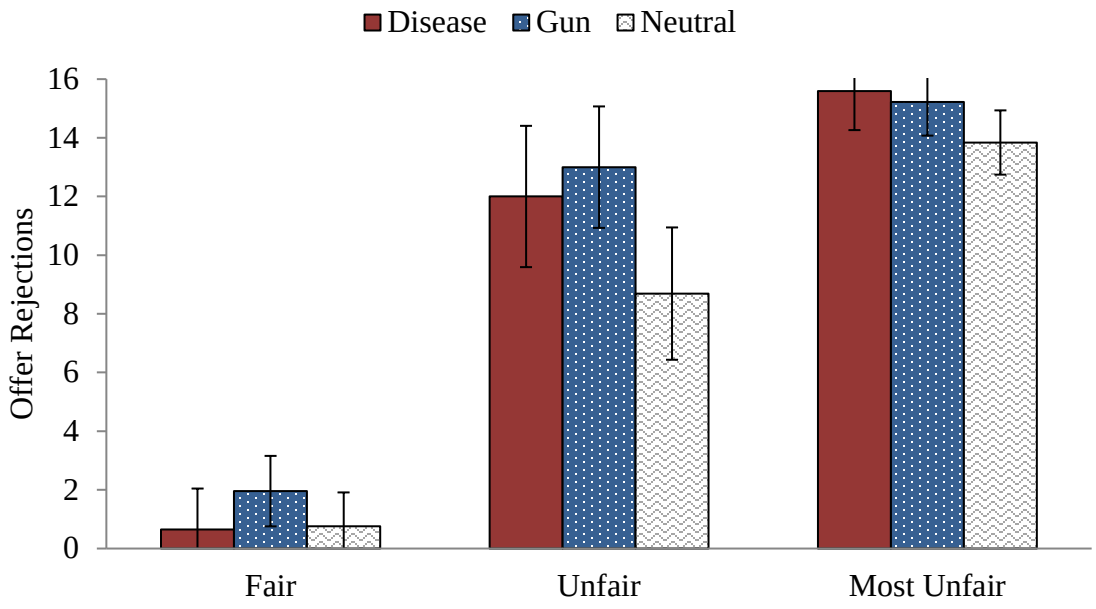

Figure 6. Offer Rejections by Prime and Offer Fairness with 95% CI Bars.

It was predicted that PVD would moderate the hypothesized interaction between prime and offer fairness, however this interaction was not significant. The original mixed factorial ANOVA was rerun adding PVD as a covariate. Adding PVD as a covariate also produced non-significant results, $F(4,122) = 1.73$, $p = .15$, $\eta^2 = .046$. Additionally, each PVD subscale was entered as a covariate, yielding results that were not significant; PVD-GA, $F(4, 122) = 1.74$, $p = .15$, $\eta^2 = .044$, PVD-PI, $F(4, 122) = 1.68$, $p = .16$, $\eta^2 = .038$.

Given the null results for hypotheses two and three, a post-hoc power analysis was run to determine if the sample size obtained was adequate for a significant result. The power analysis was conducted in G*Power. Running a power analysis on a repeated measures ANOVA with 3 measurements a power of .95, an alpha level of .05, and the obtained effect size of $\eta^2 = .011$, the required sample size would have been 282.

Table 7

Rejection Means and Standard Deviations by Prime and Offer Fairness

	Disease		Gun		Neutral	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Fair	.65	1.97	1.96	4.35	.76	1.23
Unfair	12.00	4.57	13	3.54	8.96	6.19
Most Unfair	15.59	.62	15.22	2.07	13.84	3.90

Exploratory Analyses

Reaction Time

Reaction time data were collected for each trial at the millisecond level. Reaction time was explored because it was believed that it could be used as a proxy for decision making difficulty. Although not a direct measure, the logic was that the more difficult a decision was, the longer it would take to respond. While those exposed to disease primes may not have rejected more unfair offers than other participants, it is possible that they were more conflicted in whether or not to reject unfair offers.

In order to investigate differences in reaction time among those who experienced different primes at different levels of offer fairness, a 3 (prime: disease, gun, control) X 3 (offer fairness: fair, unfair, most unfair) mixed factorial ANOVA was run using reaction time as a dependent variable. Similar to findings with the aggregate number of rejections as a dependent variable, there was a main effect of offer when reaction time was used as a dependent variable, $F(2, 146) = 65.51$, $p < .001$, $\eta^2 = .466$. Pairwise comparisons revealed that participants took longer to respond to unfair offers ($M = 962.92$, 95% CI [912.18, 1013.65]) than fair offers ($M = 800.49$, 95% CI [764.63, 836.34], $p < .001$, $d =$

.85). Participants also took longer to respond to unfair offers compared to most unfair offers (M = 789.21, 95% CI [751.03, 827.39], $p < .001$, d = .91). The difference in reaction time between fair and most unfair offers was not significant. Figure 7 displays reaction times for each level of offer fairness.

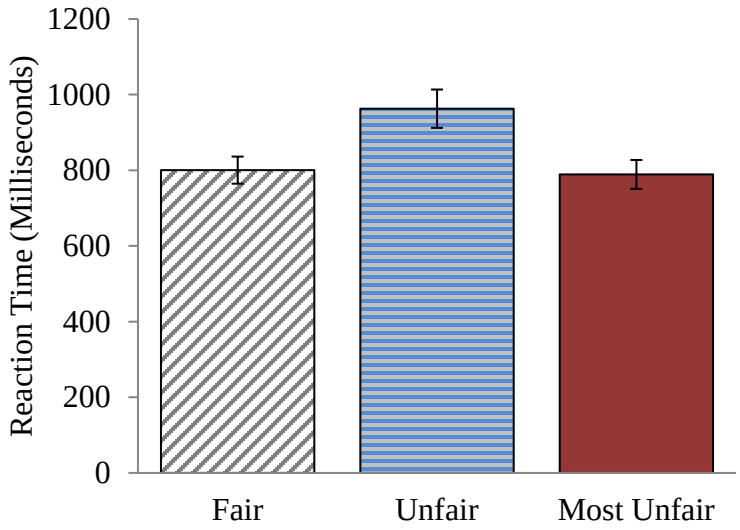

Figure 7. Reaction Time by Offer Fairness with 95% CI Bars.

Consistent with findings using the aggregate number of rejections as the dependent variable, using reaction time as a dependent variable within the mixed factorial ANOVA did not yield a significant interaction between prime and offer fairness, $F(4, 146) = 1.07$, $p = .37$, $\eta^2 = .015$. The reaction time means (in milliseconds) by prime and offer fairness are plotted in Figure 8.

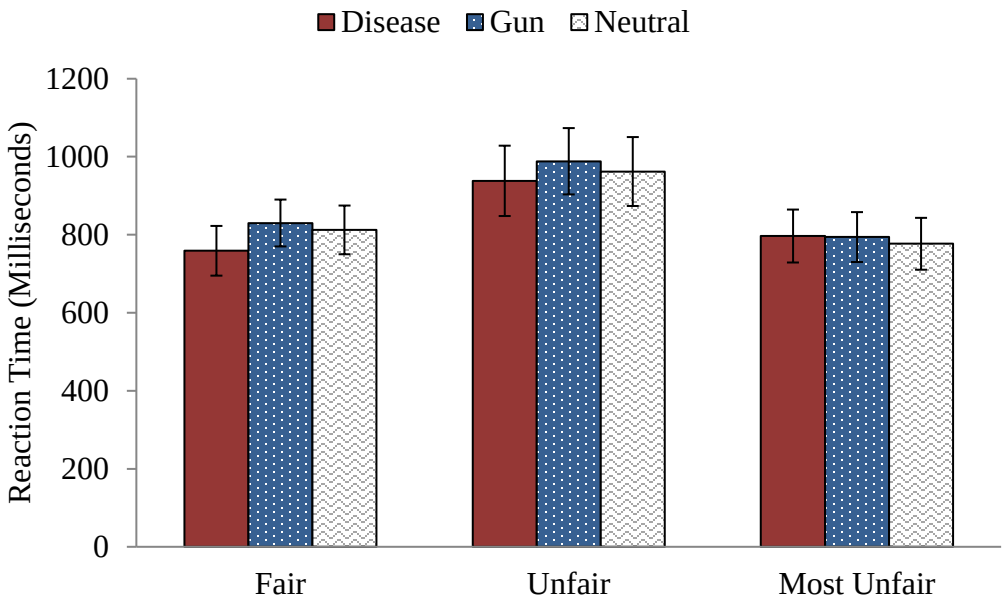

Figure 8. Reaction time by Prime and Offer Fairness with 95% CI Bars.

Including PVD as a covariate also produced non-significant results, $F(4, 144) = .87$, $p = .49$, $\eta^2 = .022$. Entering both PVD-GA $F(4, 144) = 1.36$, $p = .25$, $\eta^2 = .031$ and PVD-PI, $F(4, 144) = .95$, $p = .44$, $\eta^2 = .025$ as covariates also yielded non-significant results.

Covariates

To examine the possible mediating effects of RWA and SDO on an interaction between offer fairness and prime group, separate mixed factorial ANOVAs were run using RWA and SDO as a covariate. There were two ANOVAs run for each covariate based on the two different dependent variables (i.e., the aggregate number of rejections and reaction time).

A 3(prime: disease, gun, neutral) X 3(offer fairness: fair, unfair, most unfair) mixed factorial ANOVA was run with the number of aggregate rejections as the dependent variable, including RWA as a covariate. This ANOVA did not yield a significant interaction between prime and offer fairness, $F(4, 144) = 1.78$, $p = .141$, $\eta^2 = .047$. Running the same ANOVA with reaction time as the dependent variable also produced non-significant results, $F(4, 144) = .96$, $p = .43$, $\eta^2 = .023$.

The same ANOVAs were run with SDO entered as a covariate. Considering aggregate rejections as the dependent variable, no significant interaction between prime and offer fairness emerged, $F(4, 122) = 1.73$, $p = .15$, $\eta^2 = .041$. Considering reaction time as a dependent variable also did not yield a significant interaction between prime and offer fairness, $F(4, 144) = .91$, $p = .46$, $\eta^2 = .021$.

General Threat Arousal

As noted previously, participants within this sample rated both the disease and the gun photographs as more intense, more disgusting, more discomforting, and more troubling than the neutral photographs. Additionally, the only difference in ratings of images between the disease and gun prime groups was in how disgusting they perceived the photographs to be (see Figures 1-4). To better understand the impact of general threat arousal on performance within the UG, a new variable was created in the dataset that collapsed both the disease and gun prime groups together. Therefore, further analyses consisted of only two between-subjects conditions (i.e., threat arousal, neutral).

To analyze any possible differences in the relationship between threat arousal and neutral stimuli on outcomes within the UG, a 2(prime: threat arousal, neutral) X 3 (offer

fairness: fair, unfair, most unfair) mixed factorial ANOVA was run treating the aggregate number of rejections as the dependent variable. Mauchaly's test of sphericity indicated that sphericity was not violated, $\chi^2(2) = 4.507$, $p > .10$. A marginally significant interaction between prime and offer fairness emerged, $F(2,126) = 2.94$, $p = .06$ $\eta^2 = .009$. To interpret this interaction, three *t*-tests were run comparing the mean aggregate rejections for each level of offer fairness between the threat arousal and neutral groups. Likely due to the large difference in n for each group, Levene's test for equality of variances revealed that variances were not equal. However, correcting for unequal variances, the *t*-test revealed that participants who experienced threatening stimuli rejected significantly more *unfair* offers within the UG than participants who were exposed to neutral stimuli, $t(35.04) = 2.59$, $p = .01$, $d = .75$ (Figure 9). There were no significant differences in aggregate rejections between the threat prime group and the neutral prime group for *fair* and *most unfair* offers.

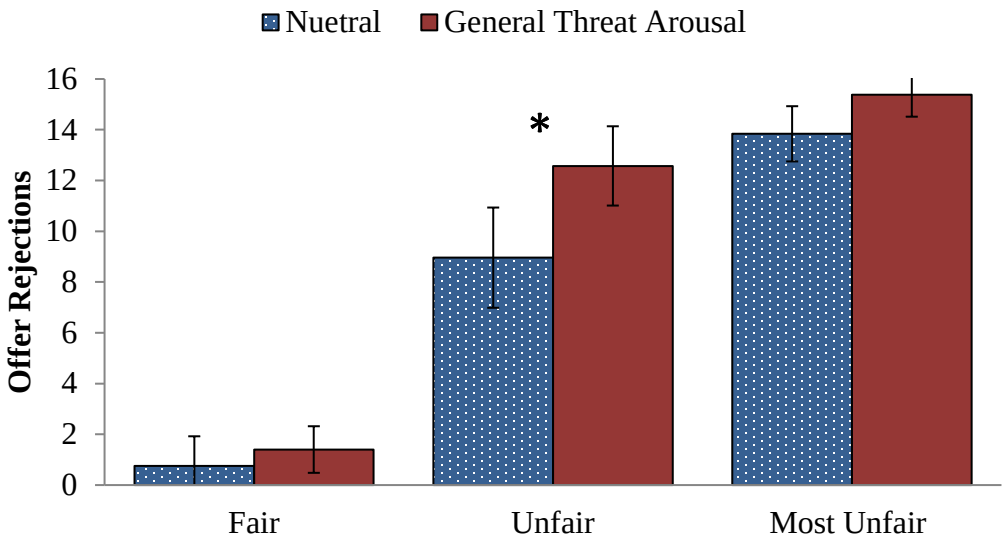

Figure 9. Rejections by Collapsed Prime and Offer Fairness with 95% CI Bars.

To better understand the relationship of threat arousing stimuli's relationship with responses in the UG, the same 2 (prime: threat arousal, neutral) X 3(offer fairness: fair, unfair, most unfair) mixed factorial ANOVA was run treating reaction time as the dependent variable. The ANOVA revealed that there was not a significant interaction between prime and offer fairness as a function of reaction time, $F(2, 148) = .45$, $p = .64$, $\eta^2 = .003$.

Threat Arousal Regression Models

To further investigate the possibility of a relationship between threat arousal and responses in the UG, a regression model treating unfair offer rejections as an outcome variable and picture ratings (i.e., intensity, disgust, discomfort, and troubling) as predictor variables was run. Weak correlations between the three predictor variables and the outcome variable, and strong correlations among three of the predictor variables provided evidence that multicollinearity was violated. Three of the four predictor variables (i.e., how intense, discomforting, and troubling the pictures were) were significantly correlated with the aggregate number of unfair rejections. The remaining predictor variable, ratings of how disgusting the pictures were, was only moderately correlated with unfair offer rejections. Only ratings of how troubling the pictures were had significant ($p = .05$) partial effects in the full model. According to the adjusted R^2 statistic, the overall model accounted for 9.3% of the total variance in unfair offer rejections, $F(4, 66) = 2.69$, $p = .04$, adjusted $R^2 = .093$. Table 8 provides a summary of the regression model.

Table 8

Unfair Offer Rejections Regressed on Picture Ratings

	Zero Order Correlations				β	*p*	sr^2
	1	2	3	4			
1. Intensity	--	--	--	--	.104	.55	.01
2. Disgusting	.663**	--	--	--	-.302	.16	.03
3. Uncomfortable	.686**	.780**	--	--	.045	.85	<.01
4. Troubling	.678**	.793**	.826**	--	.475	.05	.06

Note: $^{**}p$ <.001, $^{*}p$ < .05, † < .10

Additionally, a regression model treating most unfair offer rejections as the outcome variable and picture ratings as predictor variables was also run. Again, weak correlations between predictor variables and the outcome variable, as well as strong correlations among predictor variables indicated a violation of multicollinearity. Ratings of picture intensity (p = .01) and how troubling pictures were (p = .01) had significant partial effects in the full model. Using the adjusted R^2 statistic, the total variance in most unfair offer rejections explained by the model as a whole was 16.9%, ($F(4, 65) = 4.27$, p < .01). Table 9 provides a summary of this regression model.

Table 9

Most Unfair Offer Rejections Regressed on Picture Ratings

	Zero Order Correlations				β	*p*	sr^2
	1	2	3	4			
1. Intensity	--	--	--	--	-.436	.01	.09
2. Disgusting	.661**	--	--	--	.143	.16	.01
3. Uncomfortable	.661**	.755**	--	--	-.103	.85	< .01
4. Troubling	.674**	.769**	.804**	--	.587	.01	.10

Note: $^{**}p$ <.001, $^{*}p$ < .05, † < .10

Continuing to treat picture ratings as predictor variables, regressions were run treating the following as outcome variables: aggregate number of fair offer rejections, fair offer reaction time, unfair offer reaction time, and most unfair offer reaction time. None of these models yielded a significant adjusted R^2 change.

CHAPTER 5

DISCUSSION

General Discussion

The current study sought to provide an experimental test of previous correlational findings that suggest a relationship between prevalence of disease and social norm restrictiveness. Exposure to disease threatening stimuli was manipulated, and social norm restrictiveness was measured by a task that requires participants to accept or reject divisions of money that included a costly consequence for rejecting an offer. Three different levels of fairness (i.e., fair, unfair, and most unfair) were implemented into the negotiation task to test the sensitivity of the hypothesized effect that disease primes were predicted to have on social norm restrictiveness.

Three hypotheses were made prior to data collection: (1) a main effect of fairness would emerge, where participants would be more likely to reject unfair offers than fair offers, and more likely to reject most unfair offers than unfair offers; (2) an interaction between prime group and offer fairness, where participants who experienced the disease primes would be more likely to reject unfair offers than individuals who experience other primes; (3) this interaction would be moderated by participants' reported perceived vulnerability, where participants who believed themselves to be more vulnerable to disease would be even more likely to reject unfair offers.

Within the current study, a main effect of fairness did emerge. Overall, participants were most likely to reject offers categorized as most unfair, less likely to reject offers categorized as unfair, and least likely to reject offers categorized as fair. This

finding is unrelated to the relationship of disease detection and norm restrictiveness, however, it lends support to the validity of the negotiation task. The finding that participants rejected more offers as the level of fairness degrades suggests that they understood the parameters of the task.

The prediction that there would be an interaction between prime and offer fairness was not supported within this study. One possibility is that the disease primes may not have been powerful enough to elicit a BIS response, and therefore participants were not any more likely to punish those perceived as being unfair (there was no direct measure of participant thoughts of fairness for different offers in the UG, however, the main effect of fairness finding shows that at the very least participants responded to each offer level of fairness differently). Perhaps more salient disease primes would be necessary to affect social norms that are not directly related to the possibility of contracting a disease. Presenting a slideshow of pictures that depict contagious diseases may remind an individual that humans are vulnerable to harmful pathogens, however, its effect may not be strong enough to cause individuals to punish those who violate social norms.

Within the current study, pictures related to disease were rated as more disgusting than gun and neutral pictures, but this does not reveal whether or not participants thought of how the diseases depicted could affect them. Responses to the open-ended questions add to this concern as well, as only 7 of the 25 participants who experienced the disease pictures wrote about a personal experience related to illness. It should be noted that this explanation is somewhat at odds with Schaller et al. (2010) who found that participants who viewed these same pictures had a biological immune system response that was

consistent with defending against disease. It may be that these pictures are salient enough to elicit a biological response related to defending against disease, but not strong enough to affect a person's proclivity to retaliate when they perceive that a social norm is being violated. Future research dedicated to distinguishing between physiological and interpersonal responses to disease cues should provide more insight as to when each of these responses occur and why. It is possible that the BIS is not a first line of defense but an auxiliary line of defense.

Another possible explanation for why there was no interaction between prime and offer fairness is that restrictiveness concerning social norms may actually be a result of general threat arousal. Comparing participants in the disease and gun groups, there were no reported differences in perceptions of prime intensity, discomfort from the primes, or reports of troubling the primes were. Providing additional evidence for this alternative explanation, collapsing the disease and gun prime groups into a more general threat arousal group yielded a marginally significant main effect, where participants exposed threatening stimuli were more likely to reject unfair offers than those exposed to neutral stimuli.

This explanation was also modestly supported by the regression that treated picture ratings as predictor variables and the number of unfair offer rejections as an outcome variable. Although the effect size for the model as a whole was small (R^2 = .093), ratings of how troublesome the pictures were emerged as a significant predictor of unfair offer rejections. However, the overall effect was minimal, accounting for 6% of the overall variance. Unexpectedly, a similar regression model revealed that picture

ratings accounted for almost 17% of the variance in the number of *most unfair* offer rejections. Within this model, picture troublesome ratings and intensity ratings were significant predictors of *most unfair* offer rejections. This may suggest that the (potentially) threat arousing photosets were most effective in eliciting offer rejections in extreme situations, where proposers offered a small percentage of the overall stake. Accepting these *most unfair* offers may still be reasonable for a participant who prefers to collect some money rather than no money, and it is possible that general threat arousal plays a role in dissuading participants with this mindset.

Further supporting this explanation, regardless of condition, participants who rated the slideshow as more intense were more likely to reject unfair offers within the UG. It should be noted, though, that the study was not designed to test the hypothesis that general threat arousal causes a stronger reaction to norm violations, and that this finding is marred with limitations (i.e., unbalanced sample sizes for each group and no direct measure of threat arousal).

The use of the UG may explain why those in the disease group were not more restrictive than those in the gun and neutral groups. It may be argued that the UG is not an appropriate measure of social norm restrictiveness within this context. Within the current study, the UG allowed participants to punish individuals who made an unfair offer by possibly withholding money from them. It was believed that the rationale behind this type of punishment is that it keeps the person making the unfair offer in line with societal beliefs of fairness. In other words, this punishment may increase the likelihood that the person making the unfair offer will decide to be fair in future scenarios that

provide the ability to behave in varying degrees of fairness. However, given that fairness is not directly related to protecting one's self from disease, it is possible that the UG is not a good fit for measuring how disease threats impact social norms. Perhaps disease threats cause more restriction to norms that directly relate to disease instead of anything that falls under category of social norm (e.g., a person who violates hygiene rituals by not washing their hands after using the restroom).

It is important to note that there are many other factors that contribute to norm restrictiveness beyond threats of infectious disease. Across 33 nations, Gelfand and colleagues (2011) found that, in addition to disease threats, the historical prevalence of natural disasters, conflict with neighboring territories, high population density, and resource scarcity all contribute to the restrictiveness of a region's society. It may be that the threat of disease alone is not enough to elicit a costly punishment in response to an unfair act. Even if disease threats alone could affect norm restrictiveness in a broad sense, the pictures used to activate the BIS may not have been impactful enough to produce this effect. These pictures have caused a BIS response in previous research (Schaller et al., 2010), however, not in a context where the dependent measure was unrelated to illness.

Another possibility as to why the disease primes did not produce more norm restrictiveness than the gun primes follows the meaning-maintenance model (Heine, Proulx, & Vohs, 2006). According to this model, meaning can be threatened by an inconsistency with expectations, and one way to recover from a threat to meaning is to reaffirm a worldview (Proulx & Heine, 2008). Images that depict disease and guns may be inconsistent with a view of the world that is safe, however, it has also been argued that

any stimulus that causes aversive arousal will result in a desire to alleviate that arousal, and this is often done through compensatory behavior (Proulx, Inzlicht, & Harmon-Jones, 2012). Within the present study, participants were offered an opportunity to be punitive towards someone who was being unfair following aversive stimuli (i.e., disease or gun photographs), and therefore affirm the generally held belief in fairness. This explanation also draws support from the finding that participants who were exposed to disease and gun primes were more norm-restrictive than those who were exposed to a neutral prime.

Because there was no interaction between prime and offer fairness to moderate, PVD did not moderate the hypothesized interaction between prime and offer fairness. Despite this, PVD was entered into the analysis as a covariate to detect whether or not it was a mediator for the possible interaction between prime and offer fairness. While the *p* value for the interaction between prime and offer fairness was greatly reduced when entering PVD as a covariate, it still did not reach significance.

The fact that participants were more likely to reject most unfair offers, less likely to reject unfair offers, and least likely to reject fair offers provides some evidence to the internal validity of this study's version of the UG. Unfair offers should provide the most difficulty in deciding whether to reject or accept an offer because the percentage of money proposed is in between that of the other two extremes: fair offers (which would likely be accepted) and most unfair offers (which would likely be rejected). Given that it is the middle option, it should not be as obvious to an individual whether it is more worthwhile to accept the offer or to reject it at a potential cost to their earning. Therefore, it would be expected that participants would take more time to decide whether or not to

reject unfair offers, and indeed analyses revealed that overall participants took longer respond to unfair offers than either fair or unfair offers.

Limitations

One technological limitation that detracted from the external validity of the current study occurred through the randomization of pictures associated with each UG trail. Within the dataset provided by the program used to run the UG, there was no variable identifying which proposer picture was associated with each trial. Therefore, there was no way to test for any effect that each proposer picture may have had. It is possible that the perceived gender, attractiveness, ethnicity, or any other visual difference had an effect on whether or not a participant accepted or rejected an offer. Additionally, there was a pool of 24 pictures that the program running the UG could draw from, and there were 48 UG trails for each participant. If they recognized a proposer's picture a second time and the offer associated with that picture was different from the first time that picture appeared, participants may have responded differently. For instance, a participant may have been more likely to reject an unfair offer from proposer whose previous offer was most unfair.

Another limitation involving the UG was the offer type. For every trial, the stake was always the same (i.e., $7.00), and the offer amount was always the same for each level (i.e., $0.20, $1.00, $1.50). Future research into the BIS that uses the UG as a measurement for tolerance of social norms may want to utilize different stakes so that there are different offers. That way the percentage of the stake offered by the proposer can remain the same, but the actual value of the offer will be different. The format of the

current UG may not have appeared realistic to participants, which may have affected their responses to proposer offers. No participant indicated that they thought the task was unrealistic in debriefing, however that does not mean they did not actually think this.

The current study was also limited by a small sample. There were 76 participants that were spread across 3 different between-subjects conditions. With less than 30 participants in each group, it would take a strong effect in order to yield any significant differences. According to a post-hoc power analysis, the needed sample size with the obtained effect size was 282. However, even given this limitation, the number of rejections by condition were not trending in the predicted direction. While not significant, the unfair rejection mean was actually higher for those where exposed to the gun primes (M = 13.00) than those who viewed the disease primes (M =11.95). Therefore, the current study was lacking in power, but this alone does not explain why the expected results were not realized.

Conclusion

The relationship between disease and adherence to norms is well founded (Clay et al., 2012; Fincher et al., 2008; Gelfand et al., 2011; Murray & Schaller, 2012). However, the current study did not find much support for the theory that disease primes *cause* individuals to conform to these norms. Individuals who were introduced to disease cues were not more likely to altruistically punish others who violated the norm of fairness than those who experienced primes that were more threat arousing. There was some evidence to suggest that those who experienced disease cues punished norm violators more than those who viewed neutral cues, however this group did not punish at significantly

different rate than those who viewed generally threatening cues. The paucity of findings presented in this paper highlight the need for more research examining the relationship between the BIS and culture, and how they impact one another.

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APPENDIX A

PERCEIVED VULNERABILITY TO DISEASE

Read each of the following statements and indicate your agreement using the following scale:

Strongly Disagree **Strongly Agree**
1 2 3 4 5 6 7

1. It really bothers me when people sneeze without covering their mouths.
2. If an illness is ‘going around’, I will get it.
3. I am comfortable sharing a water bottle with a friend. (Reverse-scored)
4. I do not like to write with a pencil someone else has obviously chewed on.
5. My past experiences make me believe I am not likely to get sick even when my friends are sick. (Reverse-scored)
6. I have a history of susceptibility to infectious disease.
7. I prefer to wash my hands pretty soon after shaking someone’s hand.
8. In general, I am very susceptible to colds, flu and other infectious diseases.
9. I dislike wearing used clothes because you do not know what the last person who wore it was like.
10. I am more likely than the people around me to catch an infectious disease.
11. My hands do not feel dirty after touching money. (Reverse-scored)
12. I am unlikely to catch a cold, flu or other illness, even if it is ‘going around’. (Reverse-scored)
13. It does not make me anxious to be around sick people. (Reverse-scored)

14. My immune system protects me from most illnesses that other people get. (Reverse-scored)
15. I avoid using public telephones because of the risk that I may catch something from the previous user.

APPENDIX B

DISEASE PRIME GROUP EXAMPLE PICTURES

APPENDIX C

GUN PRIME GROUP EXAMPLE PICTURES

APPENDIX D

NEUTRAL PRIME GROUP EXAMPLE PICTURES

APPENDIX E

PICTURE RATING ITEMS

As best as you can estimate, how many pictures did you just view?

_____

Using the scales below, tell us more about the pictures.

How intense were the pictures?

1	2	3	4	5
Not at all				Very

How disgusting were the pictures?

1	2	3	4	5
Not at all				Very

How uncomfortable did the pictures make you feel?

1	2	3	4	5
Not at all				Very

How complicated?

1	2	3	4	5
Not at all				Very

How troubling were the pictures?

1	2	3	4	5
Not at all				Very

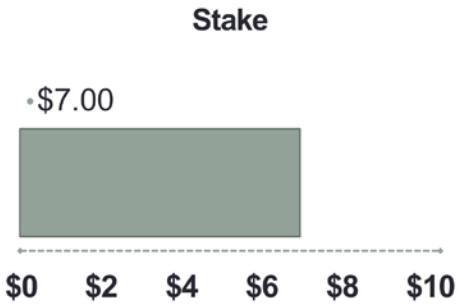
In less than 200 words, please write about a time in which you encountered something similar to the pictures within the slideshow.

(Space provided)

APPENDIX F

ULTIMATUM GAME PROCESS

Picture of the proposer, displayed for 1.5 seconds



The stake, displayed for 1 second

The offer, displayed until participant accepted or rejected

APPENDIX G

EXPERIMENTER'S SCRIPT

Make sure that there are enough materials (e.g., consent forms, questionnaires, and email slips) for the sessions that you will be running

Before participants arrive, check the participant list and set up the computer according to the participant's condition. For instance, if the participant is listed as condition 2, select the DirectRT file called condition 2. Enter the participant's number and their condition when prompted within DirectRT. Turn off the monitor.

Place two consent forms at each desk.

Introduction

Hi, are you here for the study called Negotiating with People? Please take a seat at one of the two desks on the right side of the room.

First let me tell you a little about the study. We are going to ask you to play something we call the negotiation game. The game has two players. Because we want to record our responses quickly on the computer, you will be playing this game with participants that have already been in the lab. In the future, new participants will play with you based on your choices today. As mentioned earlier within the game, there are two players: a Proposer and a Responder.

The object of the game is negotiate what you think is a reasonable division of money between yourself and the other player. There will be several "negotiations" or what we call trials. In each trial you will see an amount of money, called the stake. For example, let's say the stake is $3. As the proposer, you would tell us how much of that $3 you want to share with the responder. As the responder, your job will be to quickly decide if the amount offered is reasonable, and quickly decide whether to accept or reject the offer. If the responder accepts the offer, then both parties get the agreed upon amount. However, if the responder rejects the offer, nobody gets any money in that round.

In the game you will play as both the responder and the proposer, but as the responder you will be playing with a participant who has already submitted his or her proposals. Then, it will be your turn to act as the proposer for a new round of negotiations, and these proposals will be offered to other participants in future study sessions.

Now, to make the game more interesting, you will also receive some cash today based on the offers you accept in the game. This money is in addition to your credit hours. I'll explain how this works more before we start the game.

But, before we go any further, I'd like you to look over the consent form in front of you. If, after reading it, you do wish to participate, you can sign and date one copy and keep the second copy for your records. Once you have completed the consent form, please return it back to me.

If the participant returns a signed consent form, hand them a questionnaire.

Questionnaire
First we ask that you fill out this questionnaire that asks assesses personality, as we are interested in how personality affects how people negotiate.

Please fill out this questionnaire and return it to me when you are finished.

Wait for the participant to finish. When they return the questionnaire, mark the participants' number in the top-right corner.

*If the participant did **not** consent to having their picture taken, continue to the slide show portion of the experiment.*

Photograph
Have the camera ready. The participant's photo should be taken against the side of the bookshelf.

Within the negotiation game, you will be seeing photographs of people who have previously made offers. In order for other participants to see your photograph when responding to your offers, we are going to take your picture. Please stand against the side of the bookshelf.

Because people may negotiate differently based on the emotions of others, we are asking everybody who is playing to show as little expression as possible during the photograph.

Take the picture and show it to the participant, ask them if the photograph is okay, and place the camera back at the experimenter's desk.

Slideshow
Okay, please return to your seat. Before continuing on to the negotiation game, I need time to process your photograph. In the meantime, I am going to ask for your feedback on pictures that another person in our lab is hoping to use for a future study. After you view the pictures on the computer, there will be a few short questions about the pictures. In order to cut down on distracting noises, we ask that you wear these headphones during the computer portions of the study.

Turn the monitor on and press the "R" key on the keyboard.

“Process pictures” at the desk by the window. Click around, type, etc.

Negotiation Game

We’re now ready for the negotiation game. Remember that the game consists of two players. In the 1st round you’ll be the responder, and will decide if you accept or reject the proposal amounts. If you accept an offer, than both parties will receive the amount of money that was agreed upon for that round. If you reject an offer as the responder, than neither you nor the proposer will receive any money for that trial.

In the second round, you will be acting as the proposer and you will have a chance to decide how offers should be divided. In either round, you will have several trials where you make your decision.

During a trial, you will first see the proposer’s picture, followed by the stake or amount of money under negotiation. You will then see the amont of money offered by the proposer, at which point you must chose to accept or reject the offer by pressing either the “G” or “H” key on the computer.

You will go through many of these trials as the responder, so please respond to each offer as quickly as possible. At the end of the experiment, one trial will be selected at random from all those trials you accepted as a responder, and one trials will be selected at random from all trials that you participated in as a propser. We will then take the average amount of money you won from those two rounds, and that is the amount you will receive.

Before getting started, please write your email address down on this slip of paper so we can contact you about collecting your money at the conclusion of the study.

Hand participant an email slip and wait for them to fill it out.

Okay, any questions before you begin?

Pause for questions.

Alright, just remember to use the spacebar to advance the instruction slides, and keep in mind that you will not be able to move back.

The computer will cover the instructions one more time, and you will participate in a few practice trials before you begin.

Press the “R” key on the keyboard, and return to the experimenter’s desk.

Debriefing

Alright, it looks like you both have finished. We are going to go ahead and stop the study now. First, let me thank you for your participation. Before I excuse everyone, I wanted to get your overall impressions of the study. Did you have any questions?

Pause for questions

Were there any instructions that were unclear, or a portion of the study that did not make sense to you?

Pause for response

What did you think the study was about?

Pause for response

Did anyone tell you about this study before your participation today?

Pause for response

While we told you that you were completing two studies today, you were actually completing one larger study. This larger study will help us better understand how threats in our environment can affect our values and preferences. Specifically, some of you were asked to view a series of illness related pictures, and this tasks was designed to momentarily activate thoughts and feelings associated with contagion and threat of illness. Other participants either viewed pictures of people with guns or neutral landscapes.

Previous research has shown that being reminded of these disease-related thoughts and feelings affects how we think about social norms and what is acceptable behavior within our larger social groups. Consistent with that research we believe that those who viewed pictures related to disease would be more likely to reject unfair offers within the negotiation game, compared to those who viewed guns or neutral landscapes.

The actual purpose of the study was not fully disclosed at the beginning to ensure more natural and realistic responses from participants. The proposers were an experimental fiction, and all proposals were predetermined by the researchers. There is no actual round two of the negotiation game, and you will not be contacted again via email. A random trial will not be selected as a reward, however to be fair, all participants will receive the maximum amount of possible within the game, which was $3.15.

Finally, the last thing I would like to ask each of you is to not discuss this study with anyone else until the end of the semester. We will be collecting more data over the next few weeks, and if participants know what they study is about before they arrive it wil bias our responses and damage our results.

Can I trust each of you not to talk about the study?

Wait for response

Thank you.

Pay participants and obtain signed receipt.