

Examination of Gender and Age Differences
in Disgust Sensitivity

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Abstract

Disgust sensitivity (DS) is the strength of response an individual has to a disgust-eliciting stimulus, such as feces or a bloody injury. It is believed that DS evolved as a way to prevent illness and to protect an individual from potentially harmful substances. Previous research suggests a relationship between gender and DS, as women tend to be higher in DS than men. The purpose of this study was to replicate this finding using a larger, representative sample, and to investigate levels of DS across the lifespan. Additionally, we hypothesized that younger women would have higher levels of DS than older women, particularly for the contamination and core DS subscales. Participants in this study included US citizens who were online Amazon MTurk workers. There were 1,339 participants, 804 women and 535 men, ages 18 to 83 years old. Participants completed the Disgust Scale, which included the Core Disgust, Animal-Reminder, and Contamination subscales. Multiple regression analysis demonstrated that gender more than age reliably predicted several different types of disgust sensitivity. In addition to several main effects, there was one interaction demonstrating that younger women were more likely to report higher levels the Contamination component of DS. These findings may be interpreted through an evolutionary as well as a cultural lens, and may be relevant for understanding psychological disorders that are linked to disgust.

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Examination of Gender and Age Differences in Disgust Sensitivity

Disgust sensitivity (DS) is the degree or intensity to which an individual reacts to common disgust stimuli, such as rotten food or open wounds (Sherlock, Zietsch, Tybur, & Jern, 2016). DS may play an important role within *Homo sapiens*' evolutionary development (Sherlock et al., 2016), and it may function to protect against harmful diseases (Oaten, Stevenson, & Case, 2009). If DS is related to human evolution, then it likely has a genetic influence. Sherlock et al. (2016) researched individual differences within DS. Using female twins, the researchers controlled for environmental factors to expose the role of genes. Their findings supported the hypothesis that individual differences in DS have a strong heritability component. There is also evidence that DS corresponds to specific areas of the brain. Davidson (1992) found that exposure to disgusting stimuli increased activity in the right frontal cortex, the area of the brain related to negative affect. Given the potential evolutionary underpinnings of disgust, the purpose of this study is to investigate, understand, and learn more about how gender and age relate to DS using a large, representative sample.

Measuring Disgust Sensitivity

Haidt, McCauley and Rozin (1994) developed the Disgust Scale to investigate the emotional and functional aspects of DS. Originally, the disgust scale was a 32-item scale that measured an individual's level of disgust across eight domains: food, animals, body products, body envelope violations, death, sex, hygiene, and sympathetic magic. Sympathetic magic is defined as improbable contamination, broken into the law of similarity (something that resembles a toxic object is toxic) and law of contagion (once in contact always in contact; Olatunji, Sawchuk, Lohr, & de Jong, 2004). Since then, these categories were condensed to

measure the three primary domains of DS: Core disgust, Animal-Reminder disgust, and Contamination disgust. Core disgust is defined as caution related to putting things within one's mouth, including food, body products, and animal's domains (de Jong, Peters, & Vanderhallen, 2002). Animal-reminder is defined as an aversion to stimuli that are reminiscent of our animal ancestry and includes sex, personal hygiene, body envelope violations (i.e. blood injury), and death domains. Contamination disgust can be defined as caution related to germs and individuals with unknown illnesses or diseases (Olatunji, Haidt, McKay, & David, 2008).

Evolutionary Foundation of Disgust Sensitivity

Women have been shown to have consistently higher levels of DS compared to men (Al-Shawaf, Lewis, & Buss, 2015; Berger & Anaki, 2014; Björkund & Hursti, 2004; Curtis, Aunger, & Rabie, 2004; Rohrman, Hopp, & Quirin, 2008; Tybur, Bryan, Lieberman, Caldwell Hooper, & Merriman, 2011; Tybur, Lieberman, & Griskevicius, 2009). This supports the theory that DS can function as a way for women to prevent inferior mating practices from occurring in order to protect themselves and increase the likelihood of their offspring's survival. As women have higher biological cost during reproduction, it would make sense that women be more cautious and selective through higher evolutionarily higher levels of DS. Fessler, Eng, and Navarrete (2005) corroborated this hypothesis when they found that pregnant women become more disgusted by foods and illness within the first trimester of pregnancy, perhaps to safeguard against serious threats to the fetus. The researchers theorized that because the immune system is more suppressed during the first trimester, DS increases as a defense mechanism. It has also been proposed that as a part of keeping an individual healthy, DS can also affect mating practices. Tybur, Inbar, Güler, and Molho (2015) found that individuals seeking to avoid pathogens tend to engage in sex through a monogamous mating strategy. It has also been found that those who

have a stronger inclination towards short-term mating practices have lower levels of sexual disgust (Al-Shawaf, Lewis, & Bush, 2015).

Gender, Age, and Disgust Sensitivity

Tybur and colleagues (2011) investigated three different types of DS: sexual, pathogen, and moral. Sexual disgust is theorized to be a measure to prevent fitness reducing genes from re-entering the gene pool. Pathogen disgust protects against dangerous microorganisms, and moral disgust protects against harmful violations of social codes. It was found that women were significantly higher than men in sexual disgust and slightly higher in pathogen and moral disgust. Tybur et al. (2009) produced similar results with women scoring higher on all three disgust types than men, but the largest difference was within the sexual disgust category. Bassett (2017) found that women had higher overall DS than men. These results have been replicated by Haidt et al. (1994) and Druschel and Sherman (1999) with both finding that women were more sensitive to disgust than men were. These findings seem to suggest that while women overall may be higher in DS, the degree of that difference varies depending on what type of disgust is being considered. Many of these studies had sample sizes smaller than three hundred participants and the mean age of the participants was often around 20 years old, as most of their participants were college students. Their samples were predominantly white. Tybur et al. (2011) did have a large sample of 1,496 participants in which 71% were women. Their participant's ages ranged from 18-78, with the mean age being 33 years old. This study did not use the Disgust Scale-Revised (DS-R), as they used the Three Domains of Disgust Scale (TDDS).

It has also been theorized that DS, specifically sexual disgust, evolved to prevent subpar sexual pairing from occurring. Previous studies have found women to be more sensitive to sexual disgust than men (Al-Shawaf et al., 2015; Tybur et al., 2009; Tybur et al., 2011). Quigley,

Sherman, and Sherman (1997) found women higher in DS than men using the Disgust Scale. These differences between men and women from an evolutionary viewpoint may result from women's significant investment of more energy and physical resources in the development of a child. Because of their increased biological cost women may have increased sexual disgust to prevent mating with a male that carries poor genes, such as a birth defect or physical illness (Tybur et al., 2009).

Lee and Zietsch (2015) investigated pathogen disgust in women and their preferences in facial masculinity, using facial masculinity as a measure of good evolutionary health, and found a positive association between young women who preferred masculine faces and DS. This supports the evolutionary explanation that DS influences mating practices, as facial masculinity may be associated with traits that are beneficial to partnerships, such as good health or strength. There is also evidence to support that sexual arousal may aid mating practices by decreasing sexual disgust within women; although no such effect was found in men (Borg & de Jong, 2012; Lee, Ambler, & Sagrin, 2014). Many substances associated with sexual reproduction, like saliva and body odors, are generally associated with disgust. Sexual arousal may serve as a way to lower individuals DS levels to support sexual reproduction. Lee and Zietsch (2015) also reported age effects for pathogen disgust in that the relationship between facial masculinity and pathogen disgust only applied to young adult women. They theorized that because older women are less likely to reproduce, the relationship would not be as strong. This has been corroborated by other studies showing that general DS decreases with age (Berger & Anaki, 2014; Curtis et al., 2004; Fessler & Navarrete, 2003; Quigley et al., 1997). Fessler and Navarrete (2003) looked exclusively at women, but Quigley et al. (1997) found that DS decreases with age for both men and women. Curtis et al. (2004) found that DS declines with age for both men and women.

Berger and Anaki (2014) found weak associations between age and DS in a sample ranging from 12 to 85 years of age using the Disgust Scale-Revised (DS-R) for both men and women, as younger participants had higher levels of DS. If DS functions to prevent evolutionarily undesirable mating behaviors, then we would expect women to experience higher levels of DS compared to men, and higher DS levels during ages typically associated with prime reproductive years. As previous research supports, it is hypothesized that women will score higher in DS than men.

Current Study

Very few studies have looked at DS and age within the context of mate evolutionary theory, this study hopes to advance understanding between these two variables (Curtis et al., 2004; Fessler & Navarrete, 2003; Lee & Zietsch, 2015; Quigley et al., 1997). This study also has a much more diverse age range compared to previous research within this area, as most mean ages for participants are around 20 years old. Of those studies with more diverse age range they typically look only at women or do not use the DS-R Scale. As the original scale, it directly measures the three subscales, while other disgust scales do not. Very few studies with a broad age range and large number of participants exist that have examined age differences in DS and its subscales (Curtis et al., 2004). For this study, it is hypothesized that women will have higher levels of DS than men and that younger individuals will have higher levels of DS compared to older individuals. It is hypothesized that younger women within prime reproductive years will be higher in DS, specifically within contamination disgust, as a measure to prevent against suboptimal mating behaviors and disease avoidance. It is hypothesized that these differences may also present themselves within the animal-reminder subset, as sex within the animal-

reminder subset includes avoiding sexual partners that may result in higher reproductive costs (Tybur et al., 2009).

Methods

Participants

Participants were all US citizen Amazon MTurk workers ranging between 18 and 83 years old. All participants completed an online survey on the topic of adult development. The Institutional Review Board of Appalachian State University approved of the study survey. The mean age of participants was 40.39 ($SD = 13.39$). There were a total of 1,339 participants, with 804 women and 535 men. Eighty percent of participants were white, 10% were black, 5% Asian, and 3% Hispanic. The mean BMI was 27.67 ($SD = 7.18$). Fifty-three percent of the sample completed at least a four-year college degree. The current study is a part of a larger study that investigated picky eating behaviors in adults.

Measures

Demographics. Various questions regarding the participants' demographic factors were included in the survey. These factors included family income, educational attainment, age, race, and gender.

Disgust Sensitivity. The Disgust Scale Revised with 25 items total (DS-R) was used to measure DS (Olatunji et al., 2007; Rozin, Haidt, & McCauley, 2008). We examined the Core Disgust Subscale consisting of 12 items that measured the participants overall feeling of repulsiveness and contamination in response to multiple disgust evoking stimuli. The Core, Animal-Reminder, and Contamination Disgust Subscales were rated using a 5-point Likert scale in which "0 = No disgust or repugnance at all" to "4 = Extreme disgust or repugnance." In previous studies, the subscales exhibited good psychometric properties (Olatunji et al., 2007; van

Overveld, de Jong, Peters, & Schouten, 2011). In this sample, subscales showed acceptable internal consistency (Core; $a = .80$; Animal-Reminder; $a = .82$; Contamination; $a = .71$).

Results

Descriptive characteristics of the sample, compared by gender, may be found in Table 1. There was a wide range of ages across the sample for both genders. There was also a range of socioeconomic statuses in the sample, though overall, the sample was affluent compared to the general population (US Census Bureau, 2017). Most participants had at least some college, and the number of participants completing a four-year degree or more was higher than the general population of 33% in 2016 (US Census Bureau, 2016).

A set of *t*-tests showed that DS varied by gender and was consistently higher in women across all subscales; see Figure 1. A series of two-tailed Pearson correlations revealed several significant relationships among gender, age, and DS (see Table 2). There were consistent positive relationships between gender and DS for total DS score and for all three subscales, indicating that women had higher DS levels than men. The relationship between age and DS appeared weaker, only age and the Animal-Reminder subscale were negatively correlated, implying that this specific type of DS declines slightly across adulthood. Gender was positively correlated with the total DS score, $r(1337) = .246, p < .001$, while age was negatively correlated with the total DS score, $r(1337) = -.110, ns$. All of the DS subscales were highly positively correlated with one another.

A series of multiple regression analyses revealed a strong main effect of gender predicting DS across subscales, particularly the Core and Animal-Reminder subscales, Table 3, further indicating that women were more likely to have higher levels of DS. Age was less predictive of DS, results showed a modest main effect of age only for the Contamination

subscale, indicating that older adults had slightly lower levels of Contamination disgust. The total DS score regression mirrored these findings, Total DS: $R^2 = .066$, $F(3,1335) = 31.63$, $p < .001$, age ($\beta = -.144$, *ns*), gender ($\beta = .246$, $p < .001$), age x gender interaction ($\beta = .009$, *ns*). There was a modest interaction effect for relationship between gender and age and the Contamination subscale, suggested that younger women were more likely to have the highest levels of Contamination DS.

Discussion

This study investigated gender and age differences in three components of disgust sensitivity. It was found that women have higher levels of DS than men for all three subscales of DS. Age predicted differences in only one subscale, Contamination. Similarly, Contamination was the only subscale that had a significant interaction between age and gender, such that younger women showed the highest levels of Contamination DS.

This study supports previous findings that reporting that women more often perceive elevated levels of DS compared to men (Al-Shawaf et al., 2015; Berger & Anaki, 2014; Curtis et al., 2004; Fessler et al., 2003; Rohrmann et al., 2008; Tybur et al., 2009; Tybur et al., 2011). Evolutionary theory provides one way of understanding this finding. Evolutionarily, it would be beneficial for women to have higher levels of DS as they often must protect their children and themselves from illness, especially during pregnancy. Women are also often the ones with higher biological cost compared to men, as they use more energy and resources to birth and raise their children (Tybur et al., 2009). There is strong support for the idea that DS evolved as a way to protect one's self from illness. DS has been found to increase during the first trimester of pregnancy (Fessler et al., 2005) and certain aspects of DS have been linked to mate preference

and arousal (Lee et al., 2014; Lee & Zietsch, 2015). These findings suggest that DS is associated with disease avoidance and is connected to various aspects of reproduction.

Women could also have higher levels of DS than men because of the effect societal and gender biases have on developing children. As boys are raised, they may be encouraged to interact and explore typically disgusting things throughout their childhood, such as insects, while girls are not. It would be interesting to know the extent to which this varies across cultures. If there was wide variability in this type of socialization across cultures, we would expect to see the relationship between gender and DS vary accordingly. If there was little variability in gender role expectations regarding DS, then the gender and DS relationship would be expected to be stable as well. This phenomenon has not been thoroughly researched and the translation of the DS-R into other languages, cultures, and countries has yet to be perfected (Olatunji et al., 2009). There is some evidence to support different DS levels in general within different countries compared to the United States (Sawchuk, Olatunji, & De Jong, 2006), while some studies using an adapted disgust scale looking at other countries find women to have higher levels of DS than men (Giampietro et al., 2017).

These findings provide marginal support for the finding that DS decreases with age (Curtis et al., 2004, Fessler & Navarrete, 2003, Fessler et al., 2003), indicating a decrease over the lifespan for both genders, but a stronger decrease for women. This effect was only found to be significant for the contamination subscale, indicating that contamination DS in particular decreases, as one gets older. Perhaps when a person is no longer of prime reproductive age their evolutionarily necessity to avoid toxins and infection decreases over time, regardless of gender. Curtis et al. (2004) suggested this effect for general DS might be due to the general downward trend of brain reactivity over time. However, given the significant interaction effect, even though

men's contamination DS decreases over time, the women in this sample had a more significant change. This may suggest that disease and pathogen avoidance may be particularly important and tied to age more than the core subscale and Animal-Reminder subscale. The reasoning behind this could support the idea that disgust is related to immune system functioning (Fessler et al., 2005; Stevenson et al., 2012). Knowing more about DS could enlighten researchers of a way in which the immune system functioning is openly expressed through disgust. This could have important implications for future research directions investigating DS or immune system functioning.

The overall strengths of this study are that it has a diverse range of ages compared to a majority of studies that used college-aged individuals. This is an advantage when investigating the effects of age and DS given that very few studies have adequate age variability to examine the effects of age (Curtis et al., 2004; Lee & Zietsch, 2015; Quigley et al., 1997). This study also investigates three individual components of DS: Core, Animal-Reminder, and Contamination. Studies that do not break down general DS into the specific components potentially miss nuances that the current study was able to uncover—specifically the differential effects of age across components. Limitations include the use of a self-report survey using a cross-sectional design rather than a longitudinal study. A longitudinal study would be ideal when investigating the effects of age on DS levels because it would allow for the tracking of changes in DS in individuals over time. Although the sample is relatively heterogeneous compared to previous studies, these results may not be generalizable to the general population or cross-culturally.

Findings from this study support previous research that women have higher levels of DS than men and that some aspects of DS (contamination) may be subject to change over time, specifically decline with age in women. Further understanding disgust may help in understanding

other disorders that are suspected to be associated with disgust, such as obsessive compulsive disorder (OCD), eating disorders, and various phobias. For example, several previous studies indicate that that OCD symptomology is positively related to disgust (Armstrong & Olatunji, 2017; Bhikram, Abi-Jaoude, & Sandor, 2017; Davey, 2011; Sprengelmeyer et al., 1997). Learning about the developmental trajectory of disgust may improve treatments for these disorders, especially OCD, by allowing for a deeper understanding of an underlying factor.

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Table 1

Demographic Variables by Gender

	Women	Men
	Number (%)	Number (%)
Gender	804 (60.0%)	535 (40.0%)
Age Range	18-83 years old	18-77 years old
18-28	167 (20.8%)	127 (23.7%)
29-38	243 (30.2%)	174 (32.5%)
39-48	133 (16.5%)	100 (18.7%)
49-58	138 (17.2%)	83 (15.5%)
59-68	108 (13.4%)	43 (8.0%)
69-78	14 (1.7%)	8 (1.5%)
79-88	1 (0.1%)	0 (0.0%)
Education		
Less than High School	4 (0.5%)	1 (0.2%)
High School / GED	88 (10.9%)	58 (10.8%)
Some College	207 (25.7%)	104 (19.4%)
2-year College Degree	111 (13.8%)	56 (10.5%)
4-year College Degree	270 (33.6%)	235 (43.9%)
Master's Degree	87 (10.8%)	64 (12.0%)
Doctoral Degree	12 (1.5%)	12 (2.2%)
Professional Degree (JD, MD)	18 (2.2%)	2 (0.4%)
Technical or Vocational School	7 (0.9%)	3 (0.6%)
Income		
Less than \$20,000	137 (17.0%)	70 (13.1%)
\$20,000-\$35,000	179 (22.3%)	116 (21.7%)
\$35,000-\$50,000	178 (22.1%)	114 (21.3%)
Over \$50,000	310 (38.6%)	235 (43.9%)
Race		
White/Caucasian	648 (80.6%)	422 (78.9%)
African-American	85 (10.6%)	44 (8.2%)
Hispanic	26 (3.2%)	20 (3.7%)
Asian	30 (3.7%)	36 (6.7%)
Native American	4 (0.5%)	6 (1.1%)
Pacific Islander	0 (0.0%)	1 (0.2%)
Other	11 (1.4%)	6 (1.1%)

Table 2

Two-tailed Pearson Correlations Among Gender, Age, and Disgust Sensitivity Measures

Measure	1	2	3	4	5
1. Gender	—				
2. Age	.08*	—			
3. DS - Core	.31**	-.05	—		
4. DS - Contamination	.07*	-.04	.61**	—	
5. DS - Animal Reminder	.17**	-.11**	.65**	.53**	—

Note: DS = Disgust Sensitivity, * = $p < .01$, ** = $p < .001$

Gender Coding: 1 = Male, 2 = Female; N = 1339

Table 3

Multiple Regression Analysis of Gender, Age, and Gender X Age Interaction Predicting Disgust Sensitivity

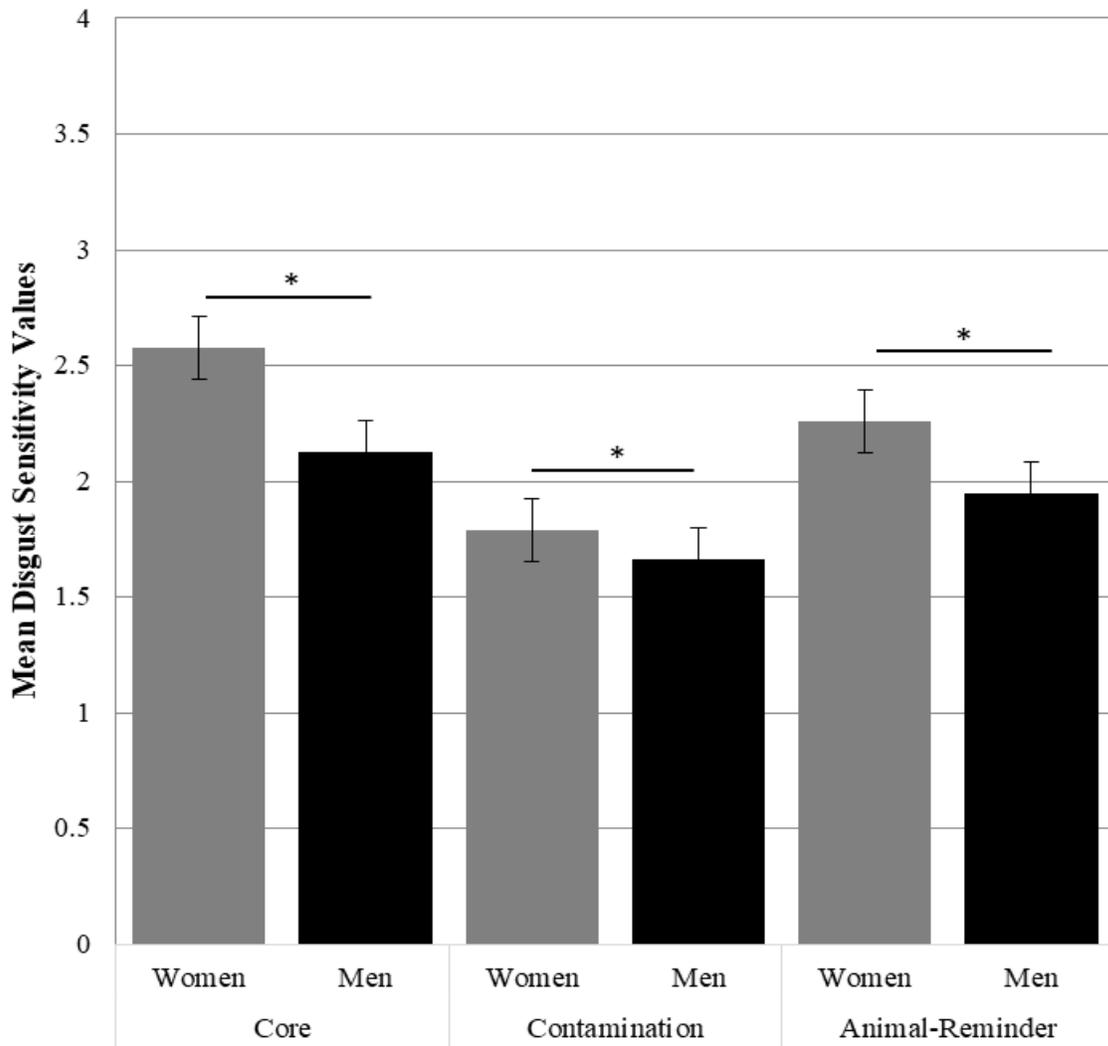
	Core Disgust				Contamination Disgust				Animal-Reminder Disgust			
	B	SE	β	<i>p</i>	B	SE	β	<i>p</i>	B	SE	β	<i>p</i>
Gender	.45	.04	.31	.00**	.14	.05	.08	.00*	.33	.05	.18	.00**
Age	-.00	.01	-.03	.78	-.02	.01	-.24	.02*	-.01	.01	-.09	.34
Gender x Age Interaction	-.00	.00	-.05	.63	.01	.00	.19	.05*	-.00	.00	-.04	.71
	$R^2 = .099$ $SD = .71145$				$R^2 = .011$ $SD = .87822$				$R^2 = .044$ $SD = .90677$			

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

Gender Coding: 1 = Male, 2 = Female; N = 1339

Figure 1

Mean Disgust Sensitivity Values by Gender



Note: * = $p < .05$