

# The relation between disgust sensitivity and risk-taking propensity: A domain specific approach

Baříš Sevi\*      Natalie J. Shook†

## Abstract

Disgust is a cross-culturally recognized emotion that is characterized by avoidant or cautious tendencies. Accordingly, greater sensitivity to disgust may be related to less willingness to take risks. Relatively little research has examined the association between disgust sensitivity and risk-taking propensity. Further, no research to date has taken a domain specific approach to understanding the association between these constructs. Across two studies ( $N_1=98$ ,  $N_2=390$ ) and a mini-meta analysis utilizing two additional datasets (total  $N=1981$ ), we assessed the extent to which domain specific disgust sensitivity (i.e., Pathogen, Sexual, and Moral) were related to domain specific risk-taking propensity (i.e., Social, Recreational, Health/Safety, Ethical, and Financial). We conducted two cross-sectional studies, with a community and a student sample. Participants completed surveys that included measures of disgust sensitivity and risk-taking propensity. Bivariate correlations across the two studies indicated that greater disgust sensitivity was related to lower risk-taking propensity across almost all domains. However, when controlling for covariance among the disgust sensitivity domains, regression analyses suggested variability in the association between disgust sensitivity and risk-taking propensity depending on domains. Based on mini meta-analysis, sexual disgust sensitivity had the strongest relationships with social risk-taking propensity and health/safety risk-taking propensity, and moral disgust sensitivity had the strongest relationship with ethical risk-taking propensity. These findings suggest the presence of domain specific relations between disgust sensitivity and risk-taking propensity. The domain specific focus may help in utilizing disgust as a factor to decrease certain risky behaviors (e.g., moral disgust for decreasing plagiarism).

**Keywords:** disgust sensitivity, risk-taking propensity, individual differences, mini meta-analysis

---

\*University of Connecticut, Department of Psychological Sciences, 406 Babbidge Road, Unit 1020 Storrs, CT 06269. E-mail: baris.sevi@uconn.edu. <https://orcid.org/0000-0001-9663-4339>.

†University of Connecticut and West Virginia University. <https://orcid.org/0000-0002-4794-408X>.

This work was supported by a Senate Research Grant from West Virginia University. The funding organization was not involved in designing the study, collecting and analyzing the data, or preparing the manuscript.

Copyright: © 2021. The authors license this article under the terms of the Creative Commons Attribution 3.0 License.

# 1 Introduction

Every day we are faced with multiple decisions, some of which involve risk, or uncertainty of a positive or negative outcome. The level of risk depends on the problem (e.g., trying a new coffee drink, moving to a new city) and the individual's subjective evaluation of the decision options. Several individual differences are associated with risk perception and risky decisions. For example, older age (Defoe et al., 2015), higher levels of anxiety (Maner et al., 2007), and being more conscientiousness (Nicholson et al., 2005; Weller & Tıkar, 2011) are associated with less risk taking. Disgust sensitivity is another individual difference factor that may be related to risk taking, but has received relatively little empirical examination (e.g., Karg, Wiener-Blotner & Schnall, 2019; Sparks et al., 2018). Further, both disgust sensitivity and risk-taking propensity have been conceptualized as domain specific (Tybur, Lieberman & Griskevicius, 2009; Weber, Blais & Betz, 2002), but no research to date has assessed the association between the two constructs taking a domain specific approach with *both*. Thus, the goals of this research were to examine the extent to which disgust sensitivity was related to risk-taking propensity and whether the association between the constructs was domain specific.

## 1.1 Disgust and Risk-taking

Disgust is a cross-culturally recognized emotion with a primary function to reduce exposure to pathogens and resultant infectious disease (Curtis, De Barra & Aunger, 2011). Specifically, common sources of pathogens (e.g., feces, blood, mucous) evoke the emotion of disgust, which motivates avoidance of the disgust-eliciting stimulus, thereby reducing the risk of pathogen transmission (Oaten, Stevenson & Case, 2009). Although disgust is universally present, individuals vary in their levels of disgust sensitivity (Haidt, McCauley & Rozin, 1994; Olatunji et al., 2007; Tybur et al., 2009). That is, those who are more disgust sensitive are more easily disgusted and experience disgust more strongly, whereas those lower in disgust sensitivity are less easily disgusted and experience disgust less intensely. Disgust sensitivity is considered a relatively stable trait and has been shown to be reliable over time (Merckelbach et al., 1993; Rozin, Lowery & Ebert, 1999; Woody & Teachman, 2000).

Theoretically, those higher in disgust sensitivity should perceive more pathogen threats in their environment and thus be more cautious and avoidant, in order to reduce contact with potential pathogens. Indeed, empirical work demonstrates that greater disgust sensitivity is associated with greater dangerous worldviews (i.e., beliefs that the world is threatening; Shook, Ford & Boggs, 2017) and more avoidant behavioral tendencies, as assessed by both self-report and behavioral measures (Armstrong et al., 2014; Reynolds et al., 2016; Shook, Thomas & Ford, 2019). These tendencies are also evident in social correlates of disgust sensitivity. For example, greater disgust sensitivity is consistently associated with socially conservative beliefs and values (see Terrizzi, Shook & McDaniel, 2010, for a review),

which encourage caution towards change and avoidance of people from different groups (Altemeyer, 1988).

Based on the theoretical and empirical link between disgust and caution or avoidance, it follows that disgust would be associated with a lower propensity to take risks. Indeed, a few studies support this negative relation. Prokosch et al. (2019) primed participants with either pathogen threat or an academic threat. They found that participants in the pathogen threat condition were less inclined to take risks in a behavioral risk assessment task and reported less risk-taking propensity on a self-report measure than those in the academic threat condition. Similarly, Fessler, Pillsworth & Flamson (2004) found that women who were induced with disgust took fewer risks in a behavioral choice task than women in a control group (no emotion induction). However, there was no effect of the disgust induction on risk taking in men. Greater disgust sensitivity has also been related to less risk-taking propensity (Sparks et al., 2018) and a heightened perception of risk (Karg et al., 2019). Together, these few studies suggest a negative relation between disgust and risk-taking propensity. However, the question remains as to how robust this relation is when taking a domain specific approach to risk taking *and* disgust sensitivity.

## 1.2 Domains of Risk Taking

An individual's propensity or willingness to take risks depends on the context (Hanoch, Johnson & Wilke, 2006). For example, both bungee jumping and investing in the stock market involve risks. However, the assessment of risk for each decision is not necessarily equivalent. A person may choose to take the risk for the stock exchanges but avoid the risk associated with bungee jumping, or vice versa. The individual's perception of risk level depends on the specific situation and contextual factors (Weber et al., 2002; Weller & Tikir, 2011). As such, scholars have argued that risk-taking propensity is domain specific and should be assessed accordingly (Figner & Weber, 2011; Weber et al., 2002).

Weber et al. (2002) defined five different domains for risk taking: recreational (e.g., doing extreme sports), health/safety (e.g., seatbelt use), social (e.g., confronting family members), ethical (e.g., cheating on an exam), and financial (e.g., stock market trading). Although not necessarily independent (i.e., risk taking across the domains correlate weakly to strongly; Highhouse et al., 2017; Frey, Duncan & Weber, 2020), the domain specific measures differentially predict outcomes (Highhouse et al., 2017), and individuals show differences in risk-taking across domains (Weber et al., 2002). Thus, the domain specific approach provides a nuanced examination of risk-taking propensity. For example, men are generally found to take more risks than women (Byrnes et al., 1999), but a domain specific examination shows that men are more likely to take risks in financial, ethical, and recreational domains, whereas women take more risks in the social domain (Figner & Weber, 2011).

Taking a domain-specific approach to risk taking may demonstrate differential effects between disgust and risk-taking propensity. For instance, given the health promotion

function of disgust (i.e., infectious disease avoidance), one might expect that disgust or disgust sensitivity would be more strongly associated with risk taking in the health/safety domain, whereas risk taking in ethical or financial domains seems less related to disgust. Karg et al. (2019) assessed the association between disgust sensitivity and risk-taking perception, as assessed by the risk perception variant of the domain-specific risk-taking scale (DOSPERT; Blais & Weber, 2006). In two studies, they reported that independent of gender and age, greater disgust sensitivity was associated with higher risk perception across the five domains of risk, but there was variability in the strength of associations depending on the risk domain ( $\beta$  range = .17 to .35).

Perception of risk and propensity to take risks are related but distinct constructs, and they can be differentially associated with other variables (Choma et al., 2014). Therefore, more research is still needed to thoroughly examine how disgust is related to risk-taking propensity. Further, one potential shortcoming of the previous study is the utilization of the revised disgust sensitivity scale (Olatunji et al., 2007) as a unidimensional measure of disgust sensitivity, instead of examining the three disgust sensitivity factors (Karg et al., 2019). Like risk taking, disgust sensitivity can be conceptualized as domain specific. Taking a domain specific approach to disgust sensitivity in conjunction with risk-taking propensity would further unpack and help present a clearer picture to the relation between disgust and risk taking.

### 1.3 Domains of Disgust Sensitivity

According to Tybur et al. (2009), there are three domains of disgust: pathogen, sexual, and moral. Pathogen disgust aligns with the fundamental function of disgust – infectious disease avoidance. However, the disgust system is proposed to have been co-opted to also respond to and avoid biologically costly sexual partners (sexual disgust) and social transgressions (moral disgust; Tybur et al., 2013). These three domains are distinguished by inputs that activate them, their behavioral outputs, and unique correlates (Al-Shawaf et al., 2019).

Pathogen disgust is activated by cues of pathogen presence (e.g., mold, pus; Tybur et al., 2013) and encourages avoidance of the pathogen cue and changes in facial expression (Rozin et al., 1994). Sexual disgust is activated in response to individuals who display cues of being a poor mate choice or sexual situations that can have negative reproductive consequences (e.g., zoophilia, incest), resulting in avoidance of such individuals or situations (Crosby et al., 2020). Moral disgust is activated by behaviors that would be condemned by others (e.g., lying, stealing; Tybur et al., 2013) and results in avoidance of individuals who engage in these condemned behaviors or with the willingness to punish these individuals (Tybur et al., 2009).

Although all three disgust domains are interrelated and involve some kind of avoidance behavior, they are distinct and are differentially related to other variables (Tybur et al., 2009). For example, higher sexual disgust sensitivity is related to a more restricted sociosexual orientation, whereas pathogen and moral disgust sensitivity are not significantly related

to sociosexual orientation (Al-Shawaf et al., 2015). Greater pathogen disgust sensitivity is related to more utilitarian judgments, whereas sexual disgust sensitivity is related to less utilitarian judgments (Laakasuo et al., 2017). Thus, a domain specific examination of disgust can provide more nuanced understanding of how disgust is related to other constructs.

With regard to risk-taking propensity, Sparks et al. (2018) specifically assessed the three domains of disgust sensitivity in two studies. They consistently found that greater pathogen, sexual, and moral disgust sensitivity were each associated with less risk-taking propensity. However, the strength of the associations varied ( $r = -.33$  to  $-.16$ ), where sexual disgust sensitivity was more strongly associated with general risk-taking propensity than moral and pathogen disgust sensitivity. Thus, these findings suggest that the size of the relation between disgust sensitivity and risk-taking propensity may vary by domain.

However, Sparks et al. (2018) utilized the DOSPERT (Blais & Weber, 2006) as a unidimensional measure of risk-taking propensity, so it is unknown whether specific disgust sensitivity domains are uniquely associated with specific risk domains. Further, the three disgust sensitivity domains are moderately correlated (Olatunji et al., 2012) and theoretically share a common basis (Tybur et al., 2013). As such, it is important to consider the three disgust domains simultaneously to determine the extent to which each domain is uniquely associated with risk-taking propensity. Investigating the relations of each disgust domain with each risk-taking domain, while controlling for the other disgust domains, can help to elucidate the unique relations between disgust and risk taking.

## 1.4 The Current Studies

Extant literature suggests that greater disgust sensitivity is associated with lower risk-taking propensity. However, the existing body of evidence is relatively sparse. Although two studies have used a domain specific approach for either disgust (Sparks et al., 2018) or risk taking (Karg et al., 2019), no studies to date have examined the domain specific relations for *both*. Taking a domain specific approach to both constructs may highlight unique associations, particularly across domains that are relevant to one another. For example, moral disgust sensitivity and ethical risk-taking propensity seem to overlap. As such, we might expect a significant negative relation between moral disgust sensitivity and ethical risk-taking propensity, but ethical risk-taking propensity may not be related to pathogen and sexual disgust sensitivity. Given the health implications linked to pathogen disgust sensitivity, a significant negative relation might be expected with health/safety risk taking propensity, but health/safety risk taking propensity may not be related to moral and sexual disgust sensitivity.

The goal of this research was to provide a detailed exploration of how disgust sensitivity is related to risk-taking propensity using a domain specific approach. We conducted two

cross-sectional studies<sup>1</sup> with a community and a student sample, and a mini meta-analysis utilizing two additional datasets (Sparks et al., 2018). We focused on the extent to which domain specific disgust sensitivity (i.e., Pathogen, Sexual, and Moral) were related to domain specific risk-taking propensity (i.e., Social, Recreational, Health/Safety, Ethical, and Financial). As gender and age differences are often found with risk-taking propensity and disgust sensitivity (Al-Shawaf et al., 2018; Defoe et al., 2015; Figner & Weber, 2011), we controlled for these demographic factors in all analyses.

## 2 Study 1

### 2.1 Method

#### 2.1.1 Participants & Procedure

A total of 98 participants (61 female;  $M_{age} = 47.92$  years,  $SD_{age} = 20.95$ ; 88.8% White) from the South Atlantic division of the US contributed to this study. Participants consisted of community-dwelling younger ( $n = 51$ ; 25– 36 years,  $M_{age} = 28.71$ ,  $SD_{age} = 3.34$ ) and older ( $n = 47$ ; 60–89 years,  $M_{age} = 68.77$ ,  $SD_{age} = 7.73$ ) adults. Participants were recruited for a larger study about age differences in decision making between younger and older adults. For older adults, a score of 24 or higher was required on the Mini-Mental State Exam (MMSE; Folstein, Folstein & McHugh, 1975) to confirm a sample free of significant cognitive impairments.

Participants completed study measures at a site of their choice (home, senior center, university research lab). After providing informed consent, participants completed several computer tasks, questionnaires, and demographic questions for the larger study, including the primary measures of interest. Participants received \$50 monetary compensation for approximately 2 hours of their time. The authors' university Institutional Review Board approved all procedures for the study.

#### 2.1.2 Measures

**Three Domain Disgust Scale (TDDS; Tybur et al., 2009).** This 21-item measure consisting of three subscales was used to assess three different domains of disgust sensitivity: pathogen (e.g., “stepping on dog poop”;  $\alpha = .83$ ), sexual (e.g. “hearing two strangers having sex”;  $\alpha = .91$ ), and moral (e.g., “shoplifting a candy bar from a convenience store”;  $\alpha = .83$ ). Participants rated how disgusting they found each item on a scale from 0 (“not at all disgusting”) to 6 (“extremely disgusting”). A composite variable was created for each domain of disgust by computing the average score across the items. Higher scores reflect greater disgust sensitivity.

<sup>1</sup>Data and syntax are available at [osf.io/3awp2/?view\\_only=700e20f9f6494784a92dd5e62f283018](https://osf.io/3awp2/?view_only=700e20f9f6494784a92dd5e62f283018).

**Domain Specific Risk-Taking (DOSPERT; Weber et al. 2002).** This 40-item measure was used to assess risk-taking propensity in five different domains: Social (e.g., “Admitting that your tastes are different from those of your friends”;  $\alpha = .69$ ), Recreational (e.g., “Going down a ski run that is too hard or closed”;  $\alpha = .84$ ), Health/Safety (e.g., “Frequent binge drinking”;  $\alpha = .75$ ), Ethical (e.g., “Plagiarizing a term paper”;  $\alpha = .85$ ), and Financial (e.g., “Betting a day’s income at the horse races”;  $\alpha = .75$ ). Participants rated their likelihood of engaging in risky behaviors on a scale from 1 (“very unlikely”) to 5 (“very likely”). Higher mean scores indicated greater risk-taking propensity.

## 2.2 Results

Means, standard deviations, and bivariate correlations between age, gender, disgust sensitivity, and risk-taking propensity are presented in Table 1. Both pathogen and sexual disgust sensitivity were negatively correlated with all five domains of risk-taking propensity. Moral disgust sensitivity was significantly negatively correlated with the social, health/safety, ethical, and financial domains, but was not significantly correlated with recreational risk-taking propensity. Older age was significantly positively related to sexual and moral disgust sensitivity, and significantly inversely associated with all domains of risk-taking propensity, except financial risk-taking propensity. Women reported significantly greater sexual disgust sensitivity and lower levels of risk-taking propensity in all domains, except social risk-taking propensity, compared to men.

TABLE 1: Mean, standard deviation, and bivariate correlations among Study 1 variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Pathogen disgust	.									
2. Sexual disgust	.55**	.								
3. Moral disgust	.32**	.45**	.							
4. Social Risk	-.31**	-.44**	-.21*	.						
5. Recreational Risk	-.33**	-.48**	-.18	.45**	.					
6. Health/Safety Risk	-.35**	-.62**	-.39**	.42**	.53**	.				
7. Ethical Risk	-.34**	-.57**	-.43**	.29**	.43**	.69**	.			
8. Financial Risk	-.31**	-.53**	-.42**	.38**	.48**	.42**	.57**	.		
9. Age	.16	.46**	.40**	-.37**	-.50**	-.56**	-.26**	-.17	.	
10. Gender	.17	.49**	.08	-.05	-.24*	-.25*	-.33**	-.29**	.03	.
<i>M</i>	4.03	3.63	4.95	3.31	2.31	2.15	1.57	1.99	47.92	1.62
<i>SD</i>	1.16	1.75	0.93	0.66	0.91	0.76	0.69	0.66	20.95	0.49

Note. \*  $p < .05$ , \*\*  $p < .01$ ; Gender is coded as 1 = Man, 2 = Woman.

To determine whether the significant relations between the domains of disgust sensitivity and the domains of risk-taking propensity can be explained by a single factor, rather than domain specific variance, a canonical correlation analysis was conducted using the R package “yacca” (Butts, 2018). The analysis was run after residualizing on age and gender. We found that two of the three canonical correlations were significant based on Bartlett’s  $X^2$  test ( $C1 = .62, p < .001$ ;  $C2 = .39, p < .05$ ; and  $C3 = .07, p > .05$ ). Thus, our expectation was supported showing that the relations between disgust sensitivity and risk-taking propensity are not explained by one single factor.

Pathogen, sexual, and moral disgust sensitivity were moderately correlated with each other. To detect the unique relations between each disgust domain and risk-taking domain, this covariance should be controlled for. To determine which domains of disgust sensitivity had a unique association with a risk-taking domain, five separate hierarchical regression analyses were conducted (see Table 2). Age and gender were entered in the first step as control variables<sup>2</sup>, and the three domains of disgust sensitivity were entered in the second step. The risk-taking domains were entered as criterion variables. Multicollinearity was checked and found not to be a problem (all VIF  $< 5$ , Tolerance  $> 0.20$ ).

TABLE 2: Study 1 hierarchical regression analyses predicting risk-taking propensity by domain from three domains of disgust sensitivity, controlling for age and gender. Standardized betas with 95% confidence intervals. Adjusted  $R^2$  are in bold.

	Social	Recreational	Health/Safety	Ethical	Financial
<b>Step 1</b>	<b>.12**</b>	<b>.28**</b>	<b>.35**</b>	<b>.15**</b>	<b>.09**</b>
Age	-.37** (-.02, -.01)	-.49** (-.03, -.01)	-.55** (-.03, -.01)	-.25* (-.01, .00)	-.15 (-.01, .00)
Gender	-.03 (-.29, .22)	-.22* (-.73, -.08)	-.22** (-.60, -.09)	-.31** (-.71, -.18)	-.29** (-.65, -.13)
<b>Step 2</b>	<b>.23**</b>	<b>.34**</b>	<b>.46**</b>	<b>.34**</b>	<b>.31**</b>
Pathogen	-.10 (-.18, .07)	-.18 (-.30, .02)	-.06 (-.16, .08)	-.02 (-.13, .11)	.01 (-.11, .12)
Sexual	-.42** (-.27, -.05)	-.21 (-.25, .03)	-.39** (-.27, -.06)	-.41** (-.27, -.06)	-.45** (-.27, -.07)
Moral	.08 (-.09, .21)	.16 (-.04, .35)	-.07 (-.19, .09)	-.24* (-.32, -.04)	-.28* (-.34, -.06)

Note. \*  $p < .05$ , \*\* $p < .01$ ; Gender is coded as 1 = Man, 2 = Woman.

For the social and health/safety domains, sexual disgust sensitivity was the only independent disgust sensitivity domain associated with risk-taking propensity. Higher levels of sensitivity in sexual disgust were associated with less social and health/safety risk-taking propensity. For ethical risk-taking and financial risk-taking, both sexual and moral disgust sensitivity were significantly related. Higher levels of sensitivity in sexual disgust and moral disgust were associated with less ethical and financial risk-taking propensity. For recreational risk-taking, none of the disgust sensitivity domains were significantly related.

<sup>2</sup>Regression analyses were also conducted without gender and age included as covariates. The pattern of results were generally the same, with one exception. When not controlling for age and gender, sexual disgust sensitivity was significantly negatively associated with recreational risk-taking propensity ( $p < .05$ ).

## 2.3 Discussion

Bivariate correlations indicated that all three disgust sensitivity domains were negatively associated with all five risk-taking domains, with one exception (i.e., moral disgust sensitivity and recreational risk-taking propensity were not significantly correlated). However, when the unique predictive value of each disgust domain on risk-taking propensity was examined after controlling for age, gender, and the other disgust domains, the pattern of results changed. When controlling for the other variables, pathogen disgust sensitivity was not significantly associated with any of the risk-taking domains. Sexual disgust sensitivity was negatively associated with social, health/safety, ethical, and financial risk-taking propensity. Moral disgust sensitivity was negatively associated with ethical and financial risk-taking propensity. None of the disgust domains were significantly associated with recreational risk-taking propensity. These findings suggest that the relation between disgust sensitivity and risk-taking propensity may be more nuanced. In particular, controlling for the covariance between the disgust domains may be important in understanding what components of disgust are associated with risk taking in different contexts.

## 3 Study 2

The first study provided initial evidence that the predictive value of disgust sensitivity may vary according to the domains of disgust and domains of risk taking. However, the small sample size of this study limits the strength of the findings. The goal of the second study was to replicate the Study 1 findings with a larger sample.

### 3.1 Method

A total of 403 undergraduate students (321 women; age range 18–35 years,  $M_{age} = 19.71$ ,  $SD_{age} = 1.84$ ; 85.4% White) at a US university participated in the study. Data from 13 participants were excluded from the analyses due to answering less than half of the items in a measure ( $n = 4$ ) or completing the study twice ( $n = 9$ ). For participants who completed the study twice, their first responses were used. The final sample consisted of 390 participants (310 women; age range 18 - 35 years,  $M_{age} = 19.70$ ,  $SD_{age} = 1.73$ ; 85.9% White).

Participants were recruited from the Department of Psychology's subject pool for a larger study regarding psychological disease avoidance processes. The study was conducted through the online survey system Qualtrics. After agreeing to an online consent form, participants completed the survey. Measures in the survey were presented in a random order, except for demographic questions, which appeared last. Participants completed the Three Domain Disgust Scale (Tybur et al., 2009) as described in Study 1 and a 30-item revised version of the Domain Specific Risk-Taking scale (Blais & Weber, 2006). The revised version is 10-items shorter, has a different response scale from 1 to 7, and some reworded items (e.g., “Plagiarizing a term paper” was revised to “Passing off somebody

else's work as your own"). After the study was finished, participants were compensated with course credit.

### 3.2 Results

Means, standard deviations, Cronbach's alphas, and bivariate correlations between age, gender, three domains of disgust sensitivity, and five domains of risk-taking propensity are presented in Table 3. Both pathogen and sexual disgust sensitivity were significantly negatively correlated with all five domains of risk-taking propensity. Moral disgust sensitivity was significantly negatively correlated with the health/safety, ethical, recreational, and financial domains, but was not significantly correlated with social risk-taking propensity. Age was significantly negatively related to pathogen disgust sensitivity, sexual disgust sensitivity, and ethical risk-taking propensity, and it was positively related to social risk-taking propensity. Women reported greater pathogen and sexual disgust sensitivity, and less risk-taking propensity in recreational, ethical, and financial domains compared to men.

TABLE 3: Means, standard deviations, Cronbach's alphas, and bivariate correlations among Study 2 variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Pathogen disgust	.									
2. Sexual disgust	.49**	.								
3. Moral disgust	.29**	.33**	.							
4. Social Risk	-.13*	-.18**	-.01	.						
5. Recreational Risk	-.30**	-.19**	-.13**	.31**	.					
6. Health/Safety Risk	-.18**	-.37**	-.26**	.33**	.40**	.				
7. Ethical Risk	-.14**	-.22**	-.33**	.08	.27**	.47**	.			
8. Financial Risk	-.17**	-.18**	-.22**	.15**	.29**	.34**	.65**	.		
9. Age	-.11*	-.12*	.06	.17**	-.01	.01	-.11*	.01	.	
10. Gender	.30**	.35**	.08	-.03	-.14**	-.08	-.18**	-.29**	-.13*	.
<i>M</i>	3.84	3.01	3.77	4.47	3.49	3.36	2.12	2.27	19.70	1.79
<i>SD</i>	1.06	1.31	1.16	0.96	1.44	1.19	0.94	1.03	1.73	0.40
<i>α</i>	.78	.81	.82	.62	.82	.67	.76	.77	.	.

Note. \*  $p < .05$ , \*\* $p < .01$ ; Gender is coded as 1 = Man, 2 = Woman.

Again, a canonical correlation analysis was conducted using the R package "yacca" (Butts, 2018). The analysis was run after residualizing on age and gender. We found that the three canonical correlations were all significant based on Bartlett's  $X^2$  test ( $C1=.41$ ,  $p$

<. 001; C2=.26,  $p <$ . 001; and C3=.22,  $p <$ . 001). Thus, the relations between disgust sensitivity and risk-taking propensity were not explained with a single factor, or even by two factors.

Five hierarchical regression analyses were conducted to determine which disgust sensitivity domains were uniquely associated with each domain of risk-taking propensity<sup>3</sup> (see Table 4). Multicollinearity was checked and found not to be a problem (all VIF < 5, Tolerance > 0.20). For the social domain, sexual disgust sensitivity was the only independent disgust domain related to risk-taking propensity. Higher levels of sensitivity in sexual disgust were associated with less social risk-taking propensity. For the health/safety domain, higher levels of sexual and moral disgust sensitivity were associated with less risk-taking propensity. For the ethical and financial domains, moral disgust sensitivity was significantly related. Higher levels of sensitivity in moral disgust were associated with less ethical and financial risk-taking propensity. For the recreational domain, higher levels of pathogen disgust sensitivity was associated with less risk-taking propensity.

TABLE 4: Study 2 hierarchical regression analyses predicting risk-taking propensity by domain from three domains of disgust sensitivity, controlling for age and gender. Standardized betas with 95% confidence intervals. Adjusted  $R^2$  are in bold.

	Social	Recreational	Health/Safety	Ethical	Financial
<b>Step 1</b>	<b>.02**</b>	<b>.02*</b>	<b>.00</b>	<b>.05**</b>	<b>.09**</b>
Age	.17** (.04, .15)	-.03 (-.11, .06)	.00 (-.07, .07)	-.14** (-.13, -.02)	-.04 (-.08, .03)
Gender	.00 (-.24, .23)	-.15** (-.88, -.17)	-.08 (-.55, .06)	-.20** (-.70, -.24)	-.30** (-1.01, -.52)
<b>Step 2</b>	<b>.06**</b>	<b>.08**</b>	<b>.15**</b>	<b>.15**</b>	<b>.12**</b>
Pathogen	-.07 (-.17, .04)	-.26** (-.51, -.20)	.02 (-.10, .14)	.03 (-.07, .12)	-.02 (-.12, .09)
Sexual	-.19** (-.23, -.05)	-.03 (-.16, .09)	-.35** (-.42, -.21)	-.11 (-.16, .00)	-.01 (-.09, .08)
Moral	.05 (-.05, .13)	-.04 (-.17, .08)	-.15** (-.26, -.05)	-.28** (-.31, -.15)	-.19** (-.25, -.07)

Note. \*  $p < .05$ , \*\* $p < .01$ ; Gender is coded as 1 = Man, 2 = Woman.

### 3.3 Discussion

Replicating Study 1 correlations, the disgust sensitivity domains were significantly, inversely associated with almost all of the risk-taking domains, except for moral disgust and social risk-taking propensity. Again, however, when the unique predictive values of disgust domains on risk-taking propensity were examined after controlling for age, gender, and the other disgust domains, the pattern of results changed. Further, the domain specific differences seen in Study 2 were not necessarily consistent with Study 1 findings.

<sup>3</sup>Regression analyses were conducted without age and gender included as covariates. The pattern of results were generally the same with one exception. When not controlling for age and gender, sexual disgust sensitivity was negatively associated with ethical risk-taking propensity ( $p < .05$ ).

Consistent with Study 1, sexual disgust sensitivity was negatively associated with health/safety and social risk-taking propensity, and moral disgust was negatively associated with ethical and financial risk-taking propensity. However, different than Study 1, pathogen disgust sensitivity emerged as negatively associated with recreational risk-taking propensity; sexual disgust sensitivity was not significantly associated with ethical and financial risk-taking propensity; and moral disgust sensitivity emerged as negatively associated with health/safety risk taking propensity. Across the two studies, the sample characteristics and the versions of the DOSPERT were different, which might account for the discrepancies between findings.

## 4 Mini Meta-Analysis

As there were some inconsistencies in the findings between Studies 1 and 2, we conducted a mini meta-analysis to achieve a more comprehensive and stronger examination of the relations between the three domains of disgust and five domains of risk taking. Along with our two studies, we acquired permission to use two datasets from Sparks et al. (2018), which included the TDDS (Tybur et al., 2009), the revised version of the DOSPERT (Blais & Weber, 2006), and demographic information. The datasets included participants who were recruited through Amazon's Mechanical Turk and the sample sizes of the studies were  $N_{Study1} = 1006$  and  $N_{Study2} = 498$  (see Sparks et al., 2018, for details about the sample and recruitment).

To compute effect sizes, Pearson's  $r$  coefficients of partial correlations between domains of disgust and risk taking were used. In the case of missing data, listwise deletion method was used. The total sample included in the meta-analyses was  $N = 1981$ . For each domain of disgust, partial correlations were examined with the five domains of risk taking while controlling for the remaining two domains of disgust, gender, and age. For each domain of risk taking, we conducted a separate mini meta-analysis with STATA 16 using the "metan" command (Harris et al., 2008). Fisher's Z and standard error scores were computed according to Borenstein et al. (2009). To avoid possible issues of heterogeneity, the "random" command was used. This function allows "metan" to run random effect meta-analyses in the presence of heterogeneity and run fixed effect analyses when heterogeneity is not present. The detailed results of the mini meta-analysis are reported in Table 5.

Across the domain-to-domain associations, there was variability in the strength and direction of the relations between disgust sensitivity and risk-taking propensity. For financial risk-taking propensity, none of the disgust sensitivity domains were significantly associated. For social risk-taking propensity, pathogen disgust sensitivity was not significantly associated, whereas sexual disgust sensitivity was inversely associated with a small to moderate effect size and moral disgust sensitivity was positively associated with a very small effect size. The variation in effect size attributable to heterogeneity was 22.7% for sexual disgust sensitivity and 0% for moral disgust sensitivity.

TABLE 5: Mean effect sizes ( $r$ ), confidence intervals, and heterogeneity across studies.

			$r$	95% CI	$I^2$
Social Risk	Pathogen Disgust	.01	−0.05, 0.06	18.1%	
	Sexual Disgust	−.25	−0.30, −0.19	22.7%	
	Moral Disgust	.07	0.03, 0.12	0.0%	
Recreational Risk	Pathogen Disgust	−.15	−0.20, −0.10	16.1%	
	Sexual Disgust	−.06	−0.10, −0.01	0.0%	
	Moral Disgust	.05	−0.02, 0.11	35.1%	
Health/Safety Risk	Pathogen Disgust	.02	−0.03, 0.06	0.0%	
	Sexual Disgust	−.22	−0.29, −0.15	53.6%	
	Moral Disgust	−.09	−0.13, −0.04	6.4%	
Ethical Risk	Pathogen Disgust	.05	0.01, 0.09	0.0%	
	Sexual Disgust	−.09	−0.19, 0.00	74.9%	
	Moral Disgust	−.28	−0.32, −0.23	0.0%	
Financial Risk	Pathogen Disgust	−.03	−0.08, 0.01	0.0%	
	Sexual Disgust	−.04	−0.14, 0.06	73.4%	
	Moral Disgust	−.09	−0.21, 0.01	79.4%	

For recreational risk-taking propensity, there were significant inverse associations with both pathogen disgust sensitivity with a small effect size and sexual disgust sensitivity with a very small effect size. Moral disgust sensitivity was not significantly associated. The variation in effect size attributable to heterogeneity was 16.1% for pathogen disgust sensitivity and 0% for sexual disgust sensitivity.

For health/safety risk-taking propensity, pathogen disgust sensitivity was not significantly associated. There was a significant inverse association with sexual disgust sensitivity with a small to moderate effect size and an inverse association with moral disgust sensitivity with a small effect size. The variation in effect size attributable to heterogeneity was 53.6% for sexual disgust sensitivity and 6.4% for moral disgust sensitivity.

For ethical risk-taking propensity, there was a positive association with pathogen disgust sensitivity with a very small effect size. Sexual disgust sensitivity was not significantly associated with recreational risk-taking propensity. There was an inverse association with moral disgust sensitivity with a small to moderate effect size. The variation in effect size attributable to heterogeneity was 0% for both pathogen disgust sensitivity and moral disgust sensitivity.

## 5 General Discussion

The current research provides the first examination of the association between disgust sensitivity and risk-taking propensity utilizing a domain specific approach. Across two studies, we found significant inverse bivariate associations between almost all three domains of disgust and five domains of risk-taking propensity, with few exceptions. However, when the unique relations between each disgust domain and risk-taking propensity domain was examined controlling for age, gender, and the other disgust domains, the results indicated specificity to which domains of disgust were associated with which risk domain. Consistent across both studies, sexual disgust sensitivity was negatively associated with health/safety risk-taking propensity and social risk-taking propensity. Moral disgust sensitivity was negatively associated with ethical risk-taking propensity and financial risk-taking propensity. But, there were a number of inconsistent findings across the studies, so we conducted a mini meta-analysis with our studies and two other datasets (Sparks et al., 2018). The results of the mini meta-analysis suggested variability in the strength and direction of associations between disgust and risk-taking domains.

For the domain of social risk taking, the results of the mini meta-analysis showed a small to moderate inverse association with sexual disgust sensitivity and a very small positive association with moral disgust sensitivity. Sexual disgust is related with interpersonal interactions and more specifically related with interactions at an intimate level. Parallel to this, social risk taking includes risks people take in their interpersonal interactions with people they are close with (e.g., friends, family). As both sexual disgust and social risk-taking involve interactions within close relationships, this may explain why these domains are specifically associated. The positive association between moral disgust sensitivity and social risk-taking propensity may be the result of a suppression effect (Conger, 1974), as the bivariate correlations were inversely correlated in both Study 1 and Study 2.

Recreational risk taking involves engaging in recreational activities that involve risk of potential injury and bodily harm (e.g., bungee jumping). In the mini meta-analysis, small inverse relations with pathogen disgust sensitivity and sexual disgust sensitivity were found. Each of these disgust domains involve concern for physical harm. Pathogen disgust involves getting infected and being sick (Tybur et al., 2009), and sexual disgust involves unwanted sexual behaviors and possible sexual dysfunctions which may compromise reproductive health (Crosby et al., 2020). Concern for bodily harm may underlie the specific associations between these domains. Alternatively, these relations may stem from a common underlying personality trait. For example, openness to experience has been inversely related to both pathogen and sexual disgust sensitivity (Tybur et al., 2011) and positively associated with recreational risk taking (Well & Tikir, 2011). Therefore, openness to experience may in part account for the association between pathogen and sexual disgust sensitivity and recreational risk taking. Future studies should control for personality.

The Health/Safety domain focuses on risk taking regarding preventative behaviors (e.g., using sunscreen; Butler et al., 2012). Initially, we expected pathogen disgust sensitivity,

the domain of disgust that is motivated to avoid possible infectious diseases, would be inversely associated with health/safety risk-taking propensity. However, the findings of the mini meta-analysis did not support this expectation. This may be due to the fact that none of the health/safety items of the DOSPERT are specifically related to infectious diseases. One item (i.e., "Engaging in unprotected sex") has possible infectious disease consequences, but it may be more closely related to sexual disgust than pathogen disgust. Indeed, health/safety risk-taking propensity had a small to moderate inverse relation with sexual disgust sensitivity. It should be noted that the heterogeneity levels for the association with sexual disgust sensitivity is moderate (Higgins et al., 2003) and some part of this association may be due to sample differences. Health/safety risk-taking propensity also had a small inverse relation with moral disgust sensitivity. Some items in this risk domain involve not adhering to laws or norms (i.e., "driving a car without wearing a seat belt" and "drinking heavily at a social function"), which may be morally condemned. This may explain the inverse association. Due to the preventative behavior focus of the health/safety domain, a new subscale has been developed to examine the medical domain (Butler et al., 2012). Future studies on disgust sensitivity and risk-taking propensity may utilize this subscale to examine the relations with a medical focus (e.g., giving blood) rather than preventative behaviors.

Ethical risk taking pertains to behaviors (e.g., cheating, lying, and illegal activity) that are generally judged to be immoral. The moral domain of disgust is related to endorsement of rules and ethics (Tybur et al., 2009). Both of these domains focus on an individual's act of following societal customs and rules. The results showed that these two domains indeed have a small to moderate inverse significant association. Pathogen disgust was positively associated with ethical risk-taking propensity with a small effect size. However, this may be the result of a suppression effect (Conger, 1974), as the bivariate correlations between pathogen disgust sensitivity and ethical risk-taking propensity were inversely correlated in both Study 1 and Study 2.

The financial risk-taking domain is related with investment and gambling behavior that may result in monetary gains or losses. The financial domain was not significantly associated with any of the three domains of disgust sensitivity. Weber and colleagues (2002) conceptualize the other four domains of risk-taking (i.e., Social, Recreational, Health/Safety, and Ethical) as personal decisions and keep financial decisions separate. In personal risk-taking domains, the agent directly at risk is the risk-taker (e.g., exclusion by loved ones, harming a part of the body). However, in the case of financial risk-taking, the agent directly at risk is money. The risk-taker will eventually face the consequences of the risk they took, but it will be through their possession of money and the harm will not be at a personal level. In the case of disgust, the possible harm (e.g., getting infected) is also directly influencing the individual and can be considered as personal. Accordingly, due to the non-personal nature of the financial risk-taking domain, the three domains of disgust may have been unrelated.

These findings suggest that utilizing a unidimensional approach to disgust sensitivity or risk-taking propensity may obscure the associations between the constructs. The variability in the strength of the unique associations between the domains of disgust sensitivity and risk-taking propensity indicate that domain specific relations exist between these variables. Taking a domain specific approach can better inform interventions and translational research to reduce risky decision making and behavior. Our results suggest that inducing specific forms of disgust, rather than “general” disgust, may be more effective at reducing specific risky behavior. For example, focusing on moral disgust to lower risk-taking in the context of ethical risks and focusing on sexual disgust to lower risk-taking in the context of health/safety may lead to higher success rates. Further research is needed to test this possibility.

The present findings should be considered in the context of certain limitations. The data are cross-sectional, so causal claims cannot be made. Future studies can utilize experimental or longitudinal designs to examine causality or directionality. This study utilized self-report measures to study disgust sensitivity and risk-taking propensity, which raises concerns of social desirability or biased responding and common method variance. Future research that uses behavioral measurements will help address possible bias or inflated effect sizes. The results of the mini meta-analyses indicated heterogeneity in some effects. Given the small number of studies, more research is needed to reliably assess these associations. The samples were also limited in diversity. Therefore, future research should utilize more diverse samples to assess generalizability of findings.

Overall, this study aimed to provide a novel exploration of how the domains of disgust sensitivity are related to the domains of risk-taking propensity. The findings showed the presence of domains specific unique relations and highlights the significance of using a domain specific approach. Both risk-taking propensity and disgust sensitivity can be measured and studied as a unidimensional construct. However, the domain specific approach can aid in identifying more nuanced relations, which may have important implications for interventions intended to reduce risky behaviors.

## References

- Al-Shawaf, L., Lewis, D. M., & Buss, D. M. (2015). Disgust and mating strategy. *Evolution and Human Behavior*, 36(3), 199–205.
- Al-Shawaf, L., Lewis, D. M., & Buss, D. M. (2018). Sex differences in disgust: Why are women more easily disgusted than men?. *Emotion Review*, 10(2), 149–160.
- Al-Shawaf, L., Lewis, D. M., Ghossainy, M. E., & Buss, D. M. (2019). Experimentally inducing disgust reduces desire for short-term mating. *Evolutionary Psychological Science*, 5(3), 267–275.
- Altemeyer, B. (1988). *The Jossey-Bass social and behavioral science series and The Jossey-Bass public administration series. Enemies of freedom: Understanding right-wing authoritarianism*. Jossey-Bass.

- Armstrong, T., McClenahan, L., Kittle, J., & Olatunji, B. O. (2014). Don't look now! Oculomotor avoidance as a conditioned disgust response. *Emotion, 14*(1), 95–104.
- Blais, A. R., & Weber, E. U. (2006). A domain-specific risk-taking (DOSPERT) scale for adult populations. *Judgment and Decision making, 1*(1), 33–47.
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. John Wiley & Sons.
- Butler, S., Rosman, A., Seleski, S., Garcia, M., Lee, S., Barnes, J., & Schwartz, A. (2012). A medical risk attitude subscale for DOSPERT. *Judgment and Decision Making, 7*, 189–189.
- Butts, C. T. (2018). *yacca*: Yet another canonical correlation analysis package. R package version 1.1. <https://CRAN.R-project.org/package=yacca>.
- Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: a meta-analysis. *Psychological Bulletin, 125*(3), 367–383.
- Choma, B. L., Hanoch, Y., Hodson, G., & Gummerum, M. (2014). Risk propensity among liberals and conservatives: The effect of risk perception, expected benefits, and risk domain. *Social Psychological and Personality Science, 5*(6), 713–721.
- Conger, A. J. (1974). A revised definition for suppressor variables: A guide to their identification and interpretation. *Educational and Psychological Measurement, 34*(1), 35–46.
- Crosby, C. L., Durkee, P. K., Meston, C. M., & Buss, D. M. (2020). Six dimensions of sexual disgust. *Personality and Individual Differences, 156*, 109714.
- Curtis, V., De Barra, M., & Aunger, R. (2011). Disgust as an adaptive system for disease avoidance behaviour. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*(1563), 389–401.
- Defoe, I. N., Dubas, J. S., Figner, B., & Van Aken, M. A. (2015). A meta-analysis on age differences in risky decision making: Adolescents versus children and adults. *Psychological Bulletin, 141*(1), 48–84.
- Delaney, R. K., Strough, J., Shook, N. J., Ford, C. G., & Lemaster, P. (2020). Don't risk it. Older adults perceive fewer future opportunities and avoid social risk taking. *The International Journal of Aging and Human Development, 92*(2), 139–157.
- Fessler, D. M., Pillsworth, E. G., & Flamson, T. J. (2004). Angry men and disgusted women: An evolutionary approach to the influence of emotions on risk taking. *Organizational Behavior and Human Decision Processes, 95*(1), 107–123.
- Figner, B., & Weber, E. U. (2011). Who takes risks when and why? Determinants of risk taking. *Current Directions in Psychological Science, 20*(4), 211–216.
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189–198.
- Frey, R., Duncan, S., & Weber, E. U. (2020). Towards a typology of risk preference: Four risk profiles describe two thirds of individuals in a large sample of the U.S. population.

- PsyArXiv Preprint.* <http://dx.doi.org/10.31234/osf.io/yjwr9>.
- Haidt, J., McCauley, C., & Rozin, P. (1994). Individual differences in sensitivity to disgust: A scale sampling seven domains of disgust elicitors. *Personality and Individual Differences*, 16(5), 701–713.
- Hanoch, Y., Johnson, J. G., & Wilke, A. (2006). Domain specificity in experimental measures and participant recruitment: An application to risk-taking behavior. *Psychological Science*, 17(4), 300–304.
- Harris, R. J., Deeks, J. J., Altman, D. G., Bradburn, M. J., Harbord, R. M., & Sterne, J. A. (2008). Metan: fixed-and random-effects meta-analysis. *The Stata Journal*, 8(1), 3–28.
- Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ*, 327(7414), 557–560.
- Highhouse, S., Nye, C. D., Zhang, D. C., & Rada, T. B. (2017). Structure of the Dospert: Is there evidence for a general risk factor?. *Journal of Behavioral Decision Making*, 30(2), 400–406.
- Karg, S. T., Wiener-Blotner, A., & Schnall, S. (2019). Disgust sensitivity is associated with heightened risk perception. *Journal of Risk Research*, 22(5), 627–642.
- Laakasuo, M., Sundvall, J., & Drosinou, M. (2017). Individual differences in moral disgust do not predict utilitarian judgments, sexual and pathogen disgust do. *Scientific reports*, 7(45526).
- Maner, J. K., Richey, J. A., Cromer, K., Mallott, M., Lejuez, C. W., Joiner, T. E., & Schmidt, N. B. (2007). Dispositional anxiety and risk-avoidant decision-making. *Personality and Individual Differences*, 42(4), 665–675.
- Merckelbach, H., de Jong, P. J., Arntz, A., & Schouten, E. (1993). The role of evaluative learning and disgust sensitivity in the etiology and treatment of spider phobia. *Advances in Behaviour Research and Therapy*, 15(4), 243–255.
- Nicholson, N., Soane, E., Fenton-O'Creevy, M., & Willman, P. (2005). Personality and domain-specific risk taking. *Journal of Risk Research*, 8(2), 157–176.
- Oaten, M., Stevenson, R. J., & Case, T. I. (2009). Disgust as a disease-avoidance mechanism. *Psychological Bulletin*, 135(2), 303–321.
- Olatunji, B. O., Adams, T., Ciesielski, B., David, B., Sarawgi, S., & Broman-Fulks, J. (2012). The Three Domains of Disgust Scale: Factor structure, psychometric properties, and conceptual limitations. *Assessment*, 19(2), 205–225.
- Olatunji, B. O., Williams, N. L., Tolin, D. F., Abramowitz, J. S., Sawchuk, C. N., Lohr, J. M., & Elwood, L. S. (2007). The Disgust Scale: Item analysis, factor structure, and suggestions for refinement. *Psychological Assessment*, 19(3), 281–297.
- Prokosch, M. L., Gassen, J., Ackerman, J. M., & Hill, S. E. (2019). Caution in the time of cholera: Pathogen threats decrease risk tolerance. *Evolutionary Behavioral Sciences*, 13(4), 311.
- Reynolds, L. M., Bissett, I. P., Porter, D., & Consedine, N. S. (2016). The “ick” factor matters: Disgust prospectively predicts avoidance in chemotherapy patients. *Annals of*

- Behavioral Medicine*, 50(6), 935–945.
- Rozin, P., Haidt, J., McCauley, C., Dunlop, L., & Ashmore, M. (1999). Individual differences in disgust sensitivity: Comparisons and evaluations of paper-and-pencil versus behavioral measures. *Journal of Research in Personality*, 33(3), 330–351.
- Rozin, P., Lowery, L., & Ebert, R. (1994). Varieties of disgust faces and the structure of disgust. *Journal of Personality and Social Psychology*, 66(5), 870–881.
- Shook, N. J., Ford, C. G., & Boggs, S. T. (2017). Dangerous worldview: A mediator of the relation between disgust sensitivity and social conservatism. *Personality and Individual Differences*, 119, 252–261.
- Shook, N. J., Thomas, R., & Ford, C. G. (2019). Testing the relation between disgust and general avoidance behavior. *Personality and Individual Differences*, 150, 109457.
- Sparks, A. M., Fessler, D. M., Chan, K. Q., Ashokkumar, A., & Holbrook, C. (2018). Disgust as a mechanism for decision making under risk: Illuminating sex differences and individual risk-taking correlates of disgust propensity. *Emotion*, 18(7), 942–958.
- Terrizzi Jr, J. A., Shook, N. J., & McDaniel, M. A. (2013). The behavioral immune system and social conservatism: A meta-analysis. *Evolution and Human Behavior*, 34(2), 99–108.
- Tybur, J. M., Bryan, A. D., Lieberman, D., Hooper, A. E. C., & Merriman, L. A. (2011). Sex differences and sex similarities in disgust sensitivity. *Personality and Individual Differences*, 51(3), 343–348.
- Tybur, J. M., Lieberman, D., & Griskevicius, V. (2009). Microbes, mating, and morality: Individual differences in three functional domains of disgust. *Journal of Personality and Social Psychology*, 97(1), 103–122.
- Tybur, J. M., Lieberman, D., Kurzban, R., & DeScioli, P. (2013). Disgust: evolved function and structure. *Psychological Review*, 120(1), 65–84.
- Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of behavioral decision making*, 15(4), 263–290.
- Weller, J. A., & Tikir, A. (2011). Predicting domain-specific risk taking with the HEXACO personality structure. *Journal of Behavioral Decision Making*, 24(2), 180–201.
- Woody, S. R., & Teachman, B. A. (2000). Intersection of disgust and fear: Normative and pathological views. *Clinical Psychology: Science and Practice*, 7(3), 291–311.