Personality and Individual Differences 51 (2011) 343–348

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Sex differences and sex similarities in disgust sensitivity

Joshua M. Tybur [a,*], Angela D. Bryan [b], Debra Lieberman [c], Ann E. Caldwell Hooper [b], Leslie A. Merriman [b]

[a] VU University Amsterdam, Department of Social and Organizational Psychology, Van Der Boechorststraat 1, 1081 BT, Amsterdam, The Netherlands
[b] University of New Mexico, Department of Psychology, 1 University of New Mexico, MSC03 2220, Albuquerque, NM 87131-0001, USA
[c] University of Miami, Department of Psychology, P.O. Box 248185, Coral Gables, FL 33124-0751, USA

ARTICLE INFO

Article history:
Received 11 November 2010
Received in revised form 30 March 2011
Accepted 1 April 2011
Available online 8 May 2011

Keywords:
Individual Differences
Evolutionary Psychology
Psychometrics
Emotions
Disgust Sensitivity
Big Five

ABSTRACT

Across two studies, we test for sex differences in the factor structure, factor loadings, concurrent validity, and means of the Three Domain Disgust Scale. In Study 1, we find that the Three Domain Disgust Scale has indistinguishable factor structure and factor loadings for men and women. In Study 2, we find a small sex difference in sensitivity to pathogen and moral disgust and a large sex difference in sensitivity to sexual disgust, with women more sensitive to disgust across domains. However, correlations between Three Domain Disgust Scale factors and the five factors and 30 facets of the NEO Personality Inventory were indistinguishable between the sexes. These findings suggest that, despite mean sex differences in disgust sensitivity, the Three Domain Disgust Scale measures similar constructs in men and women. Implications for understanding the constructs measured by the Three Domain Disgust Scale are discussed.

1. Introduction

Disgust sensitivity refers to the degree to which an individual experiences disgust toward common elicitors (e.g., spoiled food). To date, disgust sensitivity research has spanned myriad topics, including blood–injury–injection phobia (de Jong & Merckelbach, 1998), obsessive and compulsive traits (Mancini, Gragnani, & D'Olimpio, 2001; Olatunji et al., 2007), and political ideology (Inbar, Pizarro, & Bloom, 2009; Tybur, Merriman, Caldwell, McDonald, & Navarrete, 2010). The majority of these investigations have measured disgust sensitivity using the Disgust Scale (Haidt, McCauley, & Rozin, 1994), or revisions of the measure (e.g., Olatunji et al., 2007). Although versions of the Disgust Scale measure disgust responses toward varied sources of infectious disease threats (e.g., corpses, bodily wastes, interpersonal contact), they do not systematically measure disgust toward sexual or moral concepts, both of which elicit disgust (Chapman, Kim, Susskind, & Anderson, 2009; Danovitch & Bloom, 2009; Schaich Borg, Lieberman, & Kiehl, 2008; Simpson, Carter, Anthony, & Overton, 2006; Stevenson, Case, & Oaten, 2011). Given the absence of instruments designed to measure sensitivities to sexual and moral disgust, Tybur, Lieberman, and Griskevicius (2009) developed the Three Domain Disgust Scale (TDDS), which measures disgust sensitivity across pathogen, sexual, and moral domains. Hence, it allows for distinctions between "general" disgust sensitivity, sensitivity to pathogen disgust (which is substantially measured by the Disgust Scale, see Olatunji, Haidt, McKay, & Bieke, 2008; Tybur et al., 2009, 2010), and sensitivity to previously overlooked domains of sexual disgust and moral disgust.

Existing investigations have supported the validity of the TDDS as a three-factor measure. Confirmatory factor analysis suggests that a three-factor structure fits the 21-item measure well. Item composites possess good internal consistency, and the factors are weakly to moderately correlated (Tybur et al., 2009). Studies employing the TDDS have shown that different domains of disgust sensitivity have specific relationships with different outcomes, including mate preferences, social values, and political attitudes (e.g., DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010; Kurzban, Dukes, & Weeden, 2010; Tybur et al., 2010). However, it has yet to be demonstrated that the TDDS measures the same constructs in men and women. This gap contrasts with evidence suggesting that disgust *responses* vary between the sexes, with women generally being more sensitive to disgust than men, and disgust differentially relating to other behaviors between the sexes (e.g., Fessler, Pillsworth, & Flamson, 2004; Haidt et al., 1994; Olatunji et al., 2007; Schaich Borg et al., 2008). In the current research, we test the critical assumption that the TDDS measures the same constructs in men and women. If it does, then examining mean differences and sex-specific relationships between the TDDS and other constructs is valid. If it does not, then sex differences involving the TDDS may reflect differences in the constructs measured by the instrument. Moreover, lack of equivalency in the factor structure of the TDDS may suggest meaningful sex differences in the

* Corresponding author. Tel.: +31 20 59 88888; fax: +31 20 59 88702.
E-mail address: jmtybur@gmail.com (J.M. Tybur).

0191-8869/$ - see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.paid.2011.04.003

nature of sensitivities to pathogen, sexual, and moral disgust as theoretical constructs.

1.1. The current studies

Here we investigate cross-sex validity of the TDDS using two methods. In Study 1, we test two necessary conditions for construct equivalence across groups: configural and metric invariance. In Study 2, we examine TDDS construct equivalence across the sexes in a different manner: we test for sex differences in concurrent validity of the TDDS using a revision of the NEO Personality Inventory (NEO PI-3; Costa & Mccrea, 1992; McCrae, Costa, & Martin, 2005).

2. Study 1

2.1. Methods

To possess comparable validity across groups, a measure must, at minimum, have the same factor structure across groups (Steenkamp & Baumgartner, 1998; Steinmetz, Schmidt, Tina-Booh, Wieczorek, & Schwartz, 2009). Without equivalency in a measure's factor structure, relationships with other variables (e.g., regression slopes, group mean differences) can reflect differences in what is being measured across groups rather than real group differences in the construct of interest (Horn & McArdle, 1992). A further, more stringent test of cross-group validity involves testing the equivalency of factor loadings across groups (Vandenberg & Lance, 2000). Even if the same items define a latent variable, group differences in item loadings suggest subtle differences in the nature of the measured construct(s) between groups. Tests of the equivalency of factor structure and factor loadings are referred to as tests of "configural" and "metric" invariance, respectively (Vandenberg & Lance, 2000). These tests are typically done using confirmatory factor analysis (CFA), which provides a superior framework to exploratory factor analysis techniques for invariance analyses (Marsh & Hocevar, 1985).

2.1.1. Participants

Participants were 1496 individuals (71.1% female) recruited to participate in an online study on personality and emotions via advertisements on craigslist.org websites across the United States. Participant age was more varied than that of the college samples used during TDDS measure development ($M = 33.0$, $SD = 11.7$, range = 18–78). Web-based methods such as this allow for greater sample diversity without presenting serious method-specific threats to validity (see Gosling, Vazire, Srivastava, & John, 2004).

2.1.2. Measures

Participants completed several measures, including the TDDS, which measures sensitivity to pathogen, sexual, and moral disgust across 21 items measured on a 1 (not at all disgusting) to 7 (extremely disgusting) scale. Each item describes a situation, act, or concept nominated during measure development based on its ability to elicit disgust. During measure development, items were retained based on the adequacy of factor loadings and item variability.

2.1.3. Results

All analyses were conducted using EQS 6.1. First, a CFA was performed on the aggregated sample. Pathogen, sexual, and moral disgust items were constrained to load on three latent variables, which were free to covary. Cross-loadings and error covariances were constrained to zero. Mardia's coefficient (normalized estimate: 19.83) suggested that data violated assumptions of multivariate normality, so robust estimates were used to interpret model fit. Models with high numbers of degrees of freedom, including CFA on multi-dimensional measures such as the TDDS, rarely reach conventional thresholds for good model fit according to traditional measures such as comparative fit index (CFI) (Church & Burke, 1994; Marsh, Hau, & Wen, 2004). With the multi-dimensional nature of the TDDS and high degrees of freedom in mind, we interpreted model fit as adequate: S-B$\chi^2(186, N = 1496) = 1148.99$, CFI = 0.91, SRMR = 0.05, RMSEA = 0.06. These fit indices were similar for both sexes when examined separately (Men: S-B$\chi^2(186, N = 433) = 448.87$, CFI = 0.91, SRMR = 0.06, RMSEA = 0.06; Women: S-B$\chi^2(186, N = 1063) = 892.19$, CFI = 0.89, SRMR = 0.05, RMSEA = 0.06).

Next, we specified a multi-group model in which fit for both groups was examined simultaneously. In this model, the factor structure was specified identically across groups, but all item loadings, error variances, and factor covariances were free to vary. This is a method of formally establishing configural invariance (i.e., equivalence in factor structure across the sexes). Model fit was adequate: S-B$\chi^2(372, N = 1496) = 1344.43$, CFI = 0.90, SRMR = 0.06, RMSEA = 0.06. Hence, we observed evidence that the three-factor structure is the same across the sexes, with the same items characterizing each factor. Superficially, the standardized factor loadings were similar across the sexes (Table 1).

Having established configural invariance, we next tested for metric invariance across the sexes. Metric invariance is examined by constraining unstandardized factor loadings to equality across multiple groups. Nested models (i.e., a model in which factor loadings are free to differ across groups—in this case, the previous model used to test for configural invariance—versus a model in which factor loadings are not free to vary between groups) are compared. If the metric invariant model demonstrates inferior fit, factor loading equality constraints are relaxed until fit is indistinct from the baseline model.

Chi-square tests are not typically used as a critical evaluator of overall model fit, since very minor differences between specified and observed covariance structures can lead to the rejection of an adequate and parsimonious model, especially with large samples (Bentler & Bonett, 1980). Noting that a reliance on chi-square difference tests can lead to inappropriate rejection of invariant models, Chen (2007) and Cheung and Rensvold (2002) have suggested guidelines for evaluating measurement invariance using changes in common fit indices, including CFI, root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Monte Carlo simulations conducted by Chen suggest that, for samples with unequal group sizes, metric invariance should be rejected if ΔCFI is >0.005, ΔRMSEA is >0.010, and ΔSRMR is >0.025. Thus, instead of relying on chi-square difference tests to evaluate metric invariance, we report and interpret differences in these fit indexes.

CFA models require the unstandardized factor loading for one variable (i.e., the "marker" variable) for each latent variable to be fixed to 1.0. This factor loading cannot vary across the sexes, since it is constrained to the same value for both groups. We thus aimed to select marker variables demonstrating good evidence for metric invariance. We examined several models in which different items were designated as marker variables, and all other factor loadings were fixed to equality. After observing that factor loadings for TDDS items 19, 20, and 21 were consistently invariant across the sexes in these preliminary models, we designated them as marker variables for the moral, sexual, and pathogen factors, respectively, for the tests of metric invariance reported below. All other factor loadings were constrained to equality across the sexes. Fit indices were similar to those of the unconstrained model, S-B$\chi^2(390, N = 1496) = 1400.45$, CFI = 0.89, SRMR = 0.07, RMSEA = 0.06, and the model satisfied all criteria for accepting assumptions of metric invariance suggested by Chen (2007), ΔCFI = 0.004,

Table 1
Standardized factor loadings of the TDDS.

Item No.	Items of the TDDS	Men	Women
1	Shoplifting a candy bar from a convenience store	0.63	0.66
4	Stealing from a neighbor	0.76	0.78
7	A student cheating to get good grades	0.79	0.71
10	Deceiving a friend	0.69	0.71
13	Forging someone's signature on a legal document	0.82	0.75
16	Cutting to the front of a line to purchase the last few tickets to a show	0.73	0.63
19	Intentionally lying during a business transaction	0.82	0.76
2	Hearing two strangers having sex	0.67	0.66
5	Performing oral sex	0.53	0.56
8	Watching a pornographic video	0.70	0.70
11	Finding out that someone you do not like has sexual fantasies about you	0.45	0.48
14	Bringing someone you just met back to your room to have sex	0.77	0.66
17	A stranger of the opposite sex intentionally rubbing your thigh in an elevator	0.48	0.44
20	Having anal sex with someone of the opposite sex	0.65	0.62
3	Stepping on dog poop	0.49	0.54
6	Sitting next to someone who has red sores on their arm	0.52	0.59
9	Shaking hands with a stranger who has sweaty palms	0.59	0.66
12	Seeing some mold on old leftovers in your refrigerator	0.55	0.57
15	Standing close to a person who has body odor	0.68	0.72
18	Seeing a cockroach run across the floor	0.61	0.57
21	Accidentally touching a person's bloody cut	0.54	0.59

Note: The first seven items load on the moral disgust latent variable; the second seven items load on the sexual disgust latent variable; the third seven items load on the pathogen disgust latent variable.

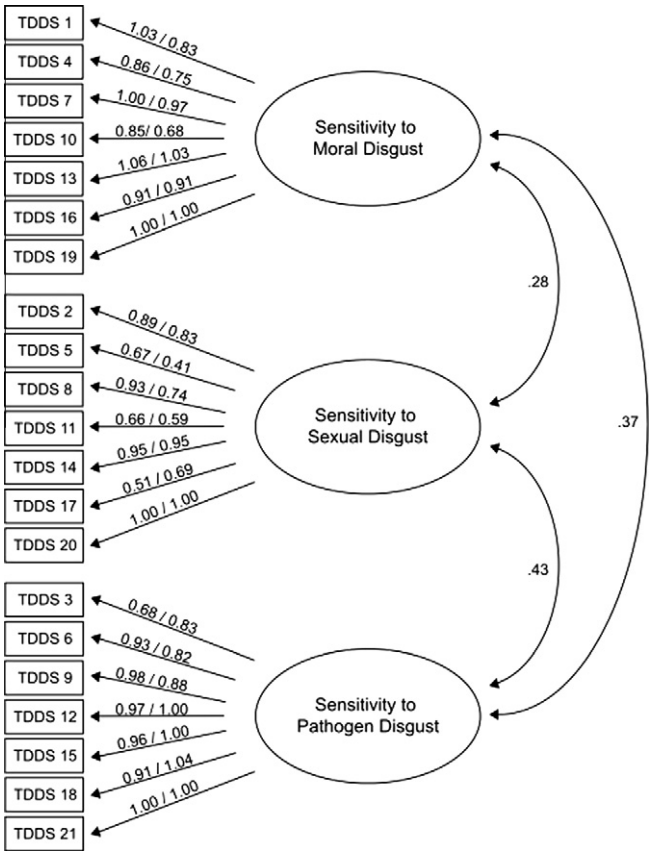

Fig. 1. Unstandardized factor loadings for the Three Domain Disgust Scale. Men's factor loadings are left of the slash. Covariances between latent variables are standardized estimates (i.e., correlations) based on the complete data set without separate estimates for men and women. Model fit is similar when factor loadings are free to vary between the sexes versus constrained to equality, ΔCFI = 0.004, ΔSRMR = 0.005, and ΔRMSEA < 0.001.

ΔSRMR = 0.005, and ΔRMSEA < 0.001. Hence, we found no evidence to suggest that TDDS factor loadings varied between the sexes. As detailed in Fig. 1, unconstrained factor loadings were similar across groups.

2.2. Discussion

Results from Study 1 suggest that the three factor structure of the TDDS applies to both men and women, and factor loadings are invariant across the sexes. Thus, the TDDS measures three latent variables for both men and women, and the three latent variables are defined equally by scale items. These results suggest that sex differences in TDDS validity reflect actual differences in disgust sensitivity rather than differences in how the constructs are measured across groups.

3. Study 2

Study 1 tested and confirmed a fundamental aspect of construct equivalence across groups. Without equivalence of the factor structure and item loadings, an instrument cannot be assumed to measure the same construct across groups, and group differences in validity coefficients may reflect biased measurement rather than true differences in how the construct functions across groups. Having observed configural and metric invariance across the sexes, we next tested for sex differences in the construct validity of the TDDS using the NEO PI-3, which measures Five Factor Model dimensions (McCrae et al., 2005). Potential sex differences in relationships with the NEO PI-3 can inform how the same constructs—sensitivity to pathogen, sexual, and moral disgust—may operate differently across the sexes. For example, TDDS items may equally define "sensitivity to sexual disgust" for men and women, but sensitivity to sexual disgust may relate more to, perhaps, openness to experience for men than for women.

Previous research using versions of the Disgust Scale, which map most closely onto the pathogen disgust subscale of the TDDS, shows that the Disgust Scale correlates with Big Five dimensions, especially neuroticism (Druschel & Sherman, 1999; Haidt et al., 1994; Olatunji et al., 2008). However, no investigations have reported correlations between Big Five dimensions and the final version of the TDDS. In Study 2 we use the TDDS to test for both

sex-specific and sex-general relationships between disgust sensitivity as measured by the TDDS and the NEO PI-3.

3.1. Methods

3.1.1. Participants

Four hundred seventy-seven undergraduate students enrolled in psychology courses at the University of New Mexico participated in the study in exchange for course credit. Age ($M = 19.89$, $SD = 3.06$) and gender (67.7% female) were typical for a sample drawn from this population.

3.1.2. Measures

Participants completed a battery of measures, including the TDDS and NEO PI-3 (McCrae et al., 2005). The NEO PI-3 measures factors of neuroticism, extraversion, openness, agreeableness, and conscientiousness, each with 48 items. The 48 items per factor are further compartmentalized into six eight-item facets—sub-factors within five factor model dimensions. This produces a total of 30 facets.

3.1.3. Results

The TDDS ($\alpha = 0.77$, 0.86, 0.82 for pathogen, sexual, and moral disgust, respectively) and NEO PI-3 demonstrated good internal consistency (all factor α's above 0.80). The 30 eight-item NEO PI-3 facets ranged in internal consistency, with some alphas low (the lowest being the activity facet of extraversion, $\alpha = 0.56$), but most in an acceptable range (23 of 30 above 0.70).

We replicated previously reported sex differences in mean TDDS scores (Tybur et al., 2009). Rather than generally being more sensitive to disgust than men, women's higher disgust sensitivity varied across pathogen, sexual, and moral domains, $F(2,474) = 55.29$, $p < 0.001$. Women were much more sensitive to sexual disgust than men, $t(475) = 12.32$, $p < 0.001$, $d = 1.44$, but only slightly more sensitive to pathogen disgust, $t(475) = 3.23$, $p < 0.05$, $d = 0.32$, and moral disgust, $t(475) = 2.31$, $p < 0.05$, $d = 0.23$. These mean differences need not indicate that the constructs measured by the TDDS have different concurrent validity across the sexes. To test for sex-specific validity of TDDS factors, we examined bivariate correlations between the TDDS and NEO PI-3 factors separately for the sexes. Using Fisher's z' transformations, we tested each correlation coefficient for significant differences between the sexes. None of the fifteen bivariate correlations differed between the sexes at the $p < 0.05$ level. We further examined the 90 correlations between NEO PI-3 facets and TDDS factors. Given the large number of correlations tested (30 per TDDS factor), we used a critical p value of 0.0017 (0.05 divided by 30) for hypothesis tests. Based on these criteria, none of the correlations between NEO PI-3 facets and TDDS factors differed between the sexes.

Given the lack of evidence for sex differences in the relationships between the TDDS and NEO PI-3, we next examined relationships between the two measures collapsing across participant sex. Because mean sex differences on two measures can inflate the correlation between the measures, we controlled for participant sex. Overall, TDDS factors were not strongly related to any NEO PI-3 factors. Using the same critical value of 0.0017, sensitivity to pathogen disgust was significantly related to openness ($r_p = -0.24$), sensitivity to sexual disgust was significantly related to openness ($r_p = -0.38$) and agreeableness ($r_p = 0.18$), and sensitivity to moral disgust was significantly related to agreeableness ($r_p = 0.25$) and conscientiousness ($r_p = 0.28$). Facet-level correlations generally followed the same patterns as the factor-level correlations (see Table 2). Notably, none of the correlations between TDDS factors and the NEO PI-3 neuroticism factor were statistically significant, and only one facet-level correlation was statistically significant (sensitivity to moral disgust and the vulnerability facet of neuroticism, $r_p = -0.17$).

Table 2
Correlations between TDDS factors and NEO PI-3 factors and facets, controlling for participant sex.

NEO PI-3 factor	NEO PI-3 facet	TDDS factor		
		Pathogen	Sexual	Moral
Neuroticism		0.10	0.03	−0.13
	Anxiety	0.10	0.06	−0.02
	Angry hostility	0.07	−0.09	−0.13
	Depression	0.03	0.07	−0.09
	Self consciousness	0.05	0.07	−0.08
	Impulsiveness	0.10	−0.05	−0.11
	Vulnerability	0.09	0.07	**−0.17**
Extraversion		−0.05	−0.02	0.07
	Warmth	−0.09	0.05	**0.15**
	Gregariousness	0.02	0.00	−0.01
	Assertiveness	−0.07	−0.04	0.07
	Activity	0.00	0.03	0.06
	Excitement seeking	0.04	−0.14	0.00
	Positive emotions	−0.10	0.03	0.05
Openness		**−0.24**	**−0.38**	−0.03
	Fantasy	**−0.17**	**−0.28**	−0.10
	Aesthetics	**−0.15**	**−0.20**	0.00
	Feelings	−0.14	**−0.18**	0.04
	Actions	**−0.19**	**−0.29**	−0.08
	Ideas	**−0.18**	**−0.25**	0.11
	Values	**−0.21**	**−0.42**	−0.10
Agreeableness		−0.13	**0.18**	**0.25**
	Trust	**−0.16**	0.04	0.14
	Straightforwardness	−0.06	**0.20**	**0.27**
	Altruism	−0.06	0.11	**0.22**
	Compliance	−0.09	0.14	0.11
	Modesty	−0.06	**0.16**	**0.18**
	Tender mindedness	−0.09	0.06	0.08
Conscientiousness		0.02	0.11	**0.28**
	Competence	−0.04	−0.01	**0.20**
	Order	0.09	0.11	0.14
	Dutifulness	0.04	0.08	**0.29**
	Achievement seeking	0.02	0.10	**0.28**
	Self discipline	−0.02	0.05	**0.19**
	Deliberation	−0.02	**0.15**	**0.22**

Note: Bold values are significant at the $p < .05$ level after correcting for multiple comparisons.

4. General discussion

Across two studies, we found consistent evidence that the TDDS measures the same constructs across the sexes. In Study 1, we found that both the factor structure and the factor loadings were invariant across the sexes. In Study 2, we found that the TDDS demonstrates indistinguishable concurrent validity with the NEO PI-3 for men and women. In sum, results suggest that the TDDS is similarly valid for both sexes, and potential differences in the meaning of TDDS constructs do not threaten the validity of inferences based on the measure.

4.1. Implications of construct equivalence

Evidence of construct equivalence across the sexes is valuable for future research using the TDDS as a measure of disgust sensitivity. Beyond informing the validity of future inferences based on sex differences, measurement equivalence may inform the meaning of TDDS constructs for both sexes. The TDDS is a relatively new measure, and the natures of sensitivities to pathogen, sexual, and moral disgust are still developing. This is especially the case for sensitivities to sexual and moral disgust, which have largely been overlooked in the disgust sensitivity literature. Consider the sexual domain of the TDDS as an example. Items forming this factor consist

of specific sexual acts (e.g., performing oral sex), potential unwanted sexual advances (e.g., finding out that someone you do not like has sexual fantasies about you), and what might be described as "sexual morality" (e.g., bringing someone you just met back to your room to have sex). Nevertheless, they form a cohesive factor with similar internal consistency as the pathogen and moral factors. This suggests that sensitivity to sexual disgust, as measured by the TDDS, captures a relatively general dimension of sexual aversion. Equivalent factor structure and loadings across the sexes further supports this interpretation. Even though certain items presumably involve more sex-specific costs or risks, they nevertheless relate to the overall construct equally across the sexes. For example, the item, "A stranger of the opposite sex intentionally rubbing your thigh in an elevator" describes substantially different threats for men and women. For women, this may be a precursor to sexual coercion or aggression, both of which typically involve markedly greater costs for women than for men (e.g., higher chance of STD acquisition; greater consequences of conception). For men, this may present some potential costs (e.g., reputational damage related of promiscuity), but the nature and urgency of the threats are qualitatively different. Invariance in factor loadings between the sexes lends support to this interpretation of the TDDS sexual disgust construct as related to general aversion. The similarity across the sexes in relationships between TDDS factors and the NEO PI-3 further reinforces the similarity between the meaning of sensitivities to pathogen, sexual, and moral disgust across the sexes.

4.2. Implications of concurrent validity with the NEO PI-3

All TDDS factors were modestly related or unrelated to the NEO PI-3. Most notably, none of the three disgust domains significantly covaried with neuroticism. This may seem counterintuitive in light of previous research showing a substantial relationship between the Disgust Scale and neuroticism (r's = 0.45 and 0.46 reported by Druschel & Sherman, 1999; Olatunji et al., 2008) and the strong correlation between the Disgust Scale-Revised and the pathogen domain of the TDDS (correlations above $r = 0.60$, Tybur et al., 2009, 2010). Despite its strong relationship with the Disgust Scale, the pathogen factor of the TDDS was not significantly related to neuroticism after controlling for participant sex and adjusting for alpha inflation ($r = 0.10$). We suggest that the lower correlation reported in this investigation may more accurately reflect the relationship between neuroticism and sensitivity to pathogen disgust. Whereas items on the TDDS pathogen factor straightforwardly concern common disgust elicitors (e.g., feces, cockroaches, body odor), many Disgust Scale items concern the degree to which the respondent is "bothered" or "upset" by unusual events that may not directly relate to intensity of disgust responses (e.g., "It would bother me to sleep in a nice hotel room if I knew that a man had died of a heart attack in that room the night before"). Given that neuroticism is generally defined as proneness to stress and anxiety, the nature of Disgust Scale item content may exaggerate the degree to which disgust sensitivity is related to neuroticism.

Other empirical findings suggest a limited relationship between disgust and neuroticism. For example, Hennig, Possel, and Netter (1996) found that high and low neuroticism individuals do not differ in self-reported disgust toward movie clips that depicted vomiting, handling a decapitated horse head, and eating food that has been spit on. Similarly, Wilson, Kumari, Gray, and Corr (2000) found no difference between high and low neuroticism participants in eye-blink startle response to disgusting film clips. Disgust sensitivity has emerged as a potentially important predictor of several constructs relevant to mental health (e.g., obsessive and compulsive traits; Mancini, Gragnani, & D'Olimpio, 2001; Olatunji et al., 2007), and experimentally induced disgust has been shown to impact attitudes relevant to sexual health (e.g., intentions to use condoms during sex; Tybur, Bryan, Magnan, & Caldwell Hooper, 2011). Further research into the etiology of disgust and disgust sensitivity using constructs such as the Big Five—specifically, clarification regarding neuroticism—may critically improve understanding of these and several other theoretically and practically important phenomena.

4.3. Conclusion

Disgust theoretically functions to regulate multiple threats, including those posed by infectious disease, costly sexual behaviors, and non-cooperative interactions within groups. Consequently, disgust sensitivity has emerged as an important trait in personality, social, and moral psychology. However, understanding of the nature of disgust sensitivity—and the validity of measures of disgust sensitivity—is still developing. We have provided evidence that the TDDS measures individual differences in sensitivities to pathogen, sexual, and moral disgust similarly across the sexes. In combination with other recent studies, this investigation suggests that the TDDS is a useful tool for new explorations and in many cases re-explorations of the manners in which disgust sensitivity relates to myriad behaviors and cognitions across the psychological sciences.

References

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588–606.

Chapman, H. A., Kim, D. A., Susskind, J. M., & Anderson, A. K. (2009). In bad taste: Evidence for the oral origins for moral disgust. *Science, 27*, 1222–1226.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling, 14*, 464–504.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255.

Church, A. T., & Burke, P. J. (1994). Exploratory and confirmatory tests of the Big Five and Tellegen's three- and four-dimensional models. *Journal of Personality and Social Psychology, 66*, 93–114.

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.

Danovitch, J., & Bloom, P. (2009). Children's extension of disgust to physical and moral events. *Emotion, 9*, 107–112.

de Jong, P. J., & Merckelbach, H. (1998). Blood–injury–injection phobia and fear of spiders: Domain specific individual differences in disgust sensitivity. *Personality and Individual Differences, 24*, 153–159.

DeBruine, L. M., Jones, B. C., Tybur, J. M., Lieberman, D., & Griskevicius, V. (2010). Women's preferences for masculinity in male faces are predicted by pathogen disgust, but not sexual or moral disgust. *Evolution and Human Behavior, 31*, 69–74.

Druschel, B. A., & Sherman, M. F. (1999). Disgust sensitivity as a function of the Big Five and gender. *Personality and Individual Differences, 26*(4), 739–748.

Fessler, D. M. T., 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*, 107–123.

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions. *American Psychologist, 59*, 93–104.

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*, 701–713.

Hennig, J., Possel, P., & Netter, P. (1996). Sensitivity to disgust as a predictor of neuroticism: A psychobiological approach. *Personality and Individual Differences, 20*, 589–596.

Horn, J. L., & McArdle, J. J. (1992). A practical and theoretical guide to measurement invariance in aging research. *Experimental Aging Research, 18*, 117–144.

Inbar, Y., Pizarro, D. A., & Bloom, P. (2009). Conservatives are more easily disgusted than liberals. *Cognition and Emotion, 23*, 714–725.

Kurzban, R., Dukes, A., & Weeden, J. (2010). Sex, drugs, and moral goals: Reproductive strategies and views about recreational drug use. *Proceedings of the Royal Society B, 277*, 3501–3508.

Mancini, F., Gragnani, A., & D'Olimpio, F. (2001). The connection between disgust and obsessions and compulsions in a non-clinical sample. *Personality and Individual Differences, 31*, 1173–1180.

Marsh, H. W., Hau, K., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers of overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11*, 320–341.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups. *Psychological Bulletin, 97*, 562–582.

McCrae, R. R., Costa, P. T., & Martin, T. A. (2005). The NEO-PI-3: A more readable revised NEO personality inventory. *Journal of Personality Assessment, 84*, 261–270.

Olatunji, B. O., Haidt, J., McKay, D., & Bieke, D. (2008). Core, animal reminder, and contamination disgust: Three kinds of disgust with distinct personality, behavioral, physiological, and clinical correlates. *Journal of Research in Personality, 42*, 1243–1259.

Olatunji, B. O., Williams, N. L., Tolin, D. F., Sawchuk, C. N., Abramowitz, J. S., Lohr, J. M., et al. (2007). The Disgust Scale: Item analysis, factor structure, and suggestions for refinement. *Psychological Assessment, 19*, 281–297.

Schaich Borg, J., Lieberman, D., & Kiehl, K. A. (2008). Infection, incest, and iniquity: Investigating the neural correlates of disgust and morality. *Journal of Cognitive Neuroscience, 20*, 1529–1546.

Simpson, J., Carter, S., Anthony, S. H., & Overton, P. G. (2006). Is disgust a homogenous emotion? *Motivation and Emotion, 30*, 31–41.

Steenkamp, J. E. M., & Baumgartner, H. (1998). Assessing measurement invariance in crossnational consumer research. *Journal of Consumer Research, 25*, 78–90.

Steinmetz, H., Schmidt, P., Tina-Booh, A., Wieczorek, S., & Schwartz, S. H. (2009). Testing measurement invariance using multigroup CFA: Differences between educational groups in human values measurement. *Quality and Quantity, 43*, 599–616.

Stevenson, R. J., Case, T. I., & Oaten, M. J. (2011). Effect of self-reported sexual arousal on responses to sex-related and non-sex-related disgust cues. *Archives of Sexual Behavior, 40*, 79–85.

Tybur, J. M., Bryan, A. D., Magnan, R. E., & Caldwell Hooper, A. E. (2011). Smells like safe sex: Olfactory pathogen primes increase intentions to use condoms. *Psychological Science, 22*, 478–480.

Tybur, J. M., Lieberman, D. L., & Griskevicius, V. (2009). Microbes, mating, and morality: Individual differences in three functional domains of disgust. *Journal of Personality and Social Psychology, 29*, 103–122.

Tybur, J. M., Merriman, L. A., Caldwell, A. E., McDonald, M. M., & Navarrete, C. D. (2010). Extending the behavioral immune system to political psychology: Are political conservativism and disgust sensitivity really related? *Evolutionary Psychology, 8*, 599–616.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*, 4–70.

Wilson, G. D., Kumari, V., Gray, J. A., & Corr, P. J. (2000). The role of neuroticism in startle reactions to fearful and disgusting stimuli. *Personality and Individual Differences, 29*, 1077–1082.