



Disgust sensitivity and the HEXACO model of personality

Joshua M. Tybur*, Reinout E. de Vries

VU University Amsterdam, Department of Social and Organizational Psychology, Van der Boerhorststraat 1, 1081 BT Amsterdam, The Netherlands

ARTICLE INFO

Article history:

Received 9 March 2013

Received in revised form 20 April 2013

Accepted 13 May 2013

Available online 14 June 2013

Keywords:

HEXACO

Big Five

Disgust sensitivity

Evolutionary psychology

ABSTRACT

In the current investigation, we test for relationships between three domains of disgust sensitivity (pathogen, sexual, and moral disgust) and the six dimensions of the HEXACO personality model in a large, demographically diverse Dutch sample. Our results extend upon previous investigations into the relationship between disgust sensitivity and personality in two important ways. First, in contrast with most previous investigations into disgust sensitivity, we measure sensitivities to sexual and moral disgust, two domains that elicit self-reports of disgust and facial expressions of disgust. Second, in contrast with the few investigations that have tested for relationships between sensitivities to sexual and moral disgust and Five Factor Model personality dimensions, we use the HEXACO personality model. We find that honesty–humility, a personality dimension assessed in the HEXACO model but not the Five Factor Model, accounts for unique variance in sensitivities to sexual and moral disgust, but not sensitivity to pathogen disgust. Other relationships between disgust sensitivity and personality are discussed, as are implications for understanding the fitness-relevant tradeoffs potentially underlying disgust sensitivity and personality.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

Observations that certain aspects of disgust are largely universal, such as the canonical disgust facial expression and the reliability with which certain objects (e.g., feces, vomit) elicit disgust, have inspired extensive work on the function and structure of disgust (see Tybur, Lieberman, Kurzban, & DeScioli, 2013, for an overview). However, within universal aspects of disgust lies variation. One example of such variation concerns the degree to which individuals are disgusted by common disgust elicitors (e.g., touching someone else's sweat)—that is, the degree to which individuals are “sensitive” to disgust. Much of the recent research in disgust has prioritized taxonomizing and understanding such individual differences (Haidt, McCauley, & Rozin, 1994; Olatunji et al., 2007; Tybur, Bryan, Lieberman, Caldwell Hooper, & Merriman, 2011; Tybur, Lieberman, & Griskevicius, 2009). In the current paper, we aim to better understand disgust sensitivity by examining how it relates to basic dimensions of personality. Specifically, we investigate the relationships between the three domains of disgust sensitivity proposed by Tybur et al. (2009) with both five and six factor models of personality.

1.1. Three domains of disgust sensitivity

Evolutionarily oriented disgust theorists have argued that disgust serves discrete, fitness-promoting functions (Rozin, Haidt, & McCauley, 2008; Tybur et al., 2009). One recent framework de-

scribes these domains as pathogen, sexual, and moral disgust, each of which have been shaped by distinct selection pressures (Tybur et al., 2013). In addition to suggesting that different computational processes underlie these domains, this framework also implies that, because disgust responses reflect distinct tradeoffs across domains, individual differences in disgust sensitivity might vary along these domains. That is, people that relatively strongly avoid pathogens, and who pay the costs for doing so (e.g., by constraining diet and social interactions), may not be the same people that relatively strongly avoid fitness-compromising sexual interactions, and who pay distinct costs for doing so (e.g., search costs after rejecting mates), and they may not be the same people that relatively strongly condemn rule violations, and who pay other distinct costs for doing so (e.g., retribution from condemnation targets and their allies; see DeScioli & Kurzban, 2013).

Tybur et al. (2009) tested this possibility by first gathering a wide range of items that were nominated by a panel as “disgusting.” Multiple factor analyses on the degree to which participants rated these items as disgusting indicated that individual differences vary along three dimensions, one of which included items similar to those on Haidt et al.'s (1994) Disgust Scale (cues to pathogens, such as feces, mold, and wounds), one of which included sexual items (e.g., being touched on the thigh by a stranger), and one of which included moral violations (e.g., lying, cheating, stealing). Rather than eliminating sexual and moral items because they did not load on the same factor as items more directly related to pathogen cues (cf. Haidt et al., 1994; Olatunji et al., 2007), Tybur et al. (2009) retained such items in the process of developing the Three Domain Disgust Scale (TDDS). Since the development of

* Corresponding author. Tel.: +31 (0) 205983088.

E-mail address: j.m.tybur@vu.nl (J.M. Tybur).

the TDDS, multiple investigations have used an evolutionary framework to generate and test predictions of unique relationships between these three domains of disgust sensitivity and other constructs (e.g., DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010; Kurzban, Duker, & Weeden, 2010; Pond et al., 2012; Tybur, Merriman, Caldwell, McDonald, & Navarrete, 2010).

1.2. Disgust sensitivity and personality

Although individual differences in disgust sensitivity vary along domains predicted by theory, questions remain regarding why individuals vary in disgust sensitivity and how to interpret these individual differences. One approach to better understanding individual differences involves examining their relationships with basic dimensions of personality. A lack of a relationship between the three domains of disgust sensitivity and fundamental personality dimensions may imply that these individual differences do not share a similar functional, genetic, or developmental origin, whereas strong overlap between the disgust and personality concepts may entail that they are influenced by similar processes.

A handful of studies have examined how disgust sensitivity, as operationalized by the Disgust Scale (Haidt et al., 1994), relates to measures of personality such as Eysenck's EPQ, the BFI, and the NEO-FFI (Druschel & Sherman, 1999; Haidt et al., 1994; Olatunji, Haidt, McKay, & Bieke, 2008). However, inferences concerning the relationship between personality and disgust sensitivity based on these studies may be limited by two aspects of the Disgust Scale. First, the Disgust Scale does not assess sexual or moral content, both of which are rated as disgusting in self-report measures (Haidt et al., 1994; Tybur et al., 2009) and elicit facial expressions of disgust (Borg, de Jong, & Schultz, 2010; Cannon, Schnall, & White, 2011; Chapman, Kim, Susskind, & Anderson, 2009). Second, half of the items on the Disgust Scale concern the degree to which an individual is bothered by, upset by, or generally avoidant of situations peripherally related to disgust (e.g., avoiding walking through a graveyard). Such item content may influence previously observed relationships between the disgust sensitivity and, for example, neuroticism (e.g., $r = .45$ and $r = .46$, as reported by Druschel and Sherman (1999) and Olatunji et al. (2008), respectively). Indeed, other methods of assessing disgust sensitivity that do not rely on such item content report null or weak relationships with neuroticism (e.g., Hennig, Poesel, & Netter, 1996; Olatunji et al., 2012; Tybur et al., 2011). The development of the TDDS offers two potential solutions to these shortcomings. First, the TDDS includes domains of sensitivity to sexual and moral disgust. Second, the TDDS does not include item content related to being bothered, upset, or avoidant of situations, but rather straightforwardly asks respondents to indicate how disgusted they are by acts and concepts described within items.

Two studies have investigated how the TDDS relates to Five Factor Model (FFM) dimensions, including Olatunji et al. (2012), who examined how the TDDS relates to the BFI, and Tybur et al. (2011), who examined how the TDDS relates to the NEO PI-3. Additionally, Tybur et al. (2009) compared a preliminary version of the TDDS with the BFI during instrument development. Although these studies investigated how a wider breadth of disgust sensitivities relate to personality, they are also limited by two factors: their reliance on the FFM of personality and on samples of university students. In the current study, we investigate relations between personality and disgust sensitivity using the HEXACO model of personality (Lee & Ashton, 2004) and a more age- and education-diverse sample.

1.3. The HEXACO model of personality and our main predictions

Lexical research using a number of different languages has shown that the personality space may actually be better represented by six, rather than five, dimensions (Ashton et al., 2004;

Lee & Ashton, 2008). These six dimensions are known by the HEXACO acronym (Honesty–humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to experience). The most notable difference between Five Factor Models and the HEXACO model is the addition, in the HEXACO model, of the honesty–humility factor, which is associated with tendencies to be sincere, fair, modest, and greed-avoidant. Through its addition of honesty–humility, the HEXACO model has been able to better predict behaviors and attitudes that are associated with egoistic, antisocial, and outright delinquent or criminal tendencies than the FFM has (e.g., Ashton & Lee, 2008).

With respect to disgust sensitivity, our primary prediction concerns the relations between the honesty–humility factor of the HEXACO model and the Sexual Disgust and Moral Disgust factors of the TDDS. Each of the investigations that have tested how sensitivities to pathogen, sexual, and moral disgust relate to personality (Olatunji et al., 2012; Tybur et al., 2009, 2011) have reported statistically significant relationships between agreeableness and both sensitivity to sexual disgust and sensitivity to moral disgust. This might imply that individuals who are more warm, kind, and sympathetic report greater disgust toward sexual and immoral acts. However, measures of agreeableness often combine characteristics such as kindness and warmth with aspects of honesty–humility, such as modesty and straightforwardness. Indeed, in examining correlations between the six NEO PI-3 Agreeableness facets and TDDS Sexual Disgust and Moral Disgust factors, Tybur et al. (2011) found that Sexual Disgust and Moral Disgust were most strongly related to Agreeableness facets most relevant to honesty–humility (e.g., Modesty, Straightforwardness).

We predict that personality models including honesty–humility will account for significantly greater variance in sensitivities to sexual and moral disgust—but not sensitivity to pathogen disgust—for three reasons. First, empirical findings suggest that honesty–humility accounts for unique variance in some sexual attitudes (e.g., being open to short-term sexual liaisons and being open to committing infidelity; Bourdage, Lee, Ashton, & Perry, 2007) and some moral violations, such as workplace delinquency (e.g., stealing from employers, committing vandalism; Ashton & Lee, 2008; Lee & Ashton, 2004). Second, as individuals high in honesty–humility are less likely to pursue the types of behaviors that elicit sexual and moral disgust, endorsing proscriptions against such behaviors might more modestly constrain those individuals' fitness interests (cf. DeScioli & Kurzban, 2013; Kurzban et al., 2010). Further, individuals who are more sincere, fair, modest, and greed-avoidant (facets of honesty–humility) may pay higher costs (e.g., in terms of being exploited) when others engage in such behaviors, and they might therefore be more likely to condemn and endorse punishment of such behaviors (e.g., with expressions of moral disgust). Third, the types of fitness costs imposed by non-reciprocators, cheaters, braggarts, etc. are distinct from the types of fitness costs imposed by infectious disease, and we thus predict that honesty–humility will not account for unique variance in sensitivity to pathogen disgust.

2. Methods

To test the above-stated predictions, and to more generally assess the relationship between basic dimensions of disgust sensitivity and personality, we examined correlations between the TDDS, the HEXACO PI-R, and the 5DPT in a large sample that varied on age and education. 2.1 Sample and procedure.

Data were collected in two waves. In the first wave, data were obtained from 1,352 respondents (50.3% women; $M_{age} = 47.9$ ($SD = 15.0$), range: 19–88 years) from a Dutch internet panel, which consisted of people from a wide variety of age and

educational backgrounds (for more details, see De Vries & Van Kampen, 2010). Participants completed the HEXACO PI-R and the 5DPT, as well as a series of other measures, in the first wave. Four hundred seventy-six (35.2%) first wave participants completed the TDDS 3.5 years later during the second wave (50.0% women; $M_{\text{age}} = 54.5$ ($SD = 13.7$), range: 22–87 years). Second wave respondents' education levels were as follows: 136 (28.6%) had a low level of education (primary education, lower-level secondary education, or lower-level tertiary education), 197 (41.4%) a medium level of education (higher-level secondary education or medium-level tertiary education), and 143 (30.0%) a high level of education (higher-level tertiary education or university level education). The second wave sample scored significantly higher on honesty–humility and Conscientiousness/Orderliness and lower on Extraversion than the participants from the first wave who did not participate in the second wave, but all effect sizes (d) were below .28.

2.1. Instruments

2.1.1. HEXACO-PI-R

The Dutch version of the Revised HEXACO Personality Inventory (HEXACO-PI-R; De Vries, Ashton, & Lee, 2009; Lee & Ashton, 2004) operationalizes the six HEXACO domain-level traits (i.e., Honesty–Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience) with 32 items per trait. The alpha reliabilities of the HEXACO scales in our second wave sample ranged between .84 and .91 (Table 1) and none of the absolute correlations between the domain-level scales were greater than .35.

2.1.2. 5DPT

The 5-Dimensional Personality Test (5DPT; De Vries & Van Kampen, 2010; Van Kampen, 2012), which was distributed two weeks after the HEXACO-PI-R in the first wave, measures a psychopathological version of the Five Factor personality dimensions and consists of 20 dichotomous (yes–no) items for each of the Five Factors. In a previous study, the Five Factor scales have been found to converge adequately with the five NEO-FFI scales (Van Kampen, 2012). In our second wave sample, the alpha reliabilities ranged

between .82 and .91 and none of the absolute correlations between the 5DPT scales were greater than .35.

2.1.3. Three Domain Disgust Scale

The TDDS includes 21 items (seven each for Pathogen, Sexual, and Moral factors) nominated as “disgusting” during scale development (see Tybur et al., 2009). Participants were asked to indicate how disgusting they find the concept described in the item from a 0 (not at all disgusting) to 6 (extremely disgusting) scale. The instrument was translated from English to Dutch by a native Dutch speaker, then back-translated from Dutch to English by a Native English speaker. Finally, the two authors (one a native Dutch speaker and one a native English speaker) examined the original, translated, and back-translated versions, and made minor modifications to correct for inconsistencies between the versions. Using Procrustes analyses, we tested the extent to which the factor structure of the Dutch TDDS used in this sample converged with the English TDDS factor structure obtained in a sample of 1496 U.S. participants reported by Tybur et al. (2011 – see Study 1). A high level of convergence was obtained, with an average congruence coefficient (ϕ) of .98. Consistent with past studies using the English version of the TDDS, internal consistencies were acceptable (>.80) for each factor, and intercorrelations between the three sub-scales were modest (between .35 and .40).

3. Results

We first examined zero-order correlations between personality variables and disgust sensitivity (see Table 1 for correlations, means, standard deviations, and internal consistencies). Consistent with past studies using the TDDS, participant sex was strongly related to Sexual Disgust ($d = 1.07$), but not Pathogen Disgust or Moral Disgust. Age was related to both Sexual Disgust ($r = .29$) and Moral Disgust ($r = .20$).

Bivariate correlations indicated only modest relationships between disgust sensitivity and the personality variables measured by the HEXACO PI-R and the 5DPT. For the HEXACO PI-R, the strongest correlate of Pathogen Disgust was Emotionality ($r = .23$), the strongest correlates of Sexual Disgust were Honesty–humility and Emotionality (both r 's = .31) and the strongest correlate of Moral Disgust was honesty–humility ($r = .32$). For the 5DPT, the

Table 1
Correlations, reliabilities (on diagonal) and descriptives ($N = 476$).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Participant Sex (0 = F, 1 = M)	–															
2. Age	.09	–														
<i>HEXACO</i>																
3. Honesty–Humility	–.18	.25	.91													
4. Emotionality	–.48	.01	.09	.89												
5. Extraversion	.02	.05	–.04	–.22	.89											
6. Agreeableness	.03	.09	.34	–.17	.11	.88										
7. Conscientiousness	.02	.07	.16	–.03	.24	.08	.84									
8. Openness to Experience	.05	.05	–.13	–.12	.23	.02	.12	.87								
<i>5DPT</i>																
9. Neuroticism	–.27	–.10	–.05	.62	–.52	–.21	–.13	–.10	.91							
10. Extraversion	–.04	.00	–.05	–.08	.73	.04	.07	.13	–.33	.88						
11. Insensitivity	.10	–.18	–.55	–.07	–.10	–.53	–.17	.14	.23	–.10	.84					
12. Orderliness	.06	.16	.04	.03	.05	–.05	.65	–.12	–.02	.01	–.06	.82				
13. Absorption	–.23	.05	.02	.24	.10	.02	.08	.50	.17	.17	.06	–.02	.87			
<i>Three Domain Disgust Scale</i>																
14. Pathogen Disgust	–.15	.06	–.03	.23	.01	–.17	.11	–.11	.13	.07	.04	.16	.05	.81		
15. Sexual Disgust	–.47	.29	.31	.31	–.09	.09	.11	–.07	.19	–.04	–.21	.14	.13	.38	.89	
16. Moral Disgust	–.01	.20	.32	.03	.07	.07	.27	.01	–.03	.01	–.18	.22	.12	.40	.37	.83
Means	.50	51.50	3.77	3.13	3.31	3.05	3.46	3.21	6.36	10.89	4.80	13.56	8.21	3.82	3.26	4.64
Standard deviations	.50	13.69	.46	.46	.45	.42	.37	.46	5.60	5.32	4.18	4.29	4.94	1.06	1.60	.95

Note: For $|r| > .09$, $p < .05$ and for $|r| > .12$, $p < .01$. Convergent correlations between the 5DPT and HEXACO variables are bold-faced. Scale alphas are on italicized on the diagonal.

strongest correlate of Pathogen Disgust was Orderliness ($r = .16$), the strongest correlate of Sexual Disgust was Insensitivity ($r = -.21$), and the strongest correlate of Moral Disgust was Orderliness ($r = .22$).

To test our primary hypothesis, that honesty–humility explains variance in sensitivities to sexual and moral disgust uniquely from other personality variables, we conducted multiple hierarchical regression analyses in which a single domain of the TDDS was regressed upon participant age and sex (the first step), then on five personality variables (the second step), then on honesty–humility (the third step). This analysis was conducted twice for each TDDS factor—once when the 5DPT factors were included in the second step, and once when the HEXACO factors were included in the second step. This approach allows us to: (a) examine relationships between personality and disgust sensitivity controlling for participant sex and age; (b) examine the unique relationships between FFM personality dimensions and disgust sensitivity; and (c) examine how honesty–humility, which is not well-represented in the FFM, uniquely relates to disgust sensitivity.

Results from these analyses are described in Table 2. The upper part of the table shows the regression of TDDS factors on participant sex and age, the 5DPT scales, and HEXACO Honesty–Humility. The lower part of the table shows the regression of disgust sensitivity on participant sex and age and all six HEXACO domain-level scales. In all six equations, personality explained variance in disgust sensitivity independent of participant sex and age. For Pathogen Disgust, the two significant and—across personality models—consistent personality predictors were Neuroticism/Emotionality and Orderliness/Conscientiousness. For Sexual Disgust, the two consistent personality predictors were Orderliness/Conscientiousness and Honesty–Humility. For Moral Disgust, the two consistent personality predictors were also Orderliness/Conscientiousness and Honesty–Humility. In sum, results indicated that honesty–humility indeed accounts for unique variance in sensitivities to sexual and moral disgust, but not sensitivity to pathogen disgust. Further, once controlling for Honesty–Humility, there was no relationship between Agreeableness/Insensitivity and Sexual Disgust or Moral Disgust.

4. Discussion and conclusions

There are two main contributions that the current investigation offers. First, results offer further insights into how sensitivities to pathogen, sexual, and moral disgust differ. Although some sexual behaviors, immoral acts, and cues to pathogens each activate neural regions suspected to underlie disgust (Schaich Borg, Lieberman, & Kiehl, 2008), each are verbally endorsed as “disgusting” (Curtis & Biran, 2001; Haidt et al., 1994; Tybur et al., 2009), and each are associated with similar facial expressions (Borg et al., 2010; Cannon et al., 2011; Chapman et al., 2009), they elicit disgust through distinct underlying computational processes shaped by different selection pressures (Tybur et al., 2013). Results here not only provide further support that individual differences in sensitivities to these three types of disgust are also distinct; they also provide indications of how they are distinct in terms of their relationships with broad personality dimensions.

Second, results offer clarifications on how to interpret sensitivities to sexual and moral disgust. Our results suggest that sensitivities to these two disgust domains are most strongly related to honesty–humility rather than agreeableness. Hence, rather than being more forgiving, flexible, gentle, and patient (how Agreeableness is defined in the HEXACO model), individuals who are more sensitive to sexual and moral disgust are more sincere, fair, greed-avoidant, and modest. The unique relationship between sensitivities to sexual and moral disgust—and the non-significant unique relationship between these disgust domains and Agreeableness, once controlling for Honesty–Humility—was observed using personality measures based on the HEXACO model and the FFM.

We note one additional clarification to past findings. The association between neuroticism/emotionality and sensitivity to pathogen disgust has been equivocal in the literature. On the one hand, the Disgust Scale (Haidt et al., 1994), which largely reflects sensitivity to pathogen disgust, is moderately related to neuroticism, with r 's reported around .45 (Druschel & Sherman, 1999; Olatunji et al., 2008). On the other hand, the Pathogen domain of the TDDS is only modestly related to neuroticism (r 's between .10 and .15, as

Table 2
Regression of the Three Domain Disgust Scales on the 5DPT and HEXACO scales ($N = 476$).

	Pathogen Disgust		Sexual Disgust		Moral Disgust	
	Final β 's	ΔR^2	Final β 's	ΔR^2	Final β 's	ΔR^2
<i>Model 1: regression of TDDS on 5DPT personality</i>						
Background variables		.03**		.34**		.04**
Gender (0 = F, 1 = M)	-.15**		-.45**		.05	
Age	.08		.29**		.08	
5DPT scales		.05**		.04**		.07**
Neuroticism	.13*		.11*		-.02	
Extraversion	.11*		-.02		.00	
Insensitivity	.04		-.07		.01	
Orderliness	.16**		.11**		.19**	
Absorption	-.03		-.00		.12**	
HEXACO Honesty–Humility	-.05	.00	.12*	.01*	.31**	.06**
Total Model R^2		.08**		.39**		.17**
<i>Model 2: regression of TDDS on HEXACO personality</i>						
Background variables		.03**		.34**		.04**
Gender (0 = F, 1 = M)	-.09		-.45**		.05	
Age	.09		.30**		.11*	
HEXACO scales		.09**		.04**		.07**
Emotionality	.17**		.07		.04	
Extraversion	.05		-.10**		.03	
Agreeableness	-.14**		.06		-.06	
Conscientiousness	.14**		.11**		.21**	
Openness to Experience	-.12**		-.03		.01	
Honesty–Humility	-.07	.00	.10*	.01*	.29**	.06**
Total Model R^2		.11**		.38**		.17**

* $p < .05$.
** $p < .01$.

reported by Olatunji et al. (2012), Tybur et al. (2009, 2011)). Here, sensitivity to pathogen disgust was again only weakly related to neuroticism/emotionality (.13/.23). It appears that there is a consistent, though weak, relationship between sensitivity to pathogen disgust and neuroticism/emotionality. Future research might aim to better explain this relationship.

The most important limitation involves potential attenuation of the relationships between personality and disgust sensitivity due to the time lag between the first (personality) and second (disgust sensitivity) waves of data collection. Hence, our results may underestimate the relationship between disgust sensitivity and personality in this population (though we note that the correlations between disgust sensitivity and personality observed here are not markedly different from those observed in studies where the traits are assessed concurrently). Despite this limitation, the use of a broad, non-university sample that may vary more on traits such as openness to experience and conscientiousness may have allowed us more power to detect relationships between disgust sensitivity and personality.

5. Conclusion

These results can inform not just disgust sensitivity, but also investigations of individual differences from an evolutionary perspective (Buss, 2009). Researchers have recently proposed (Nettle, 2006) and tested (Nettle, 2005; Schaller & Murray, 2008; Sell, Tooby, & Cosmides, 2009) hypotheses of individual differences based on presumed fitness-relevant costs and benefits of different traits and trait levels. Disgust sensitivity offers an inroad to test other hypotheses using this framework, given the connection between disgust and fitness-relevant problems (e.g., pathogen-avoidance, mate selection, condemnation) and the development and validation of disgust sensitivity instruments. As an example, recent proposals suggest that some of the fitness costs that contribute to variation in extraversion relate to extraverts' potential higher pathogen encounter rates, and that lower extraversion may reflect investment in pathogen avoidance (e.g., Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010; Schaller & Murray, 2008). If variation in sensitivity to pathogen disgust reflects similar fitness costs, then we might observe a relationship between sensitivity to pathogen disgust and extraversion. We do not observe such a relationship using the 5DPT or HEXACO extraversion measures (notably, Olatunji et al. (2012), and Tybur et al. (2011) also found no relationship between extraversion and sensitivity to pathogen disgust). Naturally, the assumption that variability in sensitivity to pathogen disgust is partially maintained by costs relevant to pathogens—let alone the same pathogens that extraverts might encounter at greater frequencies—requires further empirical tests, and results here cannot rule out the possibility that extraversion partially reflects pathogen-avoidance strategies. Instead, this example highlights one way that disgust sensitivity may be leveraged to test evolutionary hypotheses of individual differences.

Acknowledgements

We thank Niels van Doesum and Nancy Blaker for their assistance in translating and backtranslating the Three-Domain Disgust Scale from English to Dutch, and we thank Florian van Leeuwen for helpful comments on a draft of this manuscript.

References

Ashton, M. C., & Lee, K. (2008). The HEXACO model of personality structure and the importance of the H factor. *Social and Personality Psychology Compass*, 2, 1952–1962.

- Ashton, M. C., Lee, K., Perugini, M., Szarota, P., de Vries, R. E., Di Blas, L., et al. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology*, 86, 356–366.
- Borg, C., de Jong, P. J., & Schultz, W. W. (2010). Vaginismus and dyspareunia: Automatic vs. deliberate disgust responsivity. *Journal of Sexual Medicine*, 7, 2149–2157.
- Bourdage, J. S., Lee, K., Ashton, M. C., & Perry, A. (2007). Big five and HEXACO model personality correlates of sexuality. *Personality and Individual Differences*, 43, 1506–1516.
- Buss, D. M. (2009). How can evolutionary psychology explain personality and individual differences? *Perspectives in Psychological Science*, 4, 359–366.
- Cannon, R. P., Schnall, S., & White, M. (2011). Transgressions and expressions: Affective facial muscle activity predicts moral judgments. *Social Psychological & Personality Science*, 2, 325–331.
- Chapman, H. A., Kim, D. A., Susskind, J. M., & Anderson, A. K. (2009). In bad taste: Evidence for the oral origins of moral disgust. *Science*, 323, 1222–1226.
- Curtis, V., & Biran, A. (2001). Dirt, disgust, and disease: Is hygiene in our genes? *Perspectives in Biology and Medicine*, 44, 17–31.
- De Vries, R. E., Ashton, M. C., & Lee, K. (2009). De zes belangrijkste persoonlijkheidsdimensies en de HEXACO Persoonlijkheidsvragenlijst. *Gedrag & Organisatie*, 22, 232–274.
- De Vries, R. E., & Van Kampen, D. (2010). The HEXACO and 5DPT models of personality: A comparison and their relationships with psychopathy, egoism, pretentiousness, immorality, and Machiavellianism. *Journal of Personality Disorders*, 24, 244–257.
- 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 moral or sexual disgust. *Evolution and Human Behavior*, 31, 69–74.
- DeScioli, P., & Kurzban, R. (2013). A solution to the mysteries of morality. *Psychological Bulletin*, 139, 477–493.
- Druschel, B. A., & Sherman, M. F. (1999). Disgust sensitivity as a function of the big five and gender. *Personality and Individual Differences*, 26, 739–748.
- 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., Pospel, P., & Netter, P. (1996). Sensitivity to disgust as a predictor of neuroticism: A psychobiological approach. *Personality and Individual Differences*, 20, 589–596.
- Kurzban, R., Dukas, A., & Weeden, J. (2010). Sex, drugs, and moral goals: Reproductive strategies and views about recreational drugs. *Proceedings of the Royal Society of London: Series B: Biological Sciences*, 277, 3501–3508.
- Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research*, 39, 329–358.
- Lee, K., & Ashton, M. C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality*, 76, 1001–1053.
- Mortensen, C. R., Becker, D. V., Ackerman, J. M., Neuberg, S. L., & Kenrick, D. T. (2010). Infection breeds reticence: The effects of disease salience on self-perceptions of personality and behavioral tendencies. *Psychological Science*, 21, 440–447.
- Nettle, D. (2005). An evolutionary approach to the extraversion continuum. *Evolution and Human Behavior*, 26, 363–373.
- Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist*, 20, 622–631.
- Olatunji, B. O., Adams, T., Ciesielski, B., Bieke, D., Sarawgi, S., & Broman-Fulks, J. (2012). The three domains of disgust scale: Factor structure, psychometric properties, and conceptual limitations. *Assessment*, 19, 202–225.
- 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.
- Pond, R. S., DeWall, C. N., Lambert, N. M., Deckman, T., Bonser, I. M., & Fincham, F. D. (2012). Repulsed by violence: Disgust sensitivity buffers trait, behavioral, and daily aggression. *Journal of Personality and Social Psychology*, 102, 175–188.
- Rozin, P., Haidt, J., & McCauley, C. R. (2008). Disgust. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 757–776). New York, NY: Guilford Press.
- 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.
- Schaller, M., & Murray, D. R. (2008). Pathogens, personality and culture: Disease prevalence predicts worldwide variability in sociosexuality, extraversion, and openness to experience. *Journal of Personality and Social Psychology*, 95, 212–221.
- Sell, A., Tooby, J., & Cosmides, L. (2009). Formidability and the logic of human anger. *Proceedings of the National Academy of Sciences of the United States of America*, 106, 15073–15078.
- Tybur, J. M., Bryan, A. D., Lieberman, D., Caldwell Hooper, A. E., & Merriman, L. A. (2011). Sex differences and sex similarities in disgust sensitivity. *Personality and Individual Differences*, 51, 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, 103–122.
- Tybur, J. M., Lieberman, D., Kurzban, R., & DeScioli, P. (2013). Disgust: Evolved function and structure. *Psychological Review*, 120, 65–84.
- 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 conservatism and disgust sensitivity really related? *Evolutionary Psychology*, 8, 599–616.
- Van Kampen, D. (2012). The 5-dimensional personality test (5DPT): Relationships with two lexically-based instruments and the validation of the absorption scale. *Journal of Personality Assessment*, 94, 92–101.