



## Demographic influences on disgust: Evidence from a heterogeneous sample



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### ABSTRACT

In this study we examined the construct and external validity of the Disgust Scale Revised (Olatunji, Williams, et al., 2007), in a large heterogeneous sample ( $N = 1427$ ). In addition, we investigated the role of demographic variables on disgust's sensitivity. The findings reveal that the DS\_R adheres to the three-factor structure (i.e., Core disgust, Animal-Reminder Disgust, and Contamination-Based Disgust), signifying the validity of the DS\_R in a heterogeneous sample. Moreover, gender was found to have a large effect on DS\_R score, while the effects of other demographic variables, such as religion, political view, education and age, were exceptionally modest. These results indicate that demographic variables, excluding gender, do not directly influence disgust's sensitivity. Rather, these variables mainly modulate the context in which disgust is elicited.

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### 1. Introduction

Disgust is a basic emotion, with clear behavioral, physiological, expressive, and qualia components (Levenson, 1992; Rozin, Haidt, & McCauley, 2000; Rozin, Haidt, & McCauley, 2008; Tolin, Woods, & Abramowitz, 2006; Tracy & Randles, 2011). The origins and functions of disgust are claimed to be varied; one possible source is a food-rejection mechanism (Rozin et al., 2008). A second potential source is a mechanism of contamination and disease prevention (Curtis, de Barra, & Aunger, 2011). In addition, it has been claimed that the emotion in humans has an additional psychological role which may exceed its original purpose (Rozin et al., 2000, 2008). Specifically, disgust is involved in several psychopathologies such as animal and blood-injury-injection phobias, eating disorders, sexual dysfunctions, and obsessive-compulsive disorder (Olatunji, Lohr, Sawchuk, & Tolin, 2007; Olatunji & McKay, 2009; Tolin et al., 2006). Finally, studies have found disgust to be an integral part of inter-group attitudes, prejudice, and discrimination, and may be a tool in dehumanization of out-group members (Haslam, 2006; Hodson & Costello, 2007; Inbar, Pizarro, Knobe, & Bloom, 2009; Navarrete & Fessler, 2006).

As a result of the importance and extensive implications of disgust, several measures of the emotion were developed,

including the Disgust and Contamination Questionnaire (Haidt, McCauley, & Rozin, 1994), the Disgust Emotional Scale (Walls & Kleinknecht, 1996), the Looming of Disgust Questionnaire (Williams, Olatunji, Elwood, Connolly, & Lohr, 2006), and the Disgust Propensity and Sensitivity Scale (Cavanagh & Davey, 2000; Olatunji, Cisler, Deacon, Connolly, & Lohr, 2007). One of the most frequently used and validated questionnaires of disgust assessment is the Disgust Scale (DS; Haidt et al., 1994). The questionnaire consists of 32 items which are separated into eight sub-domains of disgust; food (found unfit to be consumed), animals (which are associated with dirty conditions), body products (most of the bodily solid and fluid extractions, including scents, etc.), sex (mainly deviant sexual behavior), body envelope violations (breaches revealing blood and tissue), death (and its products), hygiene (as commonly used), and sympathetic magic (stimuli which are non-infectious by themselves but resemble or came in contact with infectious stimuli).

In addition to disgust assessment, the DS\_R has shown correlation with psychopathological disorders such as spider phobia (e.g., de Jong & Muris, 2002), blood and injury phobia (Cisler, Olatunji, & Lohr, 2009; Olatunji, Smits, Connolly, Willems, & Lohr, 2007; Sawchuk, Lohr, Tolin, Lee, & Kleinknecht, 2000), eating disorders (Troop, Murphy, Bramon, & Treasure, 2000), anxiety (Thorpe, Patel, & Simonds, 2003), neuroticism (Druschel & Sherman, 1999), food neophobia and nausea frequency (Björklund & Hursti, 2004), schizoid and dependent personality (Quigley, Sherman, & Sherman, 1997) and obsessive-compulsive disorder (Mancini, Gragnani, &

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D'Olimpio, 2001; Olatunji, Sawchuk, Lohr, & de Jong, 2004; Olatunji, Williams, et al., 2007).

The original DS questionnaire was based on a two-factor model of disgust (Rozin et al., 2000). The first was Core disgust, a mechanism which elevates awareness about disease and oral incorporations of dangerous materials, comprised of the sub-domains of food, animals, and body products. The second factor was Animal-Reminder, a mechanism which elevates awareness to human animalistic nature, comprised of the sub-domains: sex, body-envelope violations, death, and hygiene.

Recently, the DS was revised to increase its item adequacy, factor structure, reliability, and validity in psychopathological studies (Olatunji et al., 2007). The Disgust Scale-Revised (DS\_R) is comprised of fewer items (27 items), which are rated on a 5-point Likert scale. Furthermore, the DS\_R has a better factor structure. It contains the DS original factors (Core disgust and Animal-Reminder) as well as a third factor, Contamination-Based Disgust, which contains items related to dangers of contamination. The three-factor model was validated in eight different countries (Olatunji, Moretz, et al., 2009), thus extending its external validity beyond the cultural environment where it was originally developed.

Despite the usefulness of the DS and its revised version, the DS\_R, both scales were constructed, examined, and refined mainly with samples of a young, and largely female, student population, which limits the external validity (Henrich, Heine, & Norenzayan, 2010). The few studies which have used a substantially large sample drawn from the general population (Fessler, Arguello, Mekdara, & Macias, 2003; Haidt et al., 1994; Thorpe et al., 2003) did not examine the new version (i.e., the DS\_R) and its factors. Moreover, current studies do not provide sufficient data on how these disgust sensitivity measures are influenced by demographic factors (Olatunji, Moretz, et al., 2009; Simpson, Carter, Anthony, & Overton, 2006). The importance of demographic variables on disgust modulation cannot be underestimated; age (Kim, Ebesutani, Young, & Olatunji, 2013; Quigley et al., 1997), political opinions (Inbar, Pizarro, Iyer, & Haidt, 2012; Inbar et al., 2009), education (Haidt et al., 1994), and religiosity (Haidt et al., 1994; Hunsberger & Jackson, 2005; Olatunji, Tolin, Huppert, & Lohr, 2005) were all found to be related to disgust. In sum, the DS\_R applicability to a more heterogeneous sample, and the influence of demographic variables on disgust sensitivity, as measured in the DS\_R, is yet to be determined.

The present study had two main goals; first, to examine the DS\_R goodness of fit in a heterogeneous sample in three models. All three models were tested in the past as a part of the tool's development (Olatunji et al., 2007). This examination was done by a confirmatory factor analysis (CFA) for three alternate models; a conservative uni-dimensional model (containing all items under one factor), a two-dimensional model (Rozin et al., 2000), and a three-factor model (Armstrong, Olatunji, Sarawgi, & Simmons, 2010; Olatunji et al., 2007).

Our second purpose was to explore the influence of demographic variables such as gender, age, education, political orientation, and religiosity on the DS\_R general score and its factors' scores in a heterogeneous sample. This was conducted with a set of multiple stepwise regressions in which demographic variables were entered in the first step and their interactions in the second step.

## 2. Materials and methods

### 2.1. Participants

All participants were Israeli Jewish citizens who agreed to participate in the study and were not offered any compensation. Prior

to analysis several types of participants were excluded; (1) participants who reported an unlikely answer in the two 'catch' items (e.g., "would you rather eat a piece of fruit or a piece of paper", Olatunji et al., 2007,  $N = 97$ ), (2) participants who left any of the items unanswered ( $N = 128$ ), and (3) pregnant women which were reported to show heightened levels of disgust ( $N = 2$ ; Fessler, Eng, & Navarrete, 2005). After the removal of these participants the analysis was conducted on all remaining participants ( $N = 1427$ , 54% women). Religiosity and political orientation were initially measured using a three-level scale ranking (religiosity: (3) very religious [orthodox], (2) religious [observant], (1) non-religious [secular]), political orientation: (1) right-wing [conservative], (2) center, (3) left-wing [liberal].

Participants mean age was 33.18 years (range 12–85,  $SD = 12.6$ ) with mean education of 14.36 years (range 6–28,  $SD = 2.33$ ). Average religiosity level was between secular to observant ( $M = 1.44$ ,  $SD = 0.7$ ), and political views were between political center to right wing ( $M = 1.9$ ,  $SD = 0.79$ ). Participants were approached by the first author at various locations such as shopping centers, transport hubs, and government offices.

### 2.2. Instruments

#### 2.2.1. DS\_R Hebrew version

The DS\_R was translated to Hebrew by a bilingual native speaker and was translated back to English by a different bilingual native translator in order to compare the two forms. This process was iterated until the form translation was satisfactory. Two important adjustments were made; First, common Hebrew synonyms of the words "cockroach" and "maggots" were added, in brackets, in the Hebrew version of the items. Second, during administration of the DS\_R religious participants have remarked on two specific items. First, on item number 1: "I might be willing to try eating monkey meat, under some circumstances", they noted that this meat may or may not elicit disgust, but it is also non-Kosher according to Jewish dietary laws. Second, for item 27: "As part of a sex education class, you are required to inflate a new unlubricated condom, using your mouth" some orthodox participants reported they have only a vague idea of what a condom is (as they did not study sex education in school or had not been exposed to such information). Therefore both items were removed from the analysis. General DS\_R reliability score was found to be acceptable (Cronbach's alpha = 0.79).

## 3. Results

### 3.1. Model comparison

A confirmatory factor analysis (CFA) goodness-of-fit examination of DS\_R data was conducted using the AMOS program (Arbuckle, 2006) and SPSS. Two measures were calculated; the root mean square error of approximation (RMSEA), with values between .08 and .05 indicating an acceptable fit and values under .05 indicating a good fit (Browne & Cudeck, 1992; McDonald & Ringo Ho, 2002). In addition, we have examined the comparative fit index (CFI) representing the extent to which the model of interest is better than the independent model. Values that approach a value of 1 indicate an acceptable fit (Bentler, 1990). The analyses revealed that the three-factor model fits the data better than the one-factor ( $\chi^2(3) = 236.9$ ,  $p < .01$ ), and two-factor ( $\chi^2(2) = 168.7$ ,  $p < .01$ ) models (Table 1). The three factors were highly and significantly inter-correlated ( $r_{\text{Core, Animal-Reminder}} = .56$ ;  $r_{\text{Core, Contamination}} = .48$ ;  $r_{\text{Contamination, Animal-Reminder}} = .39$ ; all  $p < .001$ ). In addition, we conducted a congruence coefficient estimation for item factor loading, between the three-factor model in this study and in Olatunji et al.

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