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# The Disgust Propensity and Sensitivity Scale-Revised: Psychometric properties and specificity in relation to anxiety disorder symptoms

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**Abstract**

The present study examined the factor structure and psychometric properties of the Disgust Propensity and Sensitivity Scale-Revised (DPSS-R) in a nonclinical sample ($N = 340$). Principal components analysis of the DPSS-R revealed a two-factor structure consisting of Disgust Propensity and Disgust Sensitivity. Although the two-factor structure converged well with prior research, four of the 16 DPSS-R items did not load onto the predicted factor. The DPSS-R demonstrated good reliability and validity. The DPSS-R and its two factors were moderately correlated with spider fear and contamination fear and mildly correlated with injection fear. The relation between the DPSS-R and these anxiety disorder symptoms remained largely intact after controlling for negative affect. Regression analyses also revealed that the two DPSS-R factors demonstrate specificity in the prediction of anxiety disorder symptoms. These findings are discussed in terms of promoting a more valid and reliable assessment of disgust in anxiety disorders.



*Keywords:* Disgust Sensitivity; Disgust Propensity; Spider fear; Injection fear; Contamination fear

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Descriptive and experimental research has implicated disgust in the development and maintenance of spider phobia (Olatunji, 2006), blood–injection injury (BII) phobia (Olatunji, Sawchuk, de Jong, & Lohr, 2006), contamination-based obsessive–compulsive disorder (OCD; Olatunji, Williams, Lohr, & Sawchuk, 2005), and eating disorders (Davey, Buckland, Tantow, & Dallos, 1998). There is also some evidence to suggest that disgust may account for the unique fainting response observed in BII phobia (e.g., Page, 2003), thought this finding has not been consistently replicated (e.g., Olatunji, Williams, Sawchuk, & Lohr, 2006). More recent research has also implicated disgust in hypochondriasis (e.g., Davey & Bond, 2006) social phobia (e.g., Montagne et al., 2006) and psychotic disorders (e.g., Schienle, Walter, Schäfer, Stark, & Vaitl, 2003). Accordingly, there has been increasing emphasis on the measurement of disgust in the context of psychopathology (Olatunji & Sawchuk, 2005).

Several measures of disgust have been developed to facilitate research examining the relationship between the experience of disgust and symptoms of psychopathology. The first such measure to appear was the Disgust and Contamination Sensitivity Questionnaire (DQ; Rozin, Fallon, & Mandell, 1984) that assesses the propensity to render perfectly edible food-items completely un-edible, merely via brief physical contact with perceived contaminants (Rozin & Fallon, 1987). Given that the DQ was largely limited to the food domain, the Disgust Scale (DS; Haidt, McCauley, & Rozin, 1994) was developed as a more comprehensive measure designed to cover a wider range of disgust domains, including foods, animals, body products, sex, hygiene, envelope violations (e.g., injections), death, and sympathetic magic (e.g., stimuli without infectious qualities of their own that either resemble contaminants or were once in contact with contaminants). The DS is the most commonly used measure of disgust and is widely regarded as the measure of choice for this construct (Olatunji & Sawchuk, 2005). The Disgust Emotion Scale (DES; Kleinknecht, Kleinknecht, & Thorndike, 1997; Olatunji, Sawchuk, de Jong, & Lohr, in press-b) was more recently developed as an alternative measure of multiple disgust domains (rotting foods, small animals, odors, injections and blood draws, mutilation and death).

Development of the DQ, DS, and DES has facilitated studies showing that the experience of disgust may contribute to a wide range of psychopathology symptoms (Olatunji & Sawchuk, 2005; Woody & Teachman, 2000). However, the DQ, DS, and DES are limited in several aspects (Arrindell, Mulkens, Kok, & Vollenbroek, 1999; Olatunji, Sawchuk et al., in press-b; Tolin, Woods, & Abramowitz, 2006). For example, all three disgust measures are context dependent. That is, each assesses disgust responses to specific elicitors. For example, the DS consists of items assessing disgust reactions to hygienic concerns (e.g., ''I never let any part of my body touch the toilet seat in public restrooms'') and the DES consists of items assessing disgust reactions to injection and blood draws (e.g., ''Having blood drawn from your arm''). Moreover, the item content of available disgust measures has substantial overlap with symptoms of specific anxiety disorders (e.g., OCD; BII phobia). Thus, findings that patients suffering from various anxiety disorders are characterized by higher disgust levels may be illusory and reflect shared item content between the DQ, DS, DES, and measures of anxiety symptoms.

Current disgust measures may also be limited in their assessment of the conceptual parameters of the disgust construct. Currently, such measures may be conceptualized as assessing ''Disgust Propensity'' or frequency of experiencing disgust in specific contexts. Although it has been suggested that ''Disgust Sensitivity'' or the perceived harmful consequences of experiencing disgust (cf. Reiss, 1991), may contribute to development and maintenance of symptoms of psychopathology (Olatunji & Sawchuk, 2005), available measures

do not appear to assess this aspect of disgust. Given the limitations of available measures, a more comprehensive assessment of disgust requires a measure that is not confounded by items that overlap with psychopathology symptoms and assesses both the propensity and the sensitivity to disgust-relevant experiences.

In an attempt to address the limitations of current disgust measures, Cavanagh and Davey (2000) developed the Disgust Propensity and Sensitivity Scale (DPSS). The DPSS is a 32-item measure designed to assess the frequency of experiencing disgust (propensity) as well as the emotional impact of those symptoms (sensitivity). Prior psychometric evaluation of the DPSS found the measure to demonstrate good internal consistency with an alpha coefficient of 0.89 for the Disgust Propensity subscale and an alpha coefficient of 0.87 for the Disgust Sensitivity subscale (Cavanagh & Davey, 2000) and good convergent validity (e.g., Davey & Bond, 2006). Given the potential utility of the DPSS in advancing research on the relationship between disgust experiences and symptoms of psychopathology, van Overveld, de Jong, Peters, Cavanagh, and Davey (2006) recently examined psychometric properties of the DPSS and its relation to measures of specific phobias in a large Dutch sample ($N = 967$). Selection of items based on theory- and data-driven considerations resulted in a revised DPSS (DPSS-R) that consisted of only 16 items. Confirmatory factor analysis of the DPSS-R yielded support for a two-factor model consisting of Disgust Propensity ($\alpha = 0.78$; test–retest reliability = 0.69) and Disgust Sensitivity ($\alpha = 0.77$; test–retest reliability = 0.77). Disgust Propensity and Disgust Sensitivity were also significantly correlated with spider ($r = 0.20$, $r = 0.16$, respectively) and blood-injury ($r = 0.35$, $r = 0.35$, respectively) fear ($p$'s $< 0.01$). However, regression analysis using the two DPSS-R factors as predictor variables revealed that spider fear was predicted by only Disgust Propensity, whereas blood–injury fear was predicted by both Disgust Propensity and Disgust Sensitivity. These findings provide some preliminary evidence that the two factors of the DPSS-R may have some specificity to anxiety disorder symptoms.

The primary purpose of the present study was to examine the factor structure and psychometric properties of the DPSS-R in an American sample in hopes that our findings may speak to the cross-cultural reliability of this new measure for studying the relation between disgust and anxiety disorders symptoms. Consistent with the initial validation study (van Overveld et al., 2006), it was predicted that the DPSS-R would yield two replicable lower-order factors consisting of Disgust Propensity and Disgust Sensitivity. It was further hypothesized that the DPSS-R and its lower-order factors would demonstrate good convergent and discriminant validity as indicated by a pattern of theoretically consistent relationships with anxiety disorder symptom measures (e.g., spider fear, injection fear, and contamination fear). A secondary goal of the present study was to examine the specific relation between the lower-order disgust factors of the DPSS-R and anxiety symptoms. It was predicted that the DPSS-R factors would demonstrate incremental validity over negative affect in the prediction of anxiety disorder symptoms.

## 1. Methods

### *1.1. Participants*

Three hundred and forty participants (50.0% women) were recruited from undergraduate courses at large southern university in exchange for research credit. Participants ranged in age from 18 to 47 years ($M = 19.17$, S.D. = 2.62) and were primarily Caucasian (89%).

### 1.2. Materials

The *Disgust Propensity and Sensitivity Scale-Revised* (DPSS-R; van Overveld et al., 2006) is a 16 item measure designed to assess the frequency of disgust experiences (*Disgust Propensity)* and the emotional impact of disgust experiences (*Disgust Sensitivity)*. The original 32 item of the DPSS was translated into Dutch and the 16-item version reported by van Overvled et al. was sent to a professional translator (who was a native English speaker) who translated it back to English. Subjects rate their agreement with each item on a scale ranging from 1 (''never'') to 5 (''always''). Preliminary research has shown that the DPSS-R is adequately reliable, with alpha coefficients of 0.78 for the Disgust Propensity subscale and 0.77 for the Disgust Sensitivity subscale (van Overveld et al., 2006).

The *Positive and Negative Affect Schedule* (PANAS; Watson, Clark, & Tellegen, 1988) is conceptualized as a trait measure of general mood/affect. It consists of 20 adjective descriptors of various positive and negative affective states, broken down into two 10-item subscales: *Positive Affect* and *Negative Affect*. Individuals indicate how much each mood descriptor applies to them using a 5-point Likert scale anchored by ''very slightly or not at all'' to ''extremely.'' The PANAS demonstrated adequate internal consistency in the present study ($\alpha = 0.77$).

The *Fear of Spiders Questionnaire* (FSQ; Szymansky & O'Donohue, 1995) is a widely used measure of spider fear. Participants rate 17 items assessing fear of spiders (e.g., ''If I saw a spider now, I would be afraid of it'') using an eight-point Likert scale from 0 (=''strongly disagree'') to 7 (''strongly agree''; range: 0–126).[1] The 17 items of the FSQ demonstrated good internal consistency in the present study ($\alpha = 0.96$). An additional *avoidance* item was added at the end of the measure that read ''have you ever avoided certain places, situations, movies, or TV programs for fear that you might see a spider?''

The *Injection Phobia Scale-Anxiety* (IPS-Anx; Öst, Hellstrom, & Kaver, 1992) is an 18-item, 5-point Likert scale in which individuals rate their degree of fear and anxiety if they were to experience a variety of injection and/or venipuncture procedures. The scale ranges from 0 = ''No anxiety'' to 4 = ''Maximum anxiety.'' The 18-item IPS-Anx demonstrated good internal consistency in the present study ($\alpha = 0.95$). Two additional items assessing *fainting* and *avoidance* was added at the end of the IPS-ANX. The fainting item read ''have you ever fainted, almost fainted, or felt dizzy during medical procedures such as giving blood or receiving injections?'' The avoidance item read ''have you ever avoided, delayed, or put off medical procedures because you were afraid of blood, needles, injections, etc.?''

The *Padua Inventory* (PI; Burns, Keortge, Formea, & Sternberger, 1996) contamination subscale consists of 10 items assessing contamination concerns. Items are scored on a 5-point scale ranging from 0 = ''Not at all'' to 4 = ''Very much.'' The 10-item PI demonstrated good internal consistency in the present study ($\alpha = 0.88$). An additional *safety seeking* item was added at the end of the measure that read ''about how much time per day do you spend washing yourself and/or your home or other belongings?''

### 1.3. Procedure

Participants completed the paper and pencil measures in a classroom format and received course credit for their participation. The measures were administered in a predetermined random

[1] Due to a technical error, only 17 of the 18 FSQ items was administered in the present study.

order. Consent forms were signed prior to data collection, and all participants were informed that their responses would be kept completely confidential and that they were free to withdraw from the study at any time.

## 2. Results

### 2.1. Reliability and item level analysis

The mean DPSS-R total score for the sample was 35.03 (S.D. = 8.30, range = 15–76). DPSS-R total scores were mildly associated with age ($r = 0.12$, $p < 0.05$) and were significantly higher among women ($M = 36.71$, S.D. = 8.86) than among men ($M = 32.70$, S.D. = 7.27), $t(305) = -4.25$, $p < 0.001$. Given that the scale consisted of 16 items, the mean DPSS-R total scores indicate that participants tended to indicate "Rarely" with regards to agreement with the scale items. Means and standard deviations for the DPSS-R items are presented in Table 1. Mean scores on 15 out of 16 items were below 3.0 (i.e., "Sometimes" agreement with the item), suggesting that the content of most DPSS-R items was generally outside of the experience of most nonclinical participants. The DPSS-R total score demonstrated excellent internal consistency ($\alpha = 0.90$). Each of the 16 items evidenced acceptable corrected item-total correlations (range = 0.41–0.69) based on the criterion of 0.30 recommended by Nunnally and Bernstein (1994).

### 2.2. Exploratory factor analysis

Following van Overveld et al., we used principal components analysis (PCA) to examine the lower-order factor structure of the DPSS-R. Factors were rotated using an oblique (Oblimin) transformation based on results from van Overveld et al. (2006) indicating that the DPSS-R lower-order factors are moderately correlated ($r = 0.54$). The first four eigenvalues were 6.62, 1.28, 1.10, and 0.98. As hypothesized, a two-factor solution was indicated based on examination of the scree plot and factor interpretability. Table 1 presents the pattern matrix (i.e., factor loadings) and communalities for the two-factor solution. This solution accounted for a substantial portion of the variance in the DPSS-R items (49.3%), with most explained variance contributed by the first factor (41.3%). As can be seen in Table 1, the two-factor solution had good simple structure (Thurstone, 1947). Based on the criterion of $|0.40|$ as a salient loading, there were no items with loadings on both factors, no items that failed to load on either factor, and both factors had an adequate number of items with salient loadings.

The first DPSS-R factor composed of eight items with salient loadings and had a mean score of 19.41 (S.D. = 4.54). Consistent with the findings of van Overveld et al. (2006), this factor was labeled "Disgust Propensity" as the majority of the items asses the general frequency of experiencing disgust related symptoms (e.g., "I find something disgusting"). The second factor ($M = 15.75$, S.D. = 4.75) also consisted of eight DPSS-R items, most of which assessed the perceived emotional impact or harmful consequences of experiencing disgust ("When I feel disgusted, I worry that I might pass out"). Accordingly, this factor was labeled "Disgust Sensitivity." The two subscales showed acceptable internal consistency ($\alpha$'s for Factors I and II = 0.84 and 0.83, respectively). The Disgust Propensity factor ($r = 0.84$) and the Disgust Sensitivity ($r = 0.83$) factor were highly correlated with the DPSS-R total score ($p$'s $< 0.001$). The two factors were also highly correlated with each other ($r = 0.66$, $p < 0.001$). A paired-sample $t$-test revealed significantly higher scores on the Disgust Propensity subscale compared to the Disgust Sensitivity subscale, $t(339) = 17.65$, $p < 0.001$.

Table 1
Principal components analysis of the Disgust Propensity and Sensitivity Scale-Revised (DPSS-R): factor loadings, communalities ($h^2$), and means ($M$) and standard deviations (S.D.) for the two-factor solution

| DPSS-R item | DP | DS | $h^2$ | $M$ | S.D. |
|---|---|---|---|---|---|
| 10. I experience disgust | **0.77** | −0.01 | 0.59 | 2.40 | 0.76 |
| 14. I find something disgusting | **0.72** | −0.01 | 0.51 | 2.43 | 0.82 |
| 5. I feel repulsed | **0.68** | 0.12 | 0.57 | 2.17 | 0.92 |
| 7. I screw up my face in disgust | **0.65** | 0.00 | 0.43 | 2.49 | 1.04 |
| 6. Disgusting things make my stomach turn | **0.58** | 0.23 | 0.52 | 2.58 | 0.91 |
| 1. I avoid disgusting things | **0.57** | −0.11 | 0.28 | 3.14 | 0.84 |
| 4. I think disgusting items could cause me illness/infection | **0.53** | 0.27 | 0.51 | 2.24 | 0.99 |
| 13. I worry that I might swallow a disgusting thing | **0.41** | 0.37 | 0.46 | 1.90 | 0.94 |
| 16. I think feeling disgust is bad for me | −0.25 | **0.84** | 0.55 | 1.52 | 0.78 |
| 15. It embarrasses me when I feel disgusted | −0.02 | **0.70** | 0.48 | 1.59 | 0.77 |
| 12. I become disgusted more easily than other people | 0.20 | **0.63** | 0.56 | 1.78 | 0.82 |
| 3. It scares me when I feel nauseous | 0.24 | **0.59** | 0.55 | 2.08 | 1.04 |
| 11. It scares me when I faint | 0.03 | **0.59** | 0.37 | 2.43 | 1.50 |
| 2. When I feel disgusted, I worry that I might pass out | 0.10 | **0.57** | 0.40 | 1.51 | 0.64 |
| 9. When I experience disgust, it is an intense feeling | 0.39 | **0.48** | 0.58 | 2.04 | 0.86 |
| 8. When I notice that I feel nauseous, I worry about vomiting | 0.31 | **0.45** | 0.46 | 2.67 | 1.12 |

*Note*: Factor loadings $\geq|0.40|$ are listed in boldface type; DP: Disgust Propensity; DS: Disgust Sensitivity.

Coefficients of congruence (Gorsuch, 1983) were computed to determine the degree of convergence between the two-factor solution from the present study and results from van Overveld et al. (2006). As shown in Table 2, data from the present study generally replicated those from van Overveld et al. such that the Disgust Propensity and Disgust Sensitivity factors from the present study were adequately comparable with the Disgust Propensity and Disgust Sensitivity factors of van Overveld et al. However, examination of the items of the two factors did reveal some differences. Specifically, items 9 (''When I experience disgust, it is an intense feeling'') and 12 (''I become disgusted more easily than other people'') which loaded on the Disgust Propensity factor in the van Overveld et al. study loaded on the Disgust Sensitivity factor in the present study. Furthermore, items 4 (''I think disgusting items could cause me illness/infection'') and 13 (''I worry that I might swallow a disgusting thing'') which loaded on the Disgust Sensitivity factor in the van Overveld et al. study loaded on the Disgust Propensity factor in the present study.

### 2.3. Relation between DPSS-R, its factors, and anxiety disorder symptoms

Table 3 presents correlations between the DPSS-R, its two subscales (Disgust Propensity and Disgust Sensitivity), and measures of spider fear, spider avoidance, injection fear,

Table 2
Coefficients of congruence between DPSS-R factors from van Overveld et al. (2006) and the present study

| Factor from van Overveld et al. (2006) | Factor from the present study | |
|---|---|---|
| | Disgust Propensity | Disgust Sensitivity |
| Disgust Propensity | **0.87** | 0.28 |
| Disgust Sensitivity | 0.16 | **0.74** |

*Note*: Coefficients of congruence (Gorsuch, 1983) were derived using loadings from the factor pattern matrix. Factor I: Disgust Propensity; Factor II: Disgust Sensitivity; corresponding factors are listed in boldface type.

Table 3
Pearson correlations between DPSS-R total scores, subscale scores, and anxiety disorder symptom measures

| Measure | *M* (S.D.) | DPSS-R total | Disgust Propensity | Disgust Sensitivity |
|---|---|---|---|---|
| FSQ | 22.68 (25.98) | 0.34 | 0.32 | 0.32 |
| Spider avoidance* | – | 0.20 | 0.23 | 0.18 |
| IPS-Anx | 19.86 (15.93) | 0.30 | 0.25 | 0.34 |
| Injection fainting* | – | 0.16 | 0.07 | 0.21 |
| Injection avoidance* | – | 0.16 | 0.14 | 0.20 |
| PI | 9.78 (5.60) | 0.35 | 0.32 | 0.37 |
| CSS | 69.83 (37.64) | 0.25 | 0.21 | 0.24 |
| NA | 21.26 (6.02) | 0.37 | 0.37 | 0.38 |
| PA | 34.31 (5.32) | −0.09 | −0.07 | −0.02 |

*Note*: All correlations ≥0.13 are significant at $p < 0.05$; DPSS-R: Disgust Propensity and Sensitivity Scale; FSQ: Fear of Spiders Questionnaire; IPS-Anx: Injection Phobia Scale-Anxiety; PI: Padua Inventory Contamination Fear Subscale; CSS: Contamination Safety Seeking; NA: negative affect; PA: positive affect; *M*: mean; S.D.: standard deviation; (*) dichotomous variables (yes/no).

injection-related fainting, injection-related avoidance, contamination fear, contamination-related safety seeking, negative affect, and positive affect (see means and standard deviations in Table 3). Showing evidence of good convergent validity, the DPSS-R and its two subscales were significantly correlated with most anxiety disorder symptom criterion measures (*r*'s range from 0.07 to 0.37). However, relatively week associations were observed between the DPSS-R and its two subscales and history of injection-related fainting and injection-related avoidance. The DPSS-R and its subscales were also significantly correlated with negative affect (*r*'s ranged from 0.37 to 0.38). The DPSS-R scales also had divergent validity as evidenced by non-significant correlations with positive affect. To examine the robustness of the disgust-anxiety disorder symptoms relation, partial correlations were computed between the DPSS-R, its two subscales and the anxiety disorder symptom measures when controlling for negative affect. As shown in Table 4, with the exception of injection-related fainting and injection-related avoidance, the correlations between the DPSS-R, its two subscales and the anxiety disorder symptoms remained significant even when controlling for negative affect.

Table 4
Partial correlations between DPSS-R total and subscale scores with anxiety disorder symptoms measures controlling for negative affect

| Measure | DPSS-R total | Disgust Propensity | Disgust Sensitivity |
|---|---|---|---|
| FSQ | 0.26 | 0.24 | 0.25 |
| Spider avoidance | 0.14 | 0.17 | 0.12 |
| IPS-Anx | 0.21 | 0.15 | 0.25 |
| Injection fainting | 0.12 | 0.02 | 0.17 |
| Injection avoidance | 0.11 | 0.08 | 0.15 |
| PI | 0.30 | 0.27 | 0.32 |
| CSS | 0.21 | 0.16 | 0.20 |

*Note*: All correlations ≥0.12 are significant at $p < 0.05$. DPSS-R: Disgust Propensity and Sensitivity Scale; FSQ: Fear of Spiders Questionnaire; IPS-Anx: Injection Phobia Scale-Anxiety; PI: Padua Inventory Contamination Fear Subscale; CSS: Contamination Safety Seeking.

Table 5
Specificity of DPSS-R Subscales in the prediction of fear of spiders, injections, and contamination

| Scale | *B* | S.E. *B* | *B* | *T* | *p* | Partial *r* |
|---|---|---|---|---|---|---|
| FSQ[a] | | | | | | |
| DP | 0.88 | 0.39 | 0.15 | 2.25 | <0.03 | 0.12 |
| DS | 0.87 | 0.37 | 0.16 | 2.34 | <0.03 | 0.12 |
| NA | 0.69 | 0.23 | 0.16 | 2.91 | <0.01 | 0.15 |
| IPS-Anx[b] | | | | | | |
| DP | −0.00 | 0.23 | −0.00 | −0.02 | 0.94 | −0.00 |
| DS | 0.90 | 0.22 | 0.26 | 3.93 | <0.01 | 0.21 |
| NA | 0.51 | 0.14 | 0.19 | 3.51 | <0.01 | 0.18 |
| PI[c] | | | | | | |
| DP | 0.15 | 0.08 | 0.12 | 1.86 | 0.06 | 0.10 |
| DS | 0.31 | 0.08 | 0.26 | 3.94 | <0.01 | 0.21 |
| NA | 0.05 | 0.05 | 0.05 | 1.04 | 0.29 | 0.05 |

*Note*: [a]$R^2 = 0.14$, $F(3, 336) = 19.37$, $p < 0.001$; [b]$R^2 = 0.15$, $F(3, 336) = 19.79$, $p < 0.001$; [c]$R^2 = 0.15$, $F(3, 336) = 20.49$, $p < 0.001$; DPSS-R: Disgust Propensity and Sensitivity Scale; FSQ: Fear of Spiders Questionnaire; IPS-Anx: Injection Phobia Scale-Anxiety; PI: Padua Inventory Contamination Fear Subscale; DP: Disgust Propensity; DS: Disgust Sensitivity; NA: Negative Affect.

### 2.4. Specificity of Disgust Propensity and Disgust Sensitivity in predicting anxiety disorder symptoms

A series of multiple linear regression analyses was conducted to examine the extent to which the DPSS-R subscale scores uniquely predicted spider fear, injection fear, and contamination fear. In each regression equation, Disgust Propensity, Disgust Sensitivity, and Negative Affect were simultaneously entered as predictor variables. These analyses provided a stringent test of the construct validity of the DPSS-R subscales since each of the other predictor variables were theoretically expected to contribute to anxiety disorder symptoms. In the first analysis, the incremental validity of the DPSS-R subscales in predicting spider fear was examined. Together the three predictor variables explained a significant portion of the variance in spider fear ($R^2 = 0.14$, $p < 0.001$; see Table 5). After controlling for the other variables, Disgust Propensity (partial $r = 0.12$, $p < 0.03$), Disgust Sensitivity (partial $r = 0.12$, $p < 0.03$), and Negative Affect (partial $r = 0.15$, $p < 0.01$) accounted for unique variance in spider fear. In the second regression predicting injection fear, Table 5 shows that the three predictor variables accounted for 15% of the variance in injection fear ($p < 0.001$). However, only the Disgust Sensitivity subscale (partial $r = 0.21$, $p < 0.01$) and Negative Affect (partial $r = 0.18$, $p < 0.01$) explained significant, unique variance in the dependent variable after controlling for the other predictors. The third regression predicting contamination fear revealed that the three predictor variables accounted for 15% of the variance ($p < 0.001$). However, only the Disgust Sensitivity subscale (partial $r = 0.21$, $p < 0.01$) explained significant, unique variance in contamination fear after controlling for the other predictors.

### 2.5. Specificity of Disgust Propensity and Disgust Sensitivity in predicting avoidance, fainting, and safety seeking

A second series of multiple linear regression analyses was conducted to examine the extent to which the DPSS-R subscale scores uniquely predicted self-reported spider-related avoidance, injection-related fainting, injection-related avoidance, and contamination-related safety seeking.

Table 6
Specificity of DPSS-R Subscales in the prediction of avoidance, fainting, and safety seeking

| Scale | *B* | S.E. *B* | *B* | *T* | *p* | Partial *r* |
|---|---|---|---|---|---|---|
| Spider avoidance[a] | | | | | | |
| DP | 0.01 | 0.00 | 0.17 | 2.40 | <0.02 | 0.13 |
| DS | 0.00 | 0.00 | 0.02 | 0.33 | 0.73 | 0.01 |
| NA | 0.00 | 0.00 | 0.11 | 2.01 | <0.05 | 0.10 |
| Injection fainting[b] | | | | | | |
| DP | −0.01 | 0.00 | −0.14 | −2.00 | <0.05 | −0.10 |
| DS | 0.02 | 0.00 | 0.27 | 3.85 | <0.01 | 0.20 |
| NA | 0.00 | 0.00 | 0.08 | 1.43 | 0.15 | 0.07 |
| Injection avoidance[c] | | | | | | |
| DP | −0.00 | 0.00 | −0.01 | −0.26 | 0.79 | −0.01 |
| DS | 0.01 | 0.00 | 0.17 | 2.39 | <0.02 | 0.12 |
| NA | 0.00 | 0.00 | 0.11 | 2.01 | <0.05 | 0.10 |
| Contamination safety seeking[d] | | | | | | |
| DP | 0.64 | 0.59 | 0.07 | 1.08 | 0.27 | 0.05 |
| DS | 1.33 | 0.56 | 0.16 | 2.35 | <0.02 | 0.12 |
| NA | 0.34 | 0.36 | 0.05 | 0.95 | 0.33 | 0.05 |

*Note*: [a]$R^2 = 0.07$, $F(3, 336) = 7.96$, $p < 0.001$; [b]$R^2 = 0.06$, $F(3, 336) = 7.27$, $p < 0.001$; [c]$R^2 = 0.05$, $F(3, 336) = 6.37$, $p < 0.001$; [d]$R^2 = 0.07$, $F(3, 336) = 7.87$, $p < 0.001$; DPSS-R: Disgust Propensity and Sensitivity Scale; DP: Disgust Propensity; DS: Disgust Sensitivity; NA: Negative Affect.

In each regression equation, the Disgust Propensity, Disgust Sensitivity, and negative affect were simultaneously entered as predictor variables. In the first analysis predicting spider avoidance, the three predictor variables explained a significant portion of the variance ($R^2 = 0.07, p < 0.001$; see Table 6). However, only Disgust Propensity (partial $r = 0.13$, $p < 0.02$) and negative affect (partial $r = 0.10$, $p < 0.05$) accounted for unique variance in spider avoidance. In the second regression predicting injection fainting, the three predictor variables accounted for 6% of the variance ($p < 0.001$) with only the Disgust Propensity subscale (partial $r = -0.10, p < 0.05$) and the Disgust Sensitivity subscale (partial $r = 0.20$, $p < 0.01$) explaining significant, unique variance. The third regression predicting injection avoidance revealed that the three predictor variables accounted for 5% of the variance ($p < 0.001$) with only the Disgust Sensitivity subscale (partial $r = 0.12$, $p < 0.02$) and negative affect (partial $r = 0.10$, $p < 0.05$) explaining significant, unique variance in injection avoidance after controlling for the other predictors. The final regression predicting contamination related safety seeking revealed that the three predictor variables accounted for 7% of the variance ($p < 0.001$) with only the Disgust Sensitivity subscale (partial $r = 0.12$, $p < 0.02$) explaining significant unique variance.

## 3. Discussion

In the present study we examined the psychometric properties and factor structure of the DPSS-R in a nonclinical sample of undergraduate students. Consistent with prior findings using other measures of disgust (e.g., Olatunji, Sawchuk, Arrindell, & Lohr, 2005), women scored significantly higher than men on the DPSS-R. Contrary to prior research with other measures of disgust (e.g., Fessler & Navarrete, 2005), DPSS-R total scores were positively (albeit mildly) associated with age. Item analysis revealed that participants tended to endorse minimal agreement with the vast majority of DPSS-R items. These findings suggest that the constructs

assessed by the DPSS-R items are relatively far removed from the experience of most nonclinical participants. Thus, it is possible that the DPSS-R is not an optimal measure of disgust experiences in nonclinical populations. Examination of means and standard deviations of the DPSS-R items presented in Table 1 indicates that the DPSS-R items assessing the emotional consequences of disgust symptoms were endorsed less strongly than items that assessed the frequency of disgust symptoms. Indeed mean scores on the Disgust Propensity subscale were significantly higher than those of the Disgust Sensitivity subscale. Although this pattern suggests that the perceived emotional consequence of disgust is less normative, additional research examining the distributional properties of the DPSS-R in clinical samples is needed to address this issue.

The DPSS-R total score demonstrated good reliability, convergent validity (e.g., positive correlations with anxiety disorder symptoms and negative affect), and discriminant validity (e.g., negligible relation to positive affect). Consistent with the initial validation study (van Overveld et al., 2006), results from PCA indicated that DPSS-R consists of two lower-order factors assessing Disgust Propensity and Disgust Sensitivity. These factors demonstrated adequate internal consistency and were highly correlated with each other and DPSS-R total scores. Coefficients of congruence (Gorsuch, 1983) indicated that the two-factor DPSS-R solution from the present study was comparable to that reported by Overveld et al. However, some differences were found with regards to the items within the two factors. Specifically, item 9 and 12 (''When I experience disgust, it is an intense feeling''; ''I become disgusted more easily than other people'') which loaded on the Disgust Propensity factor in the van Overveld et al. study loaded on the Disgust Sensitivity factor in the present study. In addition, item 4 and 13 (''I think disgusting items could cause me illness/infection''; ''I worry that I might swallow a disgusting thing'') which loaded on the Disgust Sensitivity factor in the van Overveld et al. study loaded on the Disgust Propensity factor in the present study. Besides cross-cultural differences in the interpretation of these items, it is unclear as to why these items would demonstrate differential factor loadings across these two studies.

Despite the pre-established criteria of 0.40 for a salient factor loading, items 9 (0.39; 0.48) and 13 (0.41; 0.37) did show relative high loadings on both factors suggesting that the two items may not be reliable in differentiating Disgust Propensity from Disgust Sensitivity. Furthermore, the face validity of some of these items (e.g., item 12: ''I become disgusted more easily than other people'') is questionable. Given the cross-cultural factor instability of four items, subsequent revisions of the DPSS-R would benefit from examination of the integrity of the measure without these items.[2] Eliminating inadequate items and condensing the DPSS-R to include only those items that do not detract from its reliability, validity, and the stability of its factor structure is an important area for future research.

A secondary aim of the present study was to examine the specific relation between the DPSS-R factors and measures of anxiety disorder symptoms. Consistent with previous research using other measures of disgust, the DPSS-R and its two subscales were found to be significantly correlated with spider fear (de Jong, Andrea, & Muris, 1997; Olatunji, 2006) BII-related fear (Olatunji, Lohr, Sawchuk, & Patten, in press-a), and contamination fear commonly observed in OCD (Olatunji, Lohr, Sawchuk, & Tolin, 2007). These findings complement prior research implicating disgust in the development of specific anxiety-related disorders.

It has been proposed that a disease-avoidance process (Matchett & Davey, 1991) may be the mechanism by which disgust contributes to anxiety-related conditions (Olatunji & Sawchuk,

[2] The DPSS-R did maintain adequate internal consistency secondary to the removal of item 4, 9, 12, and 13 ($\alpha = 0.87$).

2005). However, it has also been suggested that the relation between disgust and anxiety disorder symptoms may be an artifact of negative affectivity (Thorpe & Salkovskis, 1998). Therefore, the present study examined the relation between the DPSS-R and its subscales when controlling for negative affect. The findings showed that with the exception of history of injection-related avoidance and fainting, the relation between the DPSS-R and anxiety disorder symptoms remained intact after controlling for negative affect. These findings suggest that disgust has an independent and unique association with specific anxiety symptoms that is not accounted for by negative affectivity.

The present study also found that the DPSS-R subscales demonstrated some specificity in the prediction of anxiety disorder symptoms. Disgust Propensity, Disgust Sensitivity, and negative affect each accounted for unique variance in spider fear. However, only Disgust Propensity and negative affect accounted for unique variance in spider avoidance. Similarly, Disgust Sensitivity and negative affect explained unique variance in injection fear. However, Disgust Propensity and Disgust Sensitivity explained unique variance in history of injection-related fainting, whereas Disgust Sensitivity and negative affect explained unique variance in history of injection-related avoidance. It should be noted that the relation between Disgust Propensity and history of injection-related fainting was negative when controlling for Disgust Sensitivity and negative affect. This finding is consistent with prior research suggesting that the relationship between the frequency of disgust experiences and fainting associated with BII stimuli may be accounted for by other regulatory processes (i.e., fearfulness; Olatunji, Sawchuk, et al., 2006; Olatunji, Williams, et al., 2006). Lastly, only Disgust Sensitivity explained unique variance in contamination fear and contamination based safety seeking.

The present findings suggest that Disgust Propensity and Disgust Sensitivity as assessed by the DPSS-R may have unique relationships with different anxiety disorder symptoms, independent of each other and negative affect. Although other measures of disgust (e.g., the DS) may be more suitable for studies assessing the range of stimuli that elicit disgust, the DPSS-R appears to be a more useful instrument for examining how disgust-specific vulnerabilities contribute to psychopathology symptoms. Although the present study suggests that the DPSS-R may be valuable in this regard, additional studies dedicated to the refinement of the DPSS-R items will be necessary. Specifically, the items that compose the Disgust Propensity and Disgust Sensitivity factors must demonstrate stability across cultures. Future research is also needed to examine whether the factor structure of the DPSS-R varies between and within different samples. Indeed, a limitation of the present research was our use of an undergraduate sample. Although convenient, undergraduate samples may constrain the generalizability of these findings. Research examining the factor structure of the DPSS-R in community and clinical samples may provide useful information on this measure's generalizability and may help to reconcile some of the item-level inconsistencies. Given the unique strengths of the DPSS-R relative to other measures of disgust, it is possible that future research may underscore the utility of this measure in anxiety disorders research.

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