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## The relationship between contamination cognitions, anxiety, and disgust in two ethnic groups

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### ABSTRACT

**Background and objectives:** Obsessive-compulsive disorder (OCD) is understudied in African Americans, thus little is known about factors that might predispose this group to obsessive-compulsive anxiety. Prior research has shown that African Americans endorse more concerns about contamination, but it is not known how these differences relate to variables, such as beliefs or cognitions about contamination, the emotion of disgust, and anxiety sensitivity. The current study examined Black-White differences in contamination cognitions in a non-clinical sample ( $N = 245$ ).

**Methods:** European American and African American participants completed measures of contamination cognitions, anxiety, OCD, and disgust.

**Results:** African Americans exhibited significantly stronger contamination cognitions, as measured by the Contamination Concerns Scale. Multiple regression analysis showed that contamination concerns were predicted by disgust sensitivity, ethnicity/race, and gender. Neither anxiety sensitivity nor pathological washing behaviors were significant factors in the model.

**Limitations:** Study should be replicated in additional populations as generalizability beyond a college student population is not known.

**Conclusions:** African Americans are no more sensitive to disgust or anxiety than European Americans, but nonetheless have greater concerns about the severity of contamination surrounding certain items. This may predispose African Americans with OCD to symptoms involving contamination.

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### 1. Introduction

Epidemiological studies show that African Americans experience obsessive-compulsive disorder (OCD) at similar rates as the general population (Kessler, Chiu, Demler, & Walters, 2005; Zhang & Snowden, 1999); however African Americans are less likely than European Americans to receive treatment and consequently more likely to suffer a lifetime of disability, despite the availability of effective pharmacological and cognitive-behavioral treatments (Himle et al., 2008). Although symptom presentation, risk factors, and outcomes may vary cross-culturally, very little is known about OCD symptoms in African Americans (Williams, Powers, Yun, & Foa,

2010). Additional work is needed to better understand these symptoms in African Americans and more effectively address this critical health disparity.

African Americans show higher scores on some OC symptom dimensions relative to European Americans, and this appears to be especially true for contamination fears. The most recent epidemiological study found that over a quarter of people with OCD report contamination concerns (25.7%; Ruscio, Stein, Chiu, & Kessler, 2010), and among treatment-seeking individuals, over a third report contamination concerns (37.8%; Foa et al., 1995). The prevalence of contamination concerns among African Americans with OCD is not known because not enough African Americans with OCD were included in these studies to make a determination; however due to the differences found in contamination concerns among non-clinical samples, it seems possible that there may be a corresponding difference in symptom presentation among those with an OCD diagnosis. Thomas, Turkheimer, and Oltmans, (2000) first identified a difference in symptom dimensions when comparing

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scores of African American and European American college students on the Maudsley Obsessional Compulsive Inventory (MOCI; Hodgson & Rachman, 1977). On the MOCI washing subscale, African American participants scored one standard deviation higher than European American participants, but did not have more severe OC symptoms when high-scoring students were interviewed individually.

This initial finding of heightened endorsement of contamination fear among African Americans appears to be robust, as it has since been replicated in multiple investigations. For example, Williams, Turkheimer, Schmidt, and Oltmanns (2005) studied a large internet sample using the Padua Inventory (Sanavio, 1988), another self-report measure of OCD symptoms, and found a similar pattern of high African American endorsement of contamination items: non-clinical African American participants scored as highly as participants reporting a diagnosis of OCD. Extension of this research suggests that these differences are partially explained by cultural factors, including geography and whether the participants were primed with information that triggered thoughts about their ethnic identity before contamination measures were administered (Williams, Turkheimer, Magee, & Guterbock, 2008). Similarly, Williams and Turkheimer (2007) found that ethnic differences in contamination anxiety reflected varied cultural attitudes toward grooming and housekeeping as opposed to actual differences in the severity of psychopathology. The ethnic difference between participants on pathological contamination fears was eliminated when differences on these attitudinal factors were controlled statistically.

Collectively, the findings reviewed above indicate that although OCD and OC symptoms are equally prevalent across ethnic groups, there may be ethnic differences in OC-related cognitions. Risk factors for OCD may include different attitudes about constructs such as contamination that, in turn, influence behaviors and symptom expression. For example, in many cultural groups, animals are considered contaminated. European Americans are less likely to hold this view and more likely to own pets, whereas the opposite is true for African Americans (Siegel, 1995). This view about animals may make African Americans more likely to feel contaminated and subsequently anxious or distressed when coming in contact with an animal (Williams & Turkheimer, 2007). Examination of the affective correlations of contamination cognitions may provide important insights in better understanding cultural differences in symptoms of contamination-based OCD.

Research has demonstrated that in many cases, contamination concerns are comprised of both fear and disgust (McKay, 2006). Disgust is an emotion typically associated with things that are considered dirty, unappetizing, contagious, or otherwise offensive (Olatunji & Sawchuk, 2005). Several studies have found that self-report questionnaires assessing the tendency to experience disgust correlate with self-report measures of contamination fear, indicating a relationship between the two constructs (Moretz & McKay, 2008; Olatunji, Cisler, McKay, & Phillips, 2010). For example, Mancini, Gragnani, and D'Olimpio (2001) found a significant positive relationship between disgust and washing behaviors in a non-clinical sample. There is some preliminary evidence of group differences in disgust sensitivity, which may partially explain the ethnic differences observed in contamination concerns. For example, Haidt, McCauley, and Rozin (1994) found that relative to European American participants, African Americans scored significantly higher on the Disgust Scale. In a large undergraduate sample, Tolin, Woods, and Abramowitz (2006) found that non-whites (mostly African Americans) scored significantly higher than whites on the Disgust Scale; however findings for African American participants were not analyzed or reported separately. At

this point, very little is known about the construct of disgust and how it relates to contamination concerns among African Americans.

Differences in cognitive vulnerabilities may also be relevant to better understanding cultural differences in contamination fears. Anxiety sensitivity is a cognitive risk factor for the development of anxiety disorders and is comprised of beliefs about the consequences of physical arousal symptoms of anxiety. Cisler, Reardon, Williams, and Lohr (2007), found that anxiety sensitivity and disgust sensitivity were each independent factors in predicting contamination fears. There has been very little research on anxiety sensitivity in African Americans other than a few studies focused on the psychometric properties of anxiety sensitivity measures that found some racial differences in the factor structure of the measures (Arnau, Broman-Fulks, Green, & Berman, 2009; Carter, Miller, Sbrocco, Suchday, & Lewis, 1999; Chapman, Williams, Mast, & Woodruff-Borden, 2009). The few studies that compare scores on such measures have reported no differences between African Americans and European Americans on measures such as the Anxiety Sensitivity Index or Beck Anxiety Inventory (Carter, Sbrocco, Lewis, & Friedman, 2001; Williams & Turkheimer, 2008). However, the scarcity of focused research in this area makes it difficult to come to any conclusions.

In the present investigation we attempted to extend previous work by further examining differences between African Americans and European Americans on variables such as disgust and washing behaviors, which are associated with contamination-related OC symptoms. To date, no studies have addressed the role of disgust in ethnic/racial differences in contamination concerns. We also examined whether anxiety sensitivity is a factor in the relationship between contamination concerns and disgust due to the possibility that racial differences in anxiety sensitivity influence feelings about contamination. We hypothesized that African Americans would report greater levels of contamination concerns and more disgust sensitivity relative to European Americans, and that disgust sensitivity would be a predictor of contamination concerns for African Americans.

## 2. Methods

### 2.1. Participants

Participants included 245 undergraduates enrolled in Introductory Psychology classes at a large southeastern university. The mean age of the sample was 19.1 (SD = 1.37; range = 17–26). Of these, 202 participants (82.4%) self-identified as European American/Caucasian/White and 43 (17.6%) as African American/Black. The sample contained 135 (55.1%) women and 110 (44.9%) men, and there were no differences in the gender makeup between groups  $X^2(1, N = 245) = .61, p = .44$ .

### 2.2. Procedure and measures

Participants completed a battery of self-report measures that included the following questionnaires. They received course credit for their participation:

*Disgust Propensity and Sensitivity Scale-revised (DPSS-R; van Overveld, de Jong, Peters, Cavanagh, & Davey, 2006)*. This is a 16-item scale that measures the frequency (disgust propensity) and subjective negative impact (disgust sensitivity) of disgust-related experiences. Each item is rated on a scale ranging from 1 (“never”) to 5 (“always”). When the DPSS-R was validated on a primarily European American sample of undergraduate psychology students, the mean total score for the sample was 35.03 (S.D. = 8.30), and women scored significantly higher than men; the

total scale score demonstrated excellent internal consistency ( $\alpha = .90$ ) (Olatunji, Cisler, Deacon, Connolly, & Lohr, 2007). In the current sample,  $\alpha = .87$  for African Americans and  $\alpha = .88$  for European Americans.

**Contamination Cognitions Scale (CCS; Deacon & Olatunji, 2007).** This measure asks respondents to rate both the likelihood and severity of contamination if they were to touch each of 13 objects commonly associated with germs (e.g., door handles, toilet seats) and wash their hands. Each item is rated on a scale of 0–100. Ratings were given on a 0–100 scale, where 0 = “not at all likely,” 50 = “moderately likely,” and 100 = “extremely likely” (likelihood ratings) and 0 = “not at all bad,” 50 = “moderately bad,” and 100 = “extremely bad” (severity ratings). Likelihood and severity summary scores are calculated by averaging responses across the 13 items on each scale. The CCS total score is calculated by averaging ratings for all 26 items. The CCS has shown excellent internal consistency ( $\alpha = .97$ ) and test-retest reliability ( $r = .94$ ), when administered to a primarily European American sample of undergraduate psychology students (Deacon & Olatunji, 2007). In the current sample,  $\alpha = .97$  for African Americans and  $\alpha = .96$  for European Americans.

**Obsessive Compulsive Inventory, Short Version (OCI-R; Foa et al., 2002).** The OCI-R is a self-report inventory for determining the diagnosis and overall severity of OCD that is also intended to be applicable to the general population in assessing subclinical obsessional thoughts and behaviors. The OCI-R yields a profile of frequency and distress for each symptom class in six areas: washing, checking, ordering, obsessing, hoarding, and mental neutralizing. The three item washing scale is examined in this study, which includes one item about avoidance and two items about washing behaviors. In the current sample,  $\alpha = .62$  for African Americans and  $\alpha = .79$  for European Americans, which is less than ideal but comparable to the values reported by Foa et al. for non-anxious controls ( $\alpha = .73$ ).

**Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010).** The DOCS is a 20-item self-report measure that assesses the severity of the four most consistently replicated OCD symptom dimensions (which correspond to four DOCS sub-scales): (a) contamination, (b) responsibility for harm and mistakes, (c) symmetry/ordering, and (d) unacceptable thoughts. Within each symptom dimension, five items (rated 0–4) assess the following parameters of severity (over the past month): (a) time occupied by obsessions and rituals, (b) avoidance behavior, (c) associated distress, (d) functional interference, and (e) difficulty disregarding the obsessions and refraining from the compulsions. The DOCS sub-scales have excellent reliability in clinical samples ( $\alpha = .94$ – $.96$ ) and the measure converges well with other measures of OC symptoms (Abramowitz et al., 2010). Only the contamination subscale was used in the present study as a measure of pathological obsessive-compulsive symptoms. In the current sample,  $\alpha = .85$  for both African Americans and European Americans.

**Anxiety Sensitivity Index 3 (ASI-3; Taylor et al., 2007).** The ASI-3 is an 18-item measure that has been validated in multiple ethnic groups and exhibits good performance on other indices of reliability and validity, along with evidence of improved psychometric properties over the original ASI (Peterson and Reiss, 1992). Specifically, the ASI-3 demonstrated a stable factor structure across gender and across seven multi-national (and multi-language), non-clinical and clinical samples. The ASI-3, and its three sub-scales (physical concerns, social concerns, cognitive concerns), demonstrated strong reliability and factorial validity relative to previous measures of the construct; as well as convergent, discriminant, and criterion-related (known-group) validity (Taylor et al., 2007). In the current sample,  $\alpha = .90$  for both African Americans and European Americans.

### 3. Results

#### 3.1. Comparisons of scales and sub-scales

Descriptive statistics for all study measures for each racial group are presented in Table 1. Results of independent *t*-test comparisons (presented in Table 1) show that African Americans scored higher on measures of contamination-related cognitions, with strong differences on the total CSS scale (Cohen's  $d = .48$ , medium effect size) and Contamination Severity subscale ( $d = .50$ , medium effect size) and a trend toward significance on the Contamination Likelihood subscale ( $d = .32$ , small effect size). There were no significant between-group differences on the disgust, washing, or dimensional contamination scales. On the ASI-3 there were no significant differences on the total scores, but on the Social Concerns subscale, African Americans scored significantly lower than European Americans ( $d = .43$ , medium effect size).

#### 3.2. Correlation analyses

Ethnic group was modestly but significantly correlated with the CCS, but not the other measures ( $r = .018$ ,  $p = .004$ ). The DPSS-R and ASI-3 were strongly correlated. The correlation between the DOCS washing scale and OCI-R was similar to previous findings in a student sample (Abramowitz et al., 2010). Shown in Table 2 are the Pearson's correlations between the various study measures.

#### 3.3. Multiple regression analysis

To further examine the relationship between contamination concerns, ethnicity, and disgust, we performed a multiple regression, with total CSS scores as the dependent variable and DPSS-R total score, ASI-3 total score, DOCS Contamination score, OCI-R Washing score, ethnicity, and gender as independent variables. Gender was included because previous studies have found that females report more contamination fears and disgust sensitivity than males (Olatunji, Sawchuk, Arrindell, & Lohr, 2005). Gender and ethnicity each were dummy-coded as 1 and 0. We found that gender, disgust, and ethnicity were all significant predictors of CSS scores in the model,  $F(7,199) = 7.65$ ,  $p < .001$ , Adj R squared = .21. The ASI-3, OCI-R, and DOCS contamination subscale were not significant predictors, nor was age. The results of the regression analysis are presented in Table 3.

**Table 1**  
Mean scores (and standard deviations) on study measures and sub-scales.

Measure	White		Black		t	p
	M	SD	M	SD		
CCS total score	88.49	49.13	113.15	52.93	2.89	.004*
Contamination likelihood	35.68	22.47	42.97	22.97	1.90	.058
Contamination severity	32.46	19.88	43.03	23.21	3.01	.003*
DPSS-R total score	19.13	8.46	19.38	8.40	.16	.871
Disgust Propensity	11.46	4.63	12.37	5.13	1.15	.253
Disgust sensitivity	7.91	4.60	7.20	4.29	.90	.368
OCI-R washing scale	1.57	2.19	1.76	2.32	.50	.615
DOCS contamination scale	2.19	2.49	2.78	3.08	1.31	.192
Anxiety sensitivity index 3	12.76	10.10	10.27	10.24	1.44	.152
Physical concerns	3.14	3.38	3.76	4.72	-.99	.324
Cognitive concerns	2.53	3.68	1.83	3.39	1.13	.260
Social concerns	7.13	5.08	5.05	4.55	2.46	.015*

df ranged from 237 to 239.

White = European American; Black = African American; CCS = Contamination Cognitions Scale; DPSS-R = Disgust Propensity and Sensitivity Scale-revised; OCI-R = Obsessive Compulsive Inventory, Short Version (revised); DOCS = Dimensional Obsessive-Compulsive Scale.

\*  $p < .05$ .

**Table 2**  
Pearson's correlations between study measures.

	CCS total	ASI-3 total	OCI-R washing	DOCS contamination
DPSS-R total	.370**	.494**	.235**	.242**
CCS total		.191**	.230**	.324**
ASI-3 total			.337**	.257**
OCI-R washing				.714**

N for analyses ranged from 218 to 241.

\*\* $p < .001$ .

## 4. Discussion

### 4.1. Ethnic differences in cognitions

Understanding ethnic differences in cognitions affords clinicians and researchers an improved ability to identify pathological anxiety in a diverse population. Research suggests that African Americans may conceptualize and experience anxiety symptoms differently than European American, for example social fears may be conceptualized as adaptive cultural mistrust and anxiety symptoms may be more likely to be experienced as somatic concerns (Gordon & Teachman, 2008; Hunter & Schmidt, 2010). Given the dearth of research examining racial and ethnic differences in anxiety-related symptoms and associated phenomena, the present study was designed to further investigate Black-White differences on measures associated with contamination-related OC symptoms. We found that African Americans reported significantly more concern about contamination than did European Americans. This finding is consistent with previous research describing ethnic differences on contamination measures (e.g. Williams & Turkheimer, 2007). Although we found no significant ethnic differences in disgust propensity or sensitivity, disgust was significantly related to contamination. Ethnic group was a significant predictor of contamination concerns, even after accounting for the relationship between disgust and contamination. Interestingly, although differences appeared in cognitions about contamination, we did not find differences in reports of symptom severity.

### 4.2. Cultural differences may relate to stereotypes and racism

Williams et al. (2008) suggested that rather than an indication of increased pathological anxiety among African Americans, such findings may be due to presentation concerns, resulting in the over-endorsement of cleaning items to counteract negative stereotypes about African Americans. Termed *stereotype compensation*, the result is a reporting bias of exaggerated cleaning attitudes and behaviors. Alternatively, this difference may be due to true differences in culturally-embedded attitudes about cleanliness, which may have historically originated for the same reasons (Williams & Turkheimer, 2007). Another possibility is that some of the difference is due to socio-economic status. For example, if the African Americans in this sample were from a lower SES, and assuming that living in a lower income situation may bring one into more contact

**Table 3**  
OC symptom and anxiety variables, ethnicity and gender predicting contamination cognitions.

Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	32.04	18.89		1.70	.09
DPSS-R total	.61	.18	.26	3.30	.00
ASI-3 total	.03	.16	.02	.20	.80
OCI-R washing	.89	.69	.10	1.30	.19
DOCS contamination	.18	.17	.08	1.04	.30
Ethnicity	-8.24	3.43	-.16	-2.40	.02
Gender	-6.17	2.73	-.16	-2.26	.03
Age	-.15	1.01	-.01	-.15	.89

with contaminants, it could be a factor in the perception of the likelihood of becoming contaminated.

Differences on the OCI-R Washing Scale and the DOCS Contamination Scale were in the expected direction but were not significant. The OCI-R Washing scale has demonstrated notable differences in previous studies, with African Americans scoring significantly higher on this scale than European Americans (Williams & Turkheimer, 2007; Williams et al., 2008). However, in both of the previous studies, the OCI-R was comprised of the overlapping items from the Padua Inventory, so the order and manner of presentation differed from the current investigation, where the items were presented within the whole OCI-R scale. However, also of note is the marginal reliability of this scale in the African American sample. This is the first study to examine racial differences on the DOCS Contamination scale, and the lack of significant differences is an encouraging preliminary sign for the future of this new assessment tool, as, relative to the OCI-R, it might better assess OC symptoms without being confounded by ethnic identification.

In contrast to Cisler et al.'s (2007) finding that anxiety sensitivity was an independent predictor of contamination fears, we found no such relationship in the present study. Nevertheless, we examined ethnic differences in anxiety sensitivity and found that the social concerns dimension differed significantly between groups. African Americans reported fewer social concerns about the consequences of anxiety relative to their European American counterparts. There may be actual group differences in the experience of social anxiety, given that social phobia has a lower estimated lifetime prevalence rate for African Americans compared to European Americans (Breslau, Aguilar-Gaxiola, Kendler, Su, Williams, et al., 2006). Status as a stigmatized minority may confound the assessment of social concerns, as social anxiety may occur differentially depending on whether the subject fears evaluation by members within our outside his or her own ethnic group; for example, past experiences of racism may result in a different perception of social fears that may not be captured in typical assessment instruments (Hunter & Schmidt, 2010).

### 4.3. Clinical implications

As prior research has documented more washing and cleaning behaviors (e.g., Williams & Turkheimer, 2007), and the current investigation shows that African Americans have greater concerns about both the likelihood of becoming contaminated and the severity of the contamination, this raises some important clinical concerns. Stronger contamination cognitions coupled with increased cleaning may constitute a risk factor for the development of contamination-themed OCD in African Americans. Females have stronger concerns about cleanliness than males, and likewise, are more likely to suffer from contamination-related OCD than males (Labad et al., 2008; Olatunji et al., 2005); thus the same may be true for African Americans.

Additionally, since increased washing and cleaning appears to be a cultural norm, OCD symptoms may go unnoticed for a longer period, resulting in a failure of the affected person and their family members to recognize the presence of a disorder until symptoms become severe. Greater symptom severity is related to worse treatment outcome (Hurley, Saxena, Rauch, Hoehn-Saric, & Taber, 2002), and a longer period of disability represents reduced educational and career achievement (Himle et al., 2008). Compounding these problems are the disadvantages connected to underrepresented minority status, which may lead to a sizeable mental health disparity (i.e., Himle et al., 2008). Clinicians should use care and sensitivity when assessing an African American person with contamination OCD, as milder symptoms could be either a non-pathological difference based on cultural norms, or clinically

significant symptoms yet unrecognized by the affected person and his or her family members.

#### 4.4. Limitations

One limitation of our study is that the generalizability of our findings beyond a college student population at a single university is not known. It would be preferable to collect data on a more representative and diverse population, especially given that regional differences have been documented in the expression of contamination concerns (Williams et al., 2008).

Additionally, cultural attitudes may differ between African Americans and other American Blacks (i.e., African immigrants or those of Caribbean origin) regarding the constructs under examination. Future studies should examine these groups separately, as African Americans have a unique cultural history that is hypothesized to be a major factor in the observed differences (Williams & Turkheimer, 2008). It is not known how many in the sample were African American versus Black people with a different cultural heritage, and this may be a confounding factor. This might also explain why ethnic differences in washing did not reach significance, as has been documented previously (i.e., Williams et al., 2008).

Although the psychometric characteristics of the ASI-3 have been evaluated in many different groups, there is little research on the ASI-3 specifically in African Americans. Previous studies with earlier versions of the scale have shown that the psychometric properties of the measure vary between African Americans and European Americans (Arnau et al., 2009; Carter et al., 1999). More studies are needed to demonstrate that the ASI-3 is valid for African Americans. Differential item functioning analyses, based on item response theory, could be an important next step to identify items that may not be measuring pathological anxiety in the same manner in African Americans (e.g., Williams et al., 2005).

#### 4.5. Conclusion

African Americans are no more sensitive to disgust or anxiety than European Americans, but nonetheless have greater concerns about contamination. African Americans are more likely to believe they will be contaminated by certain items and that this contamination will be particularly severe. This may predispose African Americans with OCD to symptoms involving contamination, which may go unnoticed for a longer period, leading to delayed diagnosis and treatment.

#### 4.6. Future directions

Additional research is needed to determine the cause of differences in contamination concerns between African Americans and European Americans. It would be particularly important to understand how these cognitions might relate to cultural beliefs and behaviors, and the effect of these cognitions on African Americans with OCD. Numerous studies have examined OCD symptom dimensions, but this work has not been conducted with African Americans diagnosed with OCD, therefore new research in this area is critically needed.

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