Received: 2 August 2019 | Revised: 29 October 2019 | Accepted: 28 November 2019

DOI: 10.1002/da.22984

ANXIETY AND DEPRESSION ASSOCIATION OF AMERICA

WILEY

RESEARCH ARTICLE

Somatic symptoms in treatment-naïve Hispanic and non-Hispanic patients with major depression

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Abstract

Background: Somatic complaints are a major driver of health care costs among patients with major depressive disorder (MDD). Some epidemiologic and clinical data suggest that Hispanic and non-Hispanic Black patients with MDD endorse higher levels of somatic symptoms than non-Hispanic White patients.

Methods: Somatic symptoms in 102 Hispanic, 61 non-Hispanic Black, and 156 non-Hispanic White patients with treatment-naïve MDD were evaluated using the somatic symptom subscale of the Hamilton anxiety rating scale (HAM-A). The other seven items of the HAM-A comprise the psychic anxiety subscale, which was also evaluated across ethnicities.

Results: Hispanic patients reported significantly greater levels of somatic symptoms than non-Hispanic patients, but levels of psychic anxiety symptoms did not differ by ethnicity. Levels of somatic symptoms did not significantly differ between Black and White non-Hispanic patients. Within the Hispanic sample, somatic symptom levels were higher only among those who were evaluated in Spanish; Hispanics who spoke English showed no significant differences versus non-Hispanics.

Conclusions: In this medically healthy sample of patients with MDD, monolingual Spanish-speaking Hispanic patients endorsed high levels of somatic symptoms. Clinicians should be mindful that the depressive experience may manifest somatically and be judicious in determining when additional medical work-up is warranted for somatic complaints.

KEYWORDS

acculturation, African Americans, anxiety, ethnicity, Latino, Spanish

Boadie W. Dunlop and Sarah Still contributed equally to this study.

Funding information
National Institutes of Health, Grant/Award Numbers: M01 RR0039, UL1 RR025008; National Institute of Mental Health, Grant/Award Numbers: P50 MH077083, R01MH080880

1 | INTRODUCTION

The point prevalence of major depressive disorder (MDD) around the globe is approximately 5%, with a lifetime prevalence of 10–18% (Ferrari et al., 2013; Kessler & Bromet, 2013). The constellation of symptoms that can fulfill the diagnostic criteria for MDD is broad (Fried & Nesse, 2015), with gender and cultural factors impacting symptomatic expression and prevalence estimates (Ballenger et al., 2001; Ryder et al., 2008; Tylee & Gandhi, 2005). The Western emphasis on the psychological aspects of psychiatric disorders contrasts with the importance and often primacy of somatic symptoms in much of the rest of the world (Ryder et al., 2008). The diagnostic and statistical manual (DSM-5; American Psychiatric Association, DSM-5 Task Force, 2013) stresses the psychic symptoms of depression, such as sadness, suicidal ideation, and anhedonia; only three somatic symptoms are included in the diagnostic criteria: changes in sleep, changes in appetite, and loss of energy (Kapfhammer, 2006). Other somatic symptoms, such as paresthesia or feeling faint, are rarely the focus of mental health clinicians' attention and are often seen as epiphenomena of what is believed to be a brain disease. However, the World Health Organization Cross-National Study in Primary Care found the normative expression of depression throughout the world is through a variety of somatic symptoms, present in ≥50% of major depression patients across nations (Kirmayer, 2001). Internationally, two-thirds of depressed patients initially present with only somatic symptoms, and approximately half have unexplained medical symptoms (Simon, Von-Korff, Piccinelli, Fullerton, & Ormel, 1999). Unexplained somatic symptoms increase frequency of utilization and cost of medical services, and the increased medical costs that accrue to patients with depressive or anxiety disorders are driven primarily by associated somatic symptoms (Barsky, Orav, & Bates, 2005).

The somatic symptoms of MDD can be broadly defined as bodily sensations of concern to the patient, and may be grouped into vegetative symptoms (e.g., sleep and appetite changes, fatigue), painful symptoms (e.g., headache, back pain), and non-painful symptoms (e.g., shortness of breath, heart palpitations). Most prior research on somatic symptoms in MDD has focused on the vegetative symptoms due to their accessibility from structured diagnostic interviews or the Hamilton depression rating scale 17-item (HDRS-17). Less commonly, specific somatic symptom questionnaires have been administered to achieve a broader scope of physical symptoms (Zijlema et al., 2013). More severe or numerous somatic symptoms are consistently correlated with increased depression severity (García-Campayo et al., 2008; Novick et al., 2013). Observational studies have found painful somatic symptoms to be positively and more strongly associated with non-painful somatic symptoms than with either depressive or anxiety symptoms, suggesting that "somatic symptoms" should be understood as a specific symptom group in depression (Demyttenaere et al., 2010).

Associations have also been reported between somatic symptom complaints in MDD and ethnicity, particularly for Black or Asian patients and those of Hispanic ethnicity (Bagayogo, Interian, & Escobar, 2013), though studies that more fully control for potentially confounding variables have not found statistically significant associations (Bauer, Chen, & Alegría, 2012; Hankerson et al., 2011). Some data suggest Hispanic patients may have greater anxiety sensitivity than non-Hispanic White patients (Bakhshaie et al., 2018), and some culture-bound syndromes, such as *ataque de nervios*, involve high somatic expression of distress (Hinton, Lewis-Fernández, & Pollack, 2009). Small clinical studies have reported that depressed Hispanic patients residing in Latin nations or who had recently immigrated to the United States endorsed higher rates of somatic symptoms compared with U.S. residing non-Hispanic White depressed patients (Mezzich & Raab, 1980; Rao, Poland, & Lin, 2012), though epidemiological data from samples within the United States have provided conflicting results (Canino, Rubio-Stipek, Canino, & Escobar, 1992; Koss, 1990).

Somatic symptoms in depressed African American patients have received less attention. Only one large clinical study identified more somatic symptoms among depressed African American than White patients, but results were confounded by a higher rate of medical disease burden among African Americans (Brown, Schulberg, & Madonia, 1996). In the sequenced treatment alternatives to relieve depression (STAR*D) study, pain symptoms were more common among Hispanic and African American patients compared with non-Hispanic White patients (Husain et al., 2007), and in the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions, Blacks reported more insomnia than Whites (Hankerson et al., 2011). Discrepancies across studies may stem from different measures to quantify somatization, inclusion of different types of somatic symptoms, and variation in the sociodemographic, clinical, and medical health characteristics of study samples (Fabrega, Mezzich, & Ulrich, 1988; Tylee & Gandhi, 2005).

In patients with MDD, broadly defined somatic symptoms have been reliably associated with female gender (Silverstein, 2002; Tamayo, Román, Fumero, & Rivas, 2005), lower education (Barsky et al., 2005; Demyttenaere et al., 2010), and increasing age (Hegeman, de Waal, Comijs, Kok, & van der Mast, 2015; Schaakxs, Comijs, Lamers, Beekman, & Penninx, 2017). Notably, these gender effects are substantially diminished when controlling for the level of other depressive symptoms (Delisle, Beck, Dobson, Dozois, & Thombs, 2012). An additional factor repeatedly associated with somatic symptom complaints among outpatients is exposure to psychological trauma during childhood, though the effects of race

and ethnicity on this association have not previously been evaluated (Kealy, Rice, Ogrodniczuk, & Spidel, 2018; Park et al., 2014; Spertus, Yehuda, Wong, Halligan, & Seremetis, 2003).

An additional factor that may affect how individuals express psychological distress is acculturation. Acculturation has been defined as the process by which cultural groups adopt the customs and behaviors of a new culture (Dawson, Crano, & Burgoon, 1996). Cultures of origin may carry beliefs about disease etiology, symptom interpretation, nutrition, physical activity, and health care utilization that diverge from the dominant culture encountered after migration. Several measures have been developed to assess the construct of acculturation, incorporating aspects of spoken language, language of thought, media preferences, ethnic identity, length of residency in the new country, and ethnic interaction (Wallace, Pomery, Latimer, Martinez, & Salovey, 2010). Although multi-component measures of acculturation are ideal (Koneru, Weisman, Flynn, & Betancourt, 2007), in the absence of a specific acculturation scale, language use is considered the best single indicator of a person's level of acculturation (Cuellar, Harris, & Jasso, 1980; Lessenger, 1997).

Taking these factors into account suggests that associations between ethnicity and somatic symptoms are not straightforward. Despite the medical and financial importance of somatic symptom presentations of depression, clinically rich datasets available for examining this issue are scarce. No studies of somatic symptoms in MDD have adequately considered the effects of age, gender, comorbid anxiety disorders, or childhood trauma, all of which may affect somatic symptom expression.

To address the question of whether ethnicity affects the expression of somatic symptoms in adults with MDD, we conducted a post hoc analysis of the baseline data from the predictors of remission in depression to individual and combined treatments (PReDICT) study. This clinical trial enrolled patients at an English-speaking site and a Spanish-speaking site using the same assessors and treatment providers, providing a unique opportunity to explore the effects of race and ethnicity and to evaluate the impact of potentially important covariates. We hypothesized that, given the preponderance of results from prior studies, Hispanic patients would report higher levels of somatic symptoms compared with non-Hispanic White and Black patients, and that this effect would be moderated by gender and acculturation.

2 | METHODS

2.1 | Study overview

The PReDICT study protocol (Dunlop et al., 2012) and study results (Dunlop et al., 2017) have been published previously. The study was conducted through the Emory University's mood and anxiety disorders program (MAP) and involved an English language clinic at Emory University and a purely Spanish-speaking clinic, "Clinica Latina para el Tratamiento de la Depresión" ("Latin Clinic for the Treatment of Depression"), at Emory-affiliated Grady Hospital in Atlanta (Aponte-Rivera et al., 2014). Regardless of ethnicity, participants who spoke English were enrolled at the Emory University site. Participants who spoke only Spanish (all of whom were Hispanic) were enrolled at the Grady site, where all interviews and questionnaires were delivered in Spanish by bilingual research staff. All patients provided written informed consent before participating in the study. The study was approved by Emory's Institutional Review Board and the Grady Hospital Research Oversight Committee.

2.2 | Study design

PReDICT was designed to identify biological and clinical features that predict or moderate outcomes to treatment in MDD. The study enrolled treatment-naïve adults from 2007 to 2013 with nonpsychotic MDD and randomly assigned them in a 1:1:1 manner to 12 weeks of treatment with either duloxetine, escitalopram, or cognitive behavior therapy.

2.3 | Participants

Treatment-naïve adult outpatients, aged 18–65 years, with current MDD were recruited through community outreach, advertising, and clinician referrals. "Treatment naïve" was operationalized as never having been treated for ≥4 weeks at a minimally effective dose with an antidepressant medication or ≥4 sessions of an evidence-based psychotherapy for MDD. Diagnoses of MDD and any comorbid psychiatric disorders were made using the structured clinical interview for DSM-IV patient edition (First, Spitzer, Gibbon, & Williams, 1995) and a clinical interview by a study psychiatrist. Patients were required to have a HDRS-17 (Hamilton, 1967) total score ≥18 at screening and ≥15 at baseline to qualify for randomization. Spanish-speaking patients were assessed with a validated version of HDRS-17 (Williams, 1989). Screening visits also included a medical history, physical exam, basic laboratory testing, urine drug screen, and electrocardiogram to ensure patients were medically appropriate for the study and to rule-out other causes of depression. Key exclusion criteria were: lifetime prior exposure to escitalopram, citalopram, or duloxetine; any medically significant or unstable medication condition that could impact study participation or data interpretation; any current (past 12 months) diagnosis of obsessive compulsive disorder, eating disorder, substance dependence, or dissociative disorder, or meeting criteria for substance abuse within the 3 months before baseline. Comorbid anxiety disorders or posttraumatic stress disorder were permitted if MDD was considered by the study psychiatrist to be the primary psychiatric diagnosis. In addition, any clinically significant suicide or homicide risk, or the presence of psychotic symptoms were exclusionary.

2.4 | Assessments

At the screening visit, demographic data were collected using a study specific questionnaire, including a check-box where

participants indicated whether they considered their ethnicity to be "Hispanic" or "Not Hispanic." Patients also completed the childhood trauma questionnaire (CTQ) at this visit (Bernstein, Ahluvalia, Pogge & Handelsman, 1997). Depression severity was assessed by blinded raters at both the screening and baseline visits using the structured interview guide for the HDRS-17 (Williams, 1989), and patients also completed the Beck depression inventory (BDI) at baseline (Beck, Ward, Mendelson, Mock & Erbaugh, 1961). Anxiety was assessed at the baseline visit using the Hamilton anxiety rating scale (HAM-A), a clinician-administered scale consisting of 14 items rated 0–4, for a maximum score of 56 (Hamilton, 1959). All Spanish assessments were conducted by bilingual (English–Spanish) assessors. These assessors also worked half-time at the English-speaking site conducting the same assessments in English. Lacking a specific measure of acculturation, we employed language use as a proxy for acculturation status (Cuellar et al., 1980; Lessenger, 1997).

The HAM-A consists of two homogeneous subscales, "psychic anxiety" (items 1–6 and 14), and "somatic anxiety" (items 7–13; Maier, Buller, Philipp & Heuser, 1988). Psychic anxiety consists of the symptoms of anxious mood, tension, fears, depressed mood, insomnia, impaired concentration, and restlessness. Somatic anxiety consists of physical symptoms associated with the muscular, sensory, cardiovascular, respiratory, gastrointestinal, genitourinary, and autonomic systems. To develop the Spanish version of the HAM-A used in PReDICT, a certified medical translator with Spanish as mother tongue was used. After the initial translation, an expert panel consisting of bilingual (English/Spanish) health professionals representing four different Spanish-speaking countries reviewed the document. These reviewers focused on both linguistic accuracy as well as conceptual and cultural equivalence, given the importance of cross-cultural adaption for translated documents (Canino, Lewis-Fernandez, & Bravo, 1997; Sumathipala & Murray, 2000). The reviewers' comments were integrated by the certified translator to produce the final version. Cronbach's α for the HAM-A total score was 0.67 for the English version and 0.75 for the Spanish version.

The primary outcome to assess somatic symptoms was the somatic anxiety subscale of the HAM-A. As a secondary measure we also evaluated the Anxiety-Somatization subscale of the HDRS-17, which is less specific for somatic symptoms, consisting of six items (psychic anxiety, somatic anxiety, gastrointestinal symptoms, general somatic symptoms, hypochondriasis, and insight; Cleary & Guy, 1977). Inter-rater reliability of the assessors for the HDRS-17 and HAM-A was assessed using video-recorded interviews. Intraclass correlation coefficients were 0.91 (95% confidence interval [CI]: 0.75–0.99) for the HDRS-17 and 0.92 (95% CI: 0.62–1.00) for the HAM-A.

2.5 | Statistical analysis

For the purposes of analyses, patients were grouped first by ethnicity and then by race. Thus, patients who self-identified as Hispanic could be of any race. All patients who did not self-identify as Hispanic were then classified as non-Hispanic and grouped by race (White or Black). There were 25 patients who did not identify as being White, Black, or having Hispanic ethnicity; they were excluded from the analyses due to the small cell sizes.

All analyses were performed in SPSS version 25 (IBM Corp., 2017). Comparison of variables at baseline was conducted with analysis of variance for continuous variables and χ^2 tests for categorical variables. The t tests were used to evaluate differences between males and females on the somatic variables and Pearson correlation tests evaluated the association between age and the somatic variables.

In all subsequent analyses evaluating the main effects of ethnicity on somatic symptoms, we used analysis of covariance (ANCOVA) to control for the effect of anxiety disorders (number of anxiety disorders diagnoses) and depression severity (HDRS-17 total score); for the HDRS-17 anxiety-somatization subscale analyses, instead of controlling for the total HDRS-17 score, we used the total of the 11 items not included in the subscale. We also included gender as an independent variable and examined the main effect of gender on the somatic variables along with its interaction with ethnicity.

3 | RESULTS

Sociodemographic and clinical characteristics of the 319 patients analyzed are presented in Table 1. The majority of the sample was female (56.7%). Hispanic ethnicity was reported by 102 (32.0%); the remainder of the sample was classified as Black (61, 19.1%) or White (156, 48.9%). Forty percent (n = 139) of the sample had a comorbid anxiety disorder, without a significant difference in frequency between the groups.

Age was not significantly correlated with depression or anxiety rating scale scores (HDRS-17 r = 0.09, p = .13; HAM-A total r = 0.02, p = .72; HAM-A psychic r = 0.07, p = .19; HAM-A somatic r = −0.04, p = .52). As shown in Table 2, Hispanic women had the highest mean HAM-A somatic symptom scores, but gender and the interaction of gender with ethnicity were not significantly associated with any of the rating scale scores. As expected, patients with a comorbid anxiety disorder diagnosis had significantly higher HAM-A total scores compared with patients without a comorbid anxiety disorder (HAM-A 16.9 ± 0.86 vs. 15.6 ± 0.70, respectively, p = .009). The psychic anxiety subscale of the HAM-A showed a similar difference (11.3 ± 0.41 vs. 10.4 ± 0.38, respectively, p = .003). However, HAM-A somatic anxiety scores did not significantly differ between those with and without a comorbid anxiety disorder (4.2 ± 0.52 vs. 3.6 ± 0.42, respectively, p = .09).

For the primary question regarding the impact of ethnicity, we found specific effects for Hispanic ethnicity on somatic symptom endorsement. As shown in Table 2, somatic symptom severity was significantly greater among Hispanic patients than non-Hispanic White or non-Hispanic Black patients, who did not differ from each other. Hispanic patients also had significantly higher scores on the HAM-D anxiety-somatization scale than the other two groups. In

TABLE 1 Clinical and demographic characteristics

Characteristic	All (n = 319)	White (n = 156)	Black (n = 61)	Hispanic (n = 102)	χ^2	p Value
Sex, female, n (%)	181 (56.7)	72 (46.2)	37 (60.7)	72 (70.6)	15.47	<.001
Married/cohabitating, n (%)	165 (51.7)	84 (53.8)	22 (36.1)	59 (57.8)	7.8	.02
≥High school education, n (%)	282 (88.4)	155 (99.4)	61 (100)	66 (64.7)	82.13	<.001
Employed full time, n (%)	148 (46.5)[a]	87 (55.8)	25 (41.0)	36 (35.6)[a]	10.92	.004
Current anxiety disorders, n (%)	128 (40.1)	69 (44.2)	25 (41.0)	34 (33.3)	3.07	.22
Number of lifetime episodes, n (%)					11.86	.018
1	167 (52.8)[c]	92 (59.4)[a]	22 (36.1)	53 (53.0)[b]		
2	54 (17.1)[c]	21 (13.5)[a]	12 (19.7)	21 (21.0)[b]		
≥3	95 (30.1)[c]	42 (27.1)[a]	27 (44.3)	26 (26.0)[b]		
Characteristic	**All (n = 319)**	**White (n = 156)**	**Black (n = 61)**	**Hispanic (n = 102)**	***F* test**	***p* Value**
Age, M (*SD*)	40.26 (11.69)	42.77 (11.87)	39.90 (11.73)	36.64 (10.46)	8.95	<.001
Age of onset, M (*SD*)	30.91 (14.24)	32.63 (15.59)	27.85 (13.82)	30.11 (11.96)	2.67	.07
HDRS-17 total, M (*SD*)	19.73 (3.73)	18.99 (3.36)	20.11 (3.89)	20.64 (3.95)	6.67	.001
BDI total, M (*SD*)	22.73 (7.27)	22.05 (7.01)	22.39 (7.03)	23.97 (7.69)	2.23	.11
CTQ total, M (*SD*)	45.16 (15.25)	40.73 (12.01)	47.72 (14.09)	50.49 (18.20)	14.77	<.001

Abbreviations: BDI, Beck depression inventory; CTQ, childhood trauma questionnaire; HDRS, Hamilton depression rating scale; *SD*, standard deviation.
[a]Missing value on 1 subject.
[b]Missing value on 2 subjects.
[c]Missing value on 3 subjects.

contrast, psychic symptoms of anxiety did not differ across the three groups. The distributions of the psychic anxiety subscale scores (Figure 1a) were very similar across the three groups, which differs markedly from the divergent distributions of somatic symptom subscale scores (Figure 1b), where a substantially greater percentage of Hispanic patients had elevated scores compared with the two non-Hispanic groups.

To further explore the primary finding of higher somatic symptoms among Hispanic patients, we compared Hispanics who completed the study in Spanish versus those who completed it in English. Of the 102 Hispanic patients, 85 (83.3%) were evaluated in Spanish and 17 (16.6%) were evaluated in English. Controlling for baseline depression severity and anxiety diagnoses, somatic symptoms scores were significantly higher in the Spanish language patients (Spanish 6.0 ± 0.6, English 3.2 ± 1.3, $p < .0001$), even though the HAM-A psychic scores did not differ between the two language groups (Spanish 11.24 ± 0.44, English 11.54 ± 1.0, $p = .73$). Driven by the effect of the somatic symptoms, the total HAM-A score also

TABLE 2 Associations of gender, race, and ethnicity with anxiety and somatic symptom scores

Scale	Gender	White (n = 156)	Black (n = 61)	Hispanic (n = 102)	Gender p value	Race/ethnicity p value	Gender-ethnicity interaction p value
HAM-A total	Female (n = 138)	15.7 ± 0.9	14.8 ± 1.3	19.4 ± 0.9	.10	<.001	.27
	Male (n = 181)	14.1 ± 0.7	15.0 ± 1.4	16.5 ± 1.3		White versus Black p = .25	
	Total (N = 319)	14.9 ± 0.6	14.9 ± 1.0	18.5 ± 0.7		White versus Hispanic p < .001	
						Black versus Hispanic p < .001	
HAM-A psychic subscale	Female (n = 138)	10.8 ± 0.5	10.4 ± 0.7	11.5 ± 0.5	.75	.15	.8
	Male (n = 181)	10.3 ± 0.5	10.4 ± 0.9	10.7 ± 0.8			
	Total (N = 319)	10.5 ± 0.3	10.4 ± 0.5	11.3 ± 0.4			
HAM-A somatic subscale	Female (n = 138)	3.4 ± 0.7	3.0 ± 0.9	6.1 ± 0.7	.07	<.001	.27
	Male (n = 181)	2.6 ± 0.5	3.0 ± 0.9	4.2 ± 0.8		White versus Black p = .79	
	Total (N = 319)	3.0 ± 0.4	3.0 ± 0.7	5.5 ± 0.5		White versus Hispanic p < .001	
						Black versus Hispanic p < 0.001	
HDRS-17 anxiety-somatization subscale	Female (n = 138)	6.1 ± 0.4	6.2 ± 0.5	6.9 ± 0.4	.37	.045	0.25
	Male (n = 181)	6.0 ± 0.4	5.9 ± 0.7	6.3 ± 0.6		White versus Black p = .98	
	Total (N = 319)	6.1 ± 0.3	6.1 ± 0.4	6.7 ± 0.3		White versus Hispanic p = .026	
						Black versus Hispanic p = .048	

Note: Bolded values represent, $p < .05$.
Abbreviations: HAM-A, Hamilton anxiety rating scale; HDRS-17, Hamilton depression rating scale.

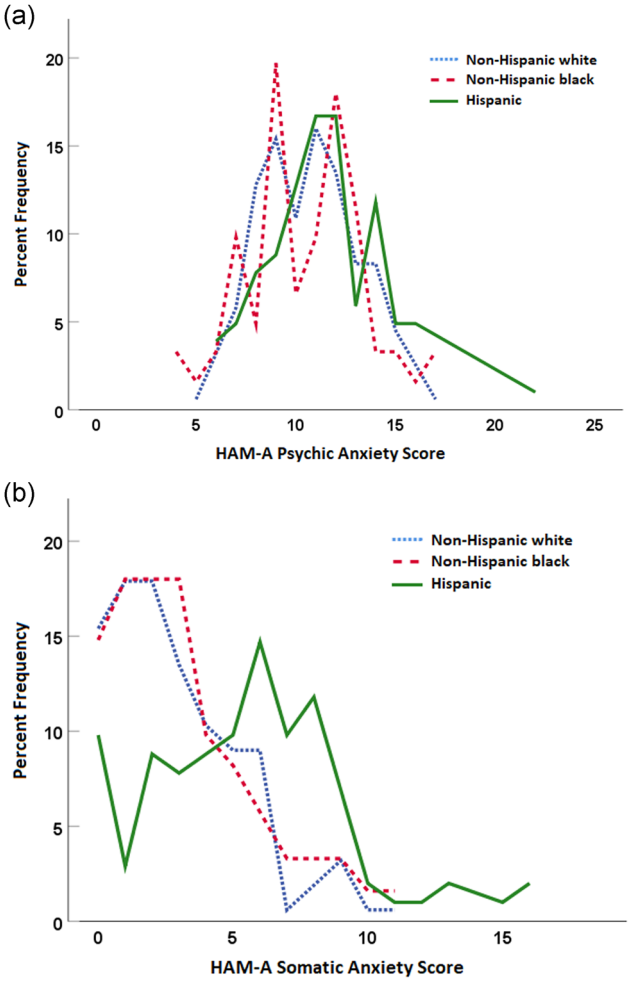

FIGURE 1 (a) Distribution of psychic anxiety symptom scores. (b) Distribution of somatic anxiety symptom scores. HAM-A, Hamilton anxiety rating scale

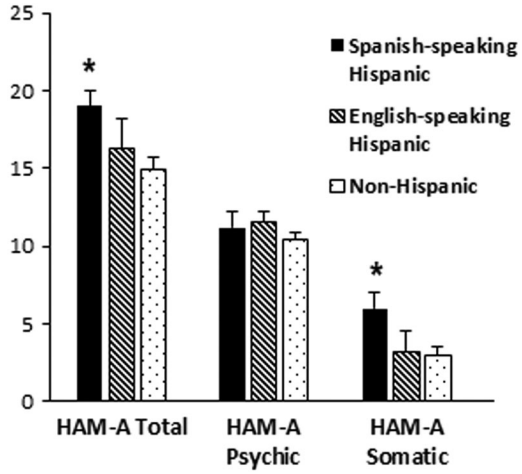

FIGURE 2 Language effects on psychic and somatic subscales of the Hamilton anxiety rating scale. *$p < .001$ for Spanish-speaking Hispanics versus non-Hispanics and english-speaking Hispanics. HAM-A, Hamilton anxiety rating scale

differed between the groups (Spanish 19.04 ± 0.83, English 16.34 ± 1.90, $p = .003$; Figure 2).

Level of education was also associated with HAM-A somatic subscale score (<high school education 7.05 ± 3.70, ≥high school education 3.37 ± 2.77, $t = 7.28$, $p < .001$). Because Hispanic patients were significantly more likely than non-Hispanic patients to have <high school education ($n = 36$ [35.3%] vs. $n = 1$ [0.5%] respectively, $p < .001$), we evaluated whether education confounded the association between ethnicity and somatic symptoms. With only one non-Hispanic patient with <high school education, a fully stratified analysis could not be performed, so we compared somatic symptoms among the subset of patients with ≥high school education. In this subset, the HAM-A somatic subscale was still significantly higher among Hispanic compared with non-Hispanic patients (4.65 ± 3.17 vs. 2.98 ± 2.52, $t = 3.92$, $p < .001$).

There were statistically significant, but weak, correlations between the HAM-A somatic symptom score and the CTQ total ($r = 0.20$, $p < .001$) and most CTQ subscale scores (emotional abuse: $r = 0.12$, $p = .024$; sexual abuse: $r = 0.12$, $p = .033$; emotional neglect: $r = 0.20$, $p < .001$; physical neglect: $r = 0.21$, $p < .001$; physical abuse: $r = 0.09$, $p = .093$). Analyses of interactions of gender and ethnicity on CTQ score produced no significant effects. To address the potential confounding introduced by the Hispanic patients having higher CTQ and HDRS scores, lower education, and greater frequency of unemployment, we performed another ANCOVA controlling for these factors. In this analysis, Hispanic participants still had significantly higher HAM-A somatic scores (omnibus $p = .001$, estimated marginal means for HAM-A somatic: White = 3.5, Black = 3.1, Hispanic = 4.7).

4 | DISCUSSION

This analysis of never-previously treated adults with MDD found that Hispanic ethnicity was associated with higher levels of somatic symptoms compared with non-Hispanic White and Black patients. Notably, psychic anxiety symptoms did not significantly differ between the groups, indicating that the somatic symptom differences were not attributable solely to higher levels of anxiety more broadly. Importantly, we found that the higher rate of somatic symptoms was only present in Spanish-speaking Hispanic patients; Hispanic patients who spoke English sufficiently well to complete the study using English showed rates of somatic symptoms that were very similar to the non-Hispanic English-speaking patients. Among the non-Hispanic sample, White and Black patients showed no differences in the level of somatic symptoms.

These results support some previous research findings that among U.S. Hispanics, language use predicts somatic symptom expression (Pina & Silverman, 2004; Ramos, 2005). It is likely that the higher endorsement of somatic symptoms among Spanish-speaking than English-speaking Hispanics arises from cultural effects, rather than from ethnicity in itself, a conclusion supported by prior qualitative research (Koss, 1990) and consistent with prior studies of acculturation on somatic symptom reporting (Bauer et al., 2012; Kirmayer & Sartorius, 2007). Given that roughly half of Hispanic

adults have limited English proficiency (U.S. Census Bureau, 2003), these findings have substantial importance for clinicians assessing Hispanic patients in primary care and psychiatric settings.

Across the entire sample, patients with anxiety disorders had greater HAM-A total and HAM-A psychic scores, but no difference in the HAM-A somatic scores. This difference may have arisen because patients with a primary diagnosis of an anxiety disorder highly associated with somatic symptoms, such as panic disorder, were excluded. There were only weak correlations between somatic symptoms and types of maltreatment experienced in childhood.

The higher level of somatic symptom reporting among Spanish-speaking Hispanics may reflect ethnomedical conceptualizations of suffering. Specifically, Hispanic cultures often make less strict distinctions than those of northern European descent between the mind and body, or between the boundary of the body and external forces, and may incorporate somatic complaints as metaphorical symbols of social and interpersonal distress (Koss, 1990). As aptly stated by Joan Koss, "there are cultural patterns of expressing distress in metaphoric somatic terms that may confound the ways unacculturated or traditional Hispanic peoples respond to diagnostic interview schedules" (Koss, 1990, p.12). Successful acquisition of English language usage may be associated with weakening of these more traditional Hispanic understandings of physical symptoms, producing the results observed in the current study, as well as those of earlier research (Escobar & Canino, 1989; Kolody, Vega, Meinhardt & Bensussen, 1986).

The greatest strength of this study was the inclusion of a sizable number of patients from minority racial and ethnic groups. Under-enrollment of minority populations in National Institutes of Health-funded research is a recurring problem, and failure to meet minority recruitment targets is common (Durant et al., 2007; Mak, Law, Alvidrez, & Pérez-Stable, 2007). The low levels of involvement of Hispanics in medical research is due, in part, to the lower level of English proficiency among these individuals (Suarez-Morales et al., 2007) and lack of inclusion of Spanish language assessments (Lau, Chang, & Okazaki, 2010). The need to better understand the mental health of Hispanics is becoming more acute, as over half the increase in the U.S. population from 2000 to 2010 was driven by growth in the Hispanic population, which now numbers over 50 million (U.S. Census Bureau, 2011).

Among the study's other strengths was the exclusion of patients with uncontrolled medical conditions, which substantially reduces the likelihood of confounding of the association between somatic symptoms and ethnicity by comorbid medical diseases (Aponte-Rivera et al., 2014). Indeed, in the screening phase of PReDICT, uncontrolled medical conditions were a significantly more common reason for exclusion for Spanish-speaking patients than for English-speaking patients (Aponte-Rivera et al., 2014). Prior studies evaluating somatic symptoms among patients presenting with depression in primary care settings may have been particularly vulnerable to this source of confounding (Brown et al., 1996). An additional strength was our adherence to multiple methodological recommendations for research with ethnic minorities, including the use of native language, validated structured interview guides in both languages, and bilingual assessors who conducted assessments at both the English- and Spanish-speaking clinics (Lau et al., 2010).

The primary limitation of this study is the lack of a scale specifically designed to assess somatic symptoms. Even though the somatic symptoms were drawn from the HAM-A, they were, however, not associated with anxiety disorders and showed a different distribution from the psychic anxiety symptoms. In addition, the somatic symptoms subsumed within the somatic subscale of the HAM-A overlap substantially with a set of 14 symptoms previously used to define a "somatization factor" in a Hispanic population (Canino et al., 1987). The HAM-A somatic subscale proved more sensitive than the anxiety-somatization subscale of the HDRS-17 in detecting differences across the groups; this may be due to the inclusion of several psychic anxiety symptoms in the HDRS-17 measure. A potential limitation is that Spanish and English-speaking patients were evaluated at separate sites, though the bilingual assessors worked at both sites and inter-rater reliability for the HAM-A was high. Furthermore, the number of English-speaking Hispanic patients was low relative to the number who spoke Spanish. Another limitation was the absence of a specific scale to assess acculturation, which could have allowed a quantitative analysis of the association between somatic symptoms and level of acculturation. Similarly, we did not have a measure of time lived in the United States, which also may have influenced the level of somatic symptom expression. We analyzed all Hispanics as a single group and lacked information on nation of origin that could have allowed for evaluation of potential cultural variations within the Hispanic sample. We were also unable to assess somatic symptoms in patients from other ethnicities or races due to their low representation in the sample.

Despite increasing insurance coverage, Hispanics continue to have lower rates of mental health treatment resource utilization and lower identification of MDD in primary care in part because they present primarily with physical symptoms (Hockenberry, Joski, Yarbrough, & Druss, 2019). It is important for clinicians to recognize that Hispanic patients' reports of numerous physical complaints beyond the vegetative somatic symptoms of MDD may be a manifestation of a major depressive episode, particularly if the patient demonstrates low acculturation to their country of residence (Tylee & Gandhi, 2005).

CONFLICT OF INTERESTS

B.W.D. has received research support from Acadia, Janssen, NIMH, and Takeda, and serves as a consultant to Myriad Neurosciences, Inc. (Mason, OH).

W.E.C. is a board member of Hugarheill ehf, an Icelandic company dedicated to the prevention of depression, receives book royalties from John Wiley & Sons (Hoboken, NJ), is supported by the Mary and John Brock Foundation and the Fuqua family foundations, is a consultant to the GeorgeWest Mental Health Foundation, a member of the scientific advisory board (SAB) of ADAA, and a member of the SAB for AIM for Mental Health Foundation.

H.S.M. has received consulting fees from St. Jude Medical Neuromodulation and intellectual property licensing fees from St. Jude Medical Neuromodulation.

C.B.N. has research grants from the NIH and is a stockholder in Xhale, Celgene, Seattle Genetics, Abbvie, OPKO Health, Inc., Antares, BI Gen Holdings, Inc., Corcept Therapeutics Pharmaceuticals Company, TC MSO, Inc., Trends in Pharma Development, LLC, and EMA Wellness. He serves on the Scientific Advisory Boards or Boards of Directors of the American Foundation for Suicide Prevention, Brain and Behavior Research Foundation (BBRF), Xhale Smart, Gratitude America, Anxiety Disorders Association of America, Skyland Trail, Signant Health, and Laureate Institute for Brain Research, Inc. CBN reports income sources or equity of $10,000 or more from American Psychiatric Publishing, Xhale, MagStim, Bracket (Clintara), Intracellular Therapeutics Inc., CME Outfitters, and EMA Wellness. In the past 3 years, he has performed consulting for Xhale, Takeda, Taisho Pharmaceutical Inc., Bracket (Clintara), Sunovion Pharmaceuticals Inc., Janssen Research & Development LLC, Magstim, Inc., Navitor Pharmaceuticals, Inc., TC MSO, Inc., Intracellular Therapies, Inc., EMA Wellness, Gerson Lehrman Group (GLG), and Acadia Pharmaceuticals. He has patents on the method and devices for transdermal delivery of lithium (US 6375990B1), the method of assessing antidepressant drug therapy via transport inhibition of monoamine neurotransmitters by ex vivo assay (US 7148027B2), and for the compounds, compositions, methods of synthesis, and methods of treatment (CRF Receptor Binding Ligand; US 8551996 B2).

All other authors report no financial relationships with commercial interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author.

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How to cite this article: Dunlop BW, Still S, LoParo D, et al. Somatic symptoms in treatment-naïve Hispanic and non-Hispanic patients with major depression. *Depress Anxiety*. 2019;1–10. https://doi.org/10.1002/da.22984