Perceived healthcare discrimination and well-being among older adults in the United States and Brazil

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ABSTRACT

Despite well-documented evidence illustrating the relationship between discrimination and health, less is known about the influence of unfair treatment when receiving medical care. Moreover, our current knowledge of cross-national and racial variations in healthcare discrimination is limited in aging populations. This article addresses these gaps using two harmonized data sets of aging populations to clarify the relationship between healthcare discrimination and health in the United States and Brazil. We use nationally representative, harmonized data from the Health and Retirement Study in the United States and the Brazilian Longitudinal Study of Aging to examine and compare perceived discrimination in the healthcare setting and its relationship to self-rated health, depression diagnosis, and depressive symptoms across national contexts. Using Poisson regression models and population attributable risk percent estimates, we found that aging adults reporting healthcare discrimination were at higher risk of poor self-rated health, diagnosed depression, and depressive symptoms. Our results also suggest that reducing perceived healthcare discrimination may contribute to improved self-rated health and mental well-being in later life across racialized societies. In two comparative settings, we highlight the differential impact of healthcare discrimination on self-rated health and depression. We describe the implications of our study's findings for national public health strategies focused on eliminating discrimination in the healthcare setting, particularly among aging countries.

1. Introduction

Like many other societies throughout the world, the United States (US) and Brazil both face rapidly aging populations and the challenges related to increased age and susceptibility to chronic and degenerative illnesses. Along with this epidemiologic transition comes additional strain on healthcare systems to better serve the preventive and disease-specific needs of these populations. In the US, the older adult population is projected to double, reaching almost 100 million by 2060 (Mather, Jacobsen, and Pollard 2015). Despite becoming an aging society only recently in 2012, Brazil is now undergoing the fastest demographic transition in the world, and projections suggest that Brazil's older population will nearly triple by 2050, reaching 29% of the total population (AARP, 2019; Lima-Costa et al., 2018; United Nations 2015).

As the US and Brazil age, both countries will contend with the consequences of large, racially diverse populations and vast racial disparities in morbidity and mortality. Both countries experience racial disparities in life expectancies, resulting in a higher life expectancy for White populations compared to their Black counterparts. Recent data from the 2010 census show that Afrodescendent individuals in Brazil are disadvantaged compared to their White counterparts when it comes to longevity, with an 8.5-year disparity in life expectancy for women (70.3 and 78.7 years, respectively) and a 9.3-year gap for men (63.2 and 72.5 years, respectively) (Chiavegatto Filho, Beltrán-Sánchez, & Kawachi, 2014). These patterns in mortality inequality persist in the United States, where the gap in life expectancy between White and Black Americans, between 2003 and 2008, was 5.4 years for men and 3.7 years for women (Harper, Rushani, & Kaufman, 2012). Access to and use of medical care are important mitigators of adverse health and impaired longevity (Kaplan & Arnold, 2019), especially when managing chronic diseases (Christopher et al., 2016; Hossain et al., 2013). Those who have a usual primary care provider and regularly engage in care have better mental and physical health (National Association of Community Health Centers and the Robert Graham Center, 2007). Despite the benefits of preventive

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healthcare utilization, frequent healthcare contact may also result in increased exposure to unfair treatment by providers or systems.

Discriminatory treatment in healthcare settings is a well-documented barrier to receiving medical care (Schwei et al., 2017; Trivedi & Ayanian, 2006). Individuals who perceive discrimination in the healthcare setting are less likely to have primary care doctors (Blanchard & Nicole Lurie, 2004), voluntarily receive treatment, and have good overall mental and physical health (Burgess et al., 2007; Hausmann et al., 2008). Given that later life may be marked by increased illness and chronic disease, factors that delay or deter care-seeking have the potential to be particularly harmful and to exacerbate disparities in health status among older adults.

Although the rapidly growing literature has established an adverse association between perceived discrimination and health, much prior research has focused on perceptions of discrimination based on either race or skin color among minoritized populations in the US (Lewis et al., 2015; Pascoe & Smart Richman, 2009). Furthermore, the literature regarding perceived discrimination and health outside the US context is still nascent. Cross-national comparisons have the potential to shed light on possible mechanisms of entrenched inequalities across societies. In the US, much existing research has focused on perceived racial/color-based discrimination among Black individuals; studies in Brazil show that perceptions of discrimination are much more likely to be attributed to class or socioeconomic status than race/color[1] (Dixon, 2019; Telles, 2014; Telles & Bailey, 2013). To date, we know less about 1) perceptions of discrimination in the healthcare setting; 2) older adults' perception of discriminatory treatment, despite their increased contact with the healthcare systems relative to younger adults; and 3) how perceptions of discrimination in the healthcare setting may specifically impact the well-being of older adults.

To address the aforementioned gaps in cross-national comparative literature focused on the relationship between discrimination and health in aging countries, we use nationally representative, harmonized data from the Health and Retirement Study in the United States (HRS-US) and the Brazilian Longitudinal Study of Aging (ELSI-Brazil) to examine perceived discrimination in the healthcare setting and its relationship to well-being among comparable populations of older adults. Our study is among the first to investigate perceived discrimination among similar populations using data sets intentionally harmonized for cross-national comparisons. We focus on two key indicators of well-being: self-rated health and depression, both of which strongly correlate with morbidity and mortality (Idler & Benyamini, 1997; Moussavi et al., 2007; Prince et al., 2007; WHO, 2021; Wong et al., 2005).

2. Background

The US and Brazil provide fruitful opportunities for cross-national comparisons of perceived discrimination, aging, and health equity for several reasons. First, both countries have large and increasingly aging, racially diverse populations. Among individuals in the US age 65 years and older, 77% were white, 9% were African-American, and 8% were Hispanic (of any racial identification) (The Administration of Community Living, 2018). Among Brazilians over the age of 60 years, 51.9% identified as White (*branco* in Portuguese), 38.7% as Brown/mixed race (*pardo*), and 7.9% as Black (*preto*) (Instituto Brasileiro de Geografia e Estatística, 2016). Therefore, as the US and Brazil age, ensuring the well-being of older individuals across racial lines will be a crucial challenge.

Second, the racial composition and stratification in these countries

represent a shared historical legacy of colonization, slavery, and marginalization of their indigenous and Afrodescendant populations. Although the US received over 300,000 enslaved persons during the transatlantic slave trade, estimates suggest Brazil may have received over 5 million, the most in the Americas (SlaveVoyages n.d.). The US abolished slavery in 1865; in contrast, in 1888, Brazil became the last country in the Americas to do so (Andrews, 2004). However, in the wake of abolition, the US and Brazil embarked on markedly different trajectories. After a brief period of reconstruction, the US legalized racial discrimination and segregation during the Jim Crow Era. Therefore, in the US, legal segregation maintained hardened racial lines after slavery. In contrast, Brazil's post-slavery era was marked by early attempts to "*whiten*" the population through mass immigration from Europe, which eventually gave way to the endorsement of a mixed-race society (Telles, 2004). In opposition to the overt racism found in the US, Brazil pursued the ideology of "*racial democracy*" (Freyre, 1933). Racial democracy purports that racial boundaries are blurry and thus that race itself is largely inconsequential while promoting the idea of a single, mixed Brazilian race (Telles, 2004). Despite the narrative of a single Brazilian race, the racial categories commonly used in Brazil are White, Brown, Black, Yellow (*amarela* in Portuguese), and Indigenous (*indígena*) (Telles, 2014). On the whole, however, in contrast to the US, where race is seen as the master status (Hughes, 1945), racial democracy explains Afrodescendant individuals' disadvantaged position in society as a consequence of class reproduction and class-based factors while rejecting the role of contemporary racial discrimination (see Telles, 2004).

Yet in both countries, stark racial disparities exist along many axes of health and socioeconomic inequality. There are racial gaps in earnings, educational attainment, income, occupational status, poverty, and unemployment (Flórez et al., 2001; Telles, 2014). Furthermore, both countries are marked by severe racial inequalities in health and mortality. In both countries, non-White individuals are more likely to suffer from chronic disease, die prematurely, have worse self-rated health, experience higher infant and child mortality rates, have low weight births, experience premature births, and have shorter life expectancies than White individuals (Lovell & Wood, 1998; Baciu, Negussie, Geller, Weinstein, & National Academies of Sciences Engineering, and Medicine, 2017; Oliveira et al., 2020; Telles, 2014; Wood, José, & Cláudia, 2010). These disparities persist among older non-White adults who have higher rates of negative health outcomes and chronic disease, including hypertension, diabetes, and stroke (Dunlop et al., 2002; Manuel, 2018; Rogers et al., 2015; Trujillo et al., 2009).

2.1. Importance of perceived discrimination on the health of aging populations

Despite longstanding racial disparities, scholars have struggled to pinpoint and remedy the sources and mechanisms that produce racial health inequities (Le Cook et al., 2009; Williams et al., 2019; Williams & Mohammed, 2009). However, given these similarities in systemic racialization across countries, examination of risk factors in one country may yield avenues of investigation in another. An increasing body of scholarship has examined the role of perceived discrimination in structuring health outcomes and previously unexplained health inequities in the US context. In contrast, investigations focused on perceived discrimination have been less common in the Brazilian context.

A robust body of research has demonstrated that perceived discrimination is associated with worse physical and mental health, including anxiety, depression, psychological distress, and cardiovascular disease (Borrell et al., 2006, 2010; Gee et al., 2008; Lewis et al., 2015). Discrimination may influence health outcomes through several pathways, such as differential access to resources (e.g., medical care), restricted social mobility, residential segregation, and other mechanisms of social and economic deprivation (Williams & Mohammed, 2009). Moreover, discrimination can also impact health through biological

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[1] The terms *race* and *color* are largely interchangeable in Brazil, where racial identification is relatively more fluid than in the U.S. In Brazil, phenotype, especially skin color, plays a prominent role in racial identification. This is in contrast to the U.S., where ancestry is a critical determinant (Dixon & Telles, 2017).

pathways (e.g., increased stress response) and health behaviors (Berger & Sarnyai, 2015; Brody et al., 2015; Goosby et al., 2018; Pascoe & Smart Richman, 2009). Among older adults, US-based studies have found that those who perceive everyday discrimination are more likely to report worse health outcomes, such as decreased mental and physical health, increased risk of new or worsened disability, increased mortality, and underutilization of preventive care services (Barnes et al., 2008; Rogers et al., 2015).

For older adults who require more frequent care associated with aging, perceived discrimination in the healthcare setting may introduce unique barriers to health and wellness. Less engagement with the healthcare system is one mechanism through which perceived discrimination may negatively influence health (Burgess et al., 2007). Perceiving discrimination may contribute to decreased provider visits (Facione & Facione, 2007) and reduced utilization of preventive healthcare services (Trivedi & Ayanian, 2006). Moreover, patient experiences of discrimination are associated with delays in filling prescriptions, treatment nonadherence, and varied treatment preference (Burgess et al., 2007; Casagrande et al., 2007; Progovac et al., 2020; Sonik et al., 2020). For example, Alcalá and Cook (2018) found that perceived racial or ethnic discrimination in healthcare in the US was associated with higher odds of delaying or forgoing medical care or prescriptions in the past 12 months. Still, the literature lacks insight on how these mechanisms may operate cross-nationally among older adults who typically have greater healthcare needs and more frequent contact with the healthcare system.

2.2. The present study

Our study advances the current literature by expanding previous investigations of discrimination to include cross-national healthcare contexts, which serve a critical function in the health of aging populations. Despite the significant focus on the detrimental impact of perceived discrimination from a racial and color-based lens, prior work has shown perceived discrimination is detrimental regardless of the sources of attribution (e.g., race/color, socioeconomic status, gender) and across racial groups (Lewis et al., 2015; Pascoe & Smart Richman, 2009; Schmitt et al., 2014; Williams & Mohammed, 2009). We advance the extant literature by examining perceived discrimination due to a broad range of attributes. Additionally, few studies have explored the proportion of adverse health outcomes that could be attributed to healthcare discrimination in comparative national settings. Our study utilizes population attributable risk percentages (PAR%s), which identify the proportional incidence of disease due to exposure, to determine the comparative influence of healthcare discrimination in each country. Despite its underutilization in disparities research, PAR%s may provide useful benefits in setting strategic national priorities because they yield easily interpretable results that quantify the harmful effects of discrimination exposure and highlight the potential benefits of preventive approaches (Cooper et al., 2016).

3. Data and methods

3.1. Data

Data for this study come from the Health and Retirement Study (HRS-US) for the US sample and the Brazilian Longitudinal Study of Aging (ELSI-Brazil) for the Brazilian sample. The HRS-US began in 1992 and has since surveyed a nationally representative sample of over 26000 Americans aged fifty years and older to understand the post-workforce health transitions of this aging population. New cohorts of individuals who have aged into HRS-US eligibility are added every six years. This study uses data from the 2016 wave to align with the available ELSI-Brazil data.

Questions regarding discrimination experiences were included in the HRS-US starting in 2008 in a section called the Psychosocial and

Lifestyle Questionnaire (Smith et al., 2013). The Psychosocial and Lifestyle Questionnaire was administered as a leave-behind, self-administered questionnaire to about 50% of the cohort in alternating waves. They were collected in each biennial wave from a rotating random sample of 50% of HRS-US participants who completed the in-person interview during that wave. Data were collected from the other half of the core participants in alternative waves. In the 2016 wave, the total number of respondents was 20912. Of the respondents in the 2016 wave, 20127 (96.2%) of them were aged 50 or over, the eligible ages for analysis. We excluded 14074 respondents who either were not survey for the discrimination question or were surveyed but did not answer the question. The HRS codebook does not distinguish between individuals who were not surveyed and those who did not respond, collectively labeling them as *Blank. INAP (Inapplicable); Partial Interview*. Therefore, we cannot differentiate between respondents with missing responses and those who were not surveyed. Of the 6053 respondents who answered the discrimination questions who were aged 50 or over, we further excluded 249 (4.1%) respondents whose racial identity was not non-Hispanic White, non-Hispanic Black, or Hispanic. For the remaining 5804 respondents, we used listwise deletion to address missing values for the remaining covariates which led to a final analytic sample of 5760 participants.

The ELSI-Brazil was conducted between 2015 and 2016 and surveyed a nationally representative sample of individuals ($n = 9412$) aged fifty years and older residing in seventy municipalities across the five major regions of Brazil (Lima-Costa et al., 2018). The analytic sample for this study included all ELSI-Brazil participants, excluding those with missing data on perceived discrimination in medical services or covariates. Twenty-nine (0.3%) of the respondents had missing values for the discrimination question. Among the 9383 respondents who answered the discrimination question, we excluded 309 (3.3%) respondents, whose racial identity was not White, Brown, or Black. For the remaining 9074 respondents, we used listwise deletion to address missing values for the remaining covariates which led to a final analytic sample of 8631 participants.

3.2. Measures

The primary exposure of interest is self-reported perceived healthcare discrimination. In the HRS-US, perceived healthcare discrimination was operationalized based on the following question in the Psychosocial and Lifestyle Questionnaire: "In your day-to-day life, how often have any of the following things happened to you? You receive poorer service or treatment than other people from doctors or hospitals." Participants could answer on a six-point frequency scale: "never," "less than once a year," "a few times a year," "a few times a month," "at least once a week," or "almost every day." We dichotomized responses based on whether they ever or never reported any healthcare discrimination. Respondents who were not surveyed about the discrimination question, as well as those with missing response, were coded as missing. In the ELSI-Brazil, perceived discrimination was based on the question: "In the past 12 months, have you felt a victim of any kind of discrimination when you sought medical services or healthcare?" Participants could answer either "Yes" or "No." Participants who did not answer were coded as missing.

3.3. Health outcomes

The primary outcomes of interest are three different health conditions, including (1) self-rated health, (2) depression diagnosis, (3) depressive symptoms. A single item assessed self-rated health in both study cohorts. For the HRS-US, participants were asked to rate their health as "excellent" (8.0%) "very good" (29.9%), "good" (35.1%), "fair" (21.1%), or "poor" (5.75%). We constructed poor health as a binary variable by combining the two bottom categories of "fair" or "poor" to indicate poor health. For the ELSI-Brazil, participants were asked, "In

general, how would you evaluate your health?" The response options were "very good or excellent" (6.5%), "good" (36.0%), "regular" (45.3%), "bad" (7.8%) or "very bad" (4.3%). In line with numerous prior studies using ELSI data, we dichotomized this variable by collapsing the top two categories ("very good or excellent" and "good") and the bottom three categories ("regular," "bad," and "very bad") (Castro et al., 2018; Castro, Lima-Costa et al., 2020; Castro, Vaz, et al., 2020; Fagundes, Amaral Júnior, Menegazzo, Hugo, & Giordani, 2022; Seixas, 2021; Seixas & Freitas, 2021).

We measured depression in two ways: depressive symptoms and depression diagnosis by a doctor. Depressive symptoms were assessed using an eight-item version of the Center for Epidemiologic Studies Depression Scale (CES-D), which is a well-validated scale (Steffick, 2000), in both study cohorts. Participants were asked to indicate (using a binary response of "yes" or "no") whether they had experienced depressive symptoms during the past week. Total scores ranged from zero to eight, with higher scores suggesting more depressive symptoms. We dichotomized scores based on an established and widely used cutoff (greater than or equal to four symptoms compared to less than four symptoms) that suggests clinically significant symptoms (Steffick, 2000). Depression diagnosis was self-reported with the following question: "Has a doctor ever told you that you have had problems with depression?" In both studies, participants' responses were recorded as "yes" or "no."

3.4. Covariates

To account for potential confounders, we included information about ethno-racial identification, socioeconomic status, educational attainment, marital status (married or cohabiting vs. single), age (continuous variable), and gender.

For racial identification in the HRS-US, participants self-reported their race as "White/Caucasian" or "Black/African American." Additionally, participants were asked to identify whether they were of Hispanic origin. For analytic purposes, we constructed the following racial categories: (a) non-Hispanic White, (b) non-Hispanic Black, and (c) Hispanic. For racial identification, ELSI-Brazil participants self-reported their racial identity according to one of the following categories: "White," "Black," "Brown," "Yellow (Asian)," or "Indigenous." Because of sample size limitations, we excluded the latter two groups from our analysis.

Socioeconomic status was operationalized using a measure of imputed household wealth quartiles in the HRS-US. For the ELSI-Brazil, following Braga et al. (2019), a household wealth indicator was constructed using principal components analysis (PCA) based on indicators of durable goods in the household (appliances and vehicles) and the employment of domestic service workers. Given that these are studies of aging populations, wealth is a more robust measure of social status than other common measures, such as income (Filmer & Pritchett, 2001), given the increased likelihood of retirement among this segment of the

Table 1
Weighted descriptive statistics.

US - Health and Retirement Study (HRS)				Brazil - The Brazilian Longitudinal Study of Aging (ELSI)			
	Overall	No perceived discrimination	Perceived discrimination		Overall	No perceived discrimination	Perceived discrimination
Perceived Discrimination	–	4681 (80.7%)	1079 (19.3%)	**Perceived Discrimination**	–	7671 (89.1%)	960 (10.9%)
Health Outcomes				**Health Outcomes**			
Poor Health	1548 (22.8%)	1167 (73.7%)	381 (26.3%)	Poor Health	4945 (55.9%)	4720 (86.3%)	675 (13.7%)
Depression Diagnosis	1398 (24.9%)	1048 (75.2%)	350 (24.8%)	Depression Diagnosis	1566 (18.5%)	1300 (83.0%)	266 (17.0%)
Depressive Symptoms	754 (11.6%)	520 (68.5%)	234 (31.5%)	Depressive Symptoms	2635 (33.4%)	2196 (83.2%)	439 (16.8%)
Racial Identity				**Racial Identity**			
White	3873 (82.6%)	3205 (81.7%)	668 (18.3%)	White	3543 (44.0%)	3205 (90.7)	338 (9.2%)
Hispanic	796 (8.3%)	647 (78.7%)	149 (21.3%)	Brown	4215 (46.0%)	3711 (88.1%)	504 (11.9%)
Black	1091 (9.0%)	829 (73.2%)	262 (26.8%)	Black	873 (10.0%)	755 (86.2%)	118 (13.8%)
Wealth				**Wealth**			
1st Quartile	1548 (21.0%)	1183 (74.9%)	365 (25.1%)	1st Quartile	2588 (26.7%)	2297 (88.6%)	291 (11.4%)
2nd Quartile	1575 (25.3%)	1290 (80.8%)	285 (19.2%)	2nd Quartile	2048 (23.0%)	1787 (87.9%)	261 (12.1%)
3rd Quartile	1390 (25.8%)	1157 (82.3%)	233 (17.7%)	3rd Quartile	2146 (26.0%)	1901 (88.8%)	245 (11.2%)
4th Quartile	1247 (27.9%)	1051 (83.4%)	196 (16.6%)	4th Quartile	1849 (24.3%)	1686 (91.0%)	163 (9.0%)
Education				**Education**			
Less than High School	964 (11.7%)	795 (82.5%)	169 (17.5%)	< 4 Years	2431 (24.1%)	2167 (88.9%)	264 (11.1%)
High School	1799 (29.2%)	1476 (81.5%)	323 (18.5%)	4–7 Years	3054 (36.2%)	2719 (89.3%)	335 (10.7%)
Some College	1461 (26.4%)	1166 (80.1%)	295 (19.9%)	8+ Years	3146 (39.6%)	2785 (89.0%)	361 (11.0%)
College or More	1536 (32.7%)	1244 (79.8%)	292 (20.2%)				
Demographics				**Demographics**			
Age, Mean (SD)	66.4 (10.1)	66.9 (10.2)	64.5 (9.3)	Age, Mean (SD)	62.4 (9.8)	62.5 (9.9)	61.5 (8.7)
Male	2333 (44.1%)	1896 (80.4%)	437 (19.6%)	Male	3763 (46.1%)	3360 (89.3%)	403 (10.7%)
Married/Cohabiting	3275 (62.6%)	2717 (82.8%)	558 (17.2%)	Married/Cohabiting	5016 (63.8%)	4473 (89.2%)	543 (10.8%)

population.

For educational attainment, in the HRS-US, we constructed a four-level categorical variable: (a) less than high school, (b) high school, (c) some college, and (d) college or more. Given the distribution of educational attainment in Brazil, we follow existing work focused on aging adults in Brazil (Braga et al., 2019) in constructing a three-level categorical variable based on self-reported years of educational attainment: (a) less than four years, (b) four to seven years, and (c) eight or more years.

3.5. Analytic plan

In Table 1, we present weighted descriptive statistics stratified by perceived discrimination for both the HRS-US and the ELSI-Brazil. Next, we display risk ratios (RRs) from modified Poisson regressions predicting the likelihood of reporting perceived healthcare discrimination in the HRS-US (Table 2) and the ELSI-Brazil (Table 3) to assess which individual characteristics are associated with reporting perceived healthcare discrimination. We use modified Poisson regressions instead of logistic regression because they are more readily interpretable (Gallis & Turner, 2019; Zou, 2004).

We then assess associations between perceived healthcare discrimination and individual health outcomes in the HRS-US (Table 4) and the ELSI-Brazil (Table 5). We adjusted all analyses for potential confounders (race, age, gender, household wealth, educational attainment, and cohabitation status). For all analyses, we report the RRs and standard errors.

Last, Table 6 presents population attributable risk percentages (PAR %s) to assess what percentage of the risk of reporting a particular disease could be attributed to reported perceived discrimination. PAR% estimates are population-level estimates that allow for estimation of the impact of exposures (Russell et al., 2011). These estimates can be more precisely understood as the percent of cases that could be prevented if

Table 2
Associations (RR) with perceived healthcare discrimination, among older adults in United States (HRS-US).

	(1) Perceived Discrimination
Racial Identity (ref. White)	
Black	1.237*
	(0.114)
Hispanic	1.085
	(0.136)
Wealth (ref. 1st Quartile)	
2nd Quartile	0.847
	(0.086)
3rd Quartile	0.802$^+$
	(0.091)
4th Quartile	0.756*
	(0.094)
Education (ref. < High School)	
High School	1.149
	(0.142)
Some College	1.220
	(0.158)
College or More	1.334*
	(0.183)
Demographic Covariates	
Age	0.981***
	(0.004)
Male	1.066
	(0.081)
Married/Cohabiting	0.775**
	(0.062)
Constant	0.714
	(0.205)
n	5760

Exponentiated coefficients; Standard errors in parentheses.
$^+$ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 3
Associations (RR) with perceived healthcare discrimination, among older adults in Brazil (ELSI-Brazil).

	(1) Perceived Discrimination
Racial Identity (ref. White)	
Black	1.449**
	(0.200)
Brown	1.236*
	(0.127)
Wealth (ref. 1st Quartile)	
2nd Quartile	1.084
	(0.109)
3rd Quartile	1.021
	(0.112)
4th Quartile	0.847
	(0.108)
Education (ref. < 4 Years)	
4–7 Years	0.998
	(0.106)
8 Years or More	1.038
	(0.118)
Demographic Covariates	
Age	0.991*
	(0.004)
Male	0.959
	(0.086)
Married/Cohabiting	0.982
	(0.086)
Constant	0.167***
	(0.052)
n	8631

Exponentiated coefficients; Standard errors in parentheses.
$^+$ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

the exposures were eliminated over a specific period of time, with causality between exposure and outcome as an underlying assumption (Rockhill et al., 1998). This measure considers both the prevalence of an exposure and the magnitude of an association to gauge the percent of an outcome that might be attributable to an exposure (Russell et al., 2011). Given our cross-sectional data, here, similar to Russell et al. (2011), we calculate overall and race-specific *pseudo*-PAR%s because of our inability to directly assess causality (Cooper et al., 2016). PAR%s are calculated using the formula below, where *pd* signifies the proportion of exposed cases and RR represents the risk ratio (Rockhill et al., 1998).

$$pd\left(\frac{RR-1}{RR}\right)$$

In this study, we use the RRs from our modified Poisson models in Tables 3 and 4 to calculate pseudo-PAR%s. Our PAR% estimates represent the excess cases of disease associated with perceived healthcare discrimination. In addition to country-level PAR%s, we also present race-specific PAR%s for each racial group (Cooper et al., 2016; Russell et al., 2011). The utility of PAR%s is that they provide an interpretable estimate of potential differences in the population-level impact of perceived healthcare discrimination that might otherwise be obscured when considering only RRs. To account for the complex survey design of both the HRS-US and the ELSI-Brazil, we used survey weights for all analysis.

4. Results

Table 1 presents the descriptive statistics for the HRS-US and the ELSI-Brazil. Overall, in the US, 19.3% of participants reported experiencing healthcare discrimination. A lower proportion of 10.9% of participants in Brazil reported experiencing healthcare discrimination. In the HRS-US, 22.8% of individuals have poor health, 24.9% depression diagnosis, and 11.6% depressive symptoms. In the ELSI-Brazil, 55.9% of individuals have poor health, 18.5% depression diagnosis, and 33.4%

Table 4
Associations (RR) between perceived healthcare discrimination and health, among older adults in United States (HRS-US).

	(1) Poor Health	(2) Depression Diagnosis	(3) Depression Symptoms
Perceived Healthcare Discrimination	1.441*** (0.095)	1.282***(0.088)	1.730***(0.172)
Racial Identity (ref. White)			
Black	1.094 (0.080)	0.685*** (0.061)	1.060 (0.121)
Hispanic	1.323*** (0.094)	0.855+ (0.077)	1.244+ (0.144)
Wealth (ref. 1st Quartile)			
2nd Quartile	0.796** (0.056)	0.872+ (0.066)	0.713** (0.085)
3rd Quartile	0.495*** (0.047)	0.655*** (0.060)	0.605*** (0.087)
4th Quartile	0.359*** (0.044)	0.554*** (0.060)	0.510*** (0.089)
Education (ref. < High School)			
High School	0.688*** (0.048)	0.891 (0.080)	0.711** (0.080)
Some College	0.561*** (0.046)	0.962 (0.090)	0.669*** (0.081)
College or More	0.383*** (0.041)	0.968 (0.099)	0.599*** (0.089)
Demographic Covariates			
Age	1.008** (0.003)	0.987*** (0.003)	0.991* (0.004)
Male	1.008 (0.061)	0.624*** (0.044)	0.716** (0.074)
Married/Cohabiting	0.969 (0.065)	0.811** (0.054)	0.616*** (0.066)
Constant	0.299*** (0.066)	1.095 (0.237)	0.524* (0.167)
n	5756	5758	5704

Exponentiated coefficients; Standard errors in parentheses.
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5
Associations (RR) between perceived healthcare discrimination and health, among older adults in Brazil (ELSI- Brazil).

	(1) Poor Health	(2) Depression Diagnosis	(3) Depression Symptoms
Perceived Healthcare Discrimination	1.277*** (0.040)	1.664*** (0.102)	1.602***(0.072)
Racial Identity (ref. White)			
Black	1.060 (0.039)	0.746** (0.075)	1.029 (0.075)
Brown	1.094** (0.031)	0.850** (0.048)	1.031 (0.052)
Wealth (ref. 1st Quartile)			
2nd Quartile	0.948 (0.039)	1.082 (0.079)	0.954 (0.054)
3rd Quartile	0.918** (0.027)	1.098 (0.103)	0.879* (0.057)
4th Quartile	0.737*** (0.033)	1.073 (0.098)	0.765*** (0.059)
Education (ref. < 4 Years)			
4–7 Years	1.029 (0.024)	1.023 (0.063)	0.950 (0.040)
8 Years or More	0.772*** (0.031)	0.880 (0.070)	0.724*** (0.044)
Demographic Covariates			
Age	0.999 (0.001)	0.989*** (0.003)	0.988*** (0.002)
Male	1.003 (0.027)	0.408*** (0.025)	0.592*** (0.021)
Married/Cohabiting	1.057* (0.025)	0.993 (0.071)	0.825*** (0.032)
Constant	0.642*** (0.064)	0.528** (0.115)	1.135 (0.164)
n	8612	8610	7631

Exponentiated coefficients; Standard errors in parentheses.
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

depressive symptoms.

In terms of racial identification, in the HRS-US, there was a majority of non-Hispanic White people (82.6%), followed by non-Hispanic Black people (9.0%) and Hispanic people (8.3%). In the ELSI-Brazil, the majority of the sample was Afrodescendant individuals (46.0% Brown and 10.0% Black), and White people constituted 44.0%. Perceived discrimination was more common among Black individuals in both countries (26.8% in the US and 13.8% in Brazil), followed by Hispanic individuals in the US (21.3%) and Brown individuals in Brazil (11.9%), as compared to White people in both countries (18.3% in the US and 9.2% in Brazil).

The average age of the HRS-US sample (66.4 years) was older than that of the ELSI-Brazil sample (62.4 years). In both samples, men represented slightly less than half of the respondents (44.1% in the HRS-US and 46.1% in the ELSI-Brazil), and over half of each sample was married or cohabiting (62.6% in the HRS-US and 63.8% in the ELSI-Brazil).

Table 2 displays the RRs of reporting perceived healthcare discrimination and sociodemographic characteristics from the HRS-US; Table 3 presents similar results from the ELSI-Brazil. The results show that, controlling for all other factors, Black individuals were significantly more likely than White individuals to report perceiving healthcare discrimination in both the US (RR: 1.24) and Brazil (RR: 1.45). In the US, Hispanic individuals did not significantly differ from White individuals. In Table 3 in Brazil, Brown participants were 1.24 times more likely to perceive healthcare discrimination than White participants.

Next, in Tables 4 and 5, we examine associations between perceived healthcare discrimination and health outcomes in the US and Brazil. Among the HRS-US participants (Table 4), perceived healthcare discrimination was significantly associated with increased risk of reporting poor self-rated health (RR: 1.44), diagnosed depression (RR: 1.28), and depressive symptoms (RR: 1.73) compared with those who

did not report healthcare discrimination after adjustment for age, gender, race, wealth, educational attainment, and cohabitation status (Table 4). ELSI-Brazil participants who reported healthcare discrimination also had significantly increased risk of reporting poor self-rated health (RR: 1.28), diagnosed depression (RR: 1.66), and depressive symptoms (RR: 1.60) than those who did not report perceiving healthcare discrimination after adjustment for relevant factors (Table 5). Therefore, the results show that perceived healthcare discrimination was associated with higher risk of poor health, diagnosed depression, and depressive symptoms across both countries.

Finally, Table 6 presents pseudo-PAR%s overall and by race for each country to examine the potential population-level impact of perceived discrimination on health outcomes. These percentages represent the excess prevalence of cases that might be mitigated if discrimination was eliminated, assuming causality. In the US, Column 1 reveals that 8.04% of cases of poor health in the overall sample are excess cases attributable to perceived discrimination. This means that an additional 8.04% of cases of poor health occur than would be expected if no one were to report perceived discrimination. For the overall sample, the estimate of excess depression diagnoses is 5.46%, and the estimate of excess depressive symptoms is 13.34%. In Brazil, Column 5 shows that the proportion of excess cases are 2.98%, 6.79%, and 6.33% for poor health, depression diagnosis, and depressive symptoms, respectively. Therefore, the proportion of excess cases of poor health and depressive symptoms are over twice as large in the US compared to Brazil, whereas the proportion of excess depression diagnoses are similar across countries.

Columns 2–4 and 6–8 present race-specific pseudo-PAR%s for the US and Brazil, based on associations between perceived discrimination and health outcomes. In the US, we see that the pseudo-PAR%s were higher for Black and Hispanic individuals than for White individuals. For example, the pseudo-PAR%s for depressive symptoms were 12.61%, 13.41%, and 16.78%, respectively, for White, Hispanic, and Black

Table 6
Pseudo-population attributable percentages by country and racial identification.

	US				Brazil			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	White	Hispanic	Black	Overall	White	Brown	Black
Poor Health	8.04	7.62	8.00	10.33	2.98	2.51	3.21	3.69
Depression Diagnosis	5.46	5.24	5.77	7.30	6.79	6.05	7.35	8.06
Depressive Symptoms	13.34	12.61	13.41	16.78	6.33	5.44	6.89	6.97

people. In Brazil, the variation between racial groups for pseudo-PAR% was considerably smaller, with rates of 5.44%, 6.89%, and 6.97% and for White, Brown, and Black people, respectively. We see the same general pattern for self-rated health and depression diagnosis. Across both societies, the PAR% estimates for White people were the lowest among all the racial groups, whereas Black people in both cases had the greatest proportion of excess cases attributable to perceived discrimination across all the outcomes. Given that the RRs for perceived discrimination do not vary among racial groups in either country, the observed variation in PAR%s represent disparities in the underlying prevalence of exposure to perceived discrimination across racial groups.

5. Discussion

This study is one of the first to examine perceptions of discrimination within the healthcare setting and their association with key health outcomes among racially diverse aging populations in the US and Brazil. Using nationally representative, harmonized data from aging populations, we conducted a cross-national comparison of the prevalence of perceived healthcare discrimination and its association with poor health, depression diagnosis, and depressive symptoms. We also estimated the percentage of cases that could potentially be eliminated if perceived discrimination could be eradicated in healthcare. As countries increasingly face rapidly aging populations, it is imperative to understand how aging individuals perceive their interaction with the healthcare system and how these perceptions may vary across racial lines.

The findings of this study represent several key contributions to the literature on perceived discrimination, aging, and health. First, we documented the prevalence of perceived healthcare discrimination among older adults in each society. We found that perceived healthcare discrimination is much more common in the US (19.3%) than in Brazil (10.9%). These results are similar to those of past research examining healthcare discrimination among older adults in the US (Rogers et al., 2015) and Brazil (Braga et al., 2019). However, few prior studies have differentiated rates of perceived discrimination between the US and Brazil across comparable populations. In one such study, Burgard et al. (2017) found higher rates of lifetime discrimination across various domains in Brazil compared to in the US when examining lifetime discrimination across race and gender groups. We build on this study by disaggregating discrimination in the healthcare context and including sample populations that are directly comparable because of the harmonized natures of the HRS-US and the ELSI-Brazil. Experiencing healthcare discrimination may not only influence health outcomes but also have potentially deleterious effects on the health of aging societies by influencing subsequent healthcare-seeking behaviors, perceptions of healthcare quality, and avoidance of the healthcare system altogether (Burgess et al., 2007; Hausmann et al., 2008). Practically, our findings affirm the growing need for future national public health strategies to eliminate healthcare discrimination.

Similar to the overall level of prevalence across racial groups, we descriptively find that across racial groups, aging adults in the US are almost twice as likely as those in Brazil to report healthcare discrimination. The finding that White people in both countries are the least likely to report discrimination, followed by those who identify as Brown, Hispanic, or Black, is largely consistent with prior findings among adult

populations of all ages (Bastos et al., 2014; Bleich et al., 2019; Findling et al., 2019; Macinko et al., 2012). However, after adjusting for demographic covariates, we find that in the US, only Black individuals are significantly more likely to report discrimination than White individuals. In contrast, in Brazil, the racial disparity remains among Black and Brown individuals, who are 45% and 24% more likely, respectively, to report healthcare discrimination than White Brazilians. These cross-national patterns remained after we examined the pseudo-PAR%s to estimate the percentage of excess cases of poor health, depressive symptoms, and depressive diagnosis that might be avoided if perceived discrimination were eliminated from the healthcare system. Moreover, PAR% estimates are markedly higher in the US than in Brazil for poor health and depressive symptoms. In contrast, percentages are similar for depression diagnoses across the two countries. Therefore, although the estimated RRs associated with perceived discrimination and health outcomes do not vary by race, the real-world implications of this association do vary because non-White groups are exposed to more discrimination than White groups.

Our findings related to racial patterns of the perceptions of healthcare discrimination are of particular interest because in this study, we do not distinguish among attributes, such as race or color, associated with participants' experiences. Past research suggests that perceptions of discrimination based on race/color are relatively lower in Brazil than in the US (Telles & Bailey, 2013). This may be because in Brazil, perceived discrimination is often not attributed to race in line with the ideology of racial democracy. In the US context, however, racial discrimination is often the most commonly reported axis of discrimination for Black individuals. A national survey conducted in Brazil in 2013 regarding perceived discrimination in health services found that only 1.4% of respondents reported discrimination based on race or color (Boccolini et al., 2016). Instead, factors associated with socioeconomic status, including lack of money, social class, and occupation, were more commonly deemed the source of discrimination (Boccolini et al., 2016). The importance given to class or social status over race/color mirrors findings from earlier studies in Brazil (Gouveia et al., 2005). However, in Brazil, race/color, and socioeconomic status are tightly correlated (Telles, 2014). Therefore, it is difficult to disentangle race and color factors, particularly when perceiving discrimination (Dixon, 2019). Our results suggest that racial identification is predictive of perceiving healthcare discrimination, despite not explicitly querying regarding the specific attribute toward which discrimination occurs. Future work should investigate whether the attribution of discrimination matters for older adults and whether there are varied strategies for addressing perceived discrimination along various lines.

Our second key finding was that across countries, aging adults reporting healthcare discrimination were at higher risk of poor self-rated health, diagnosed depression, and depressive symptoms. Among aging populations, depression is estimated to contribute to 5.7% of years lost to disability (WHO, 2017), and poor health is a well-established predictor of morbidity and mortality (Idler & Benyamini, 1997). In countries like the US and Brazil, with growing older populations and an expected increase in chronic conditions, understanding risk factors that may disrupt healthy aging is critically important. Coupled with the increased healthcare utilization burden of older individuals, the influence of healthcare discrimination in the US and Brazil may also yield

compounded chronic disease burden and multi-morbidity in aging societies. To adequately cater to the growing healthcare needs of aging populations, addressing healthcare discrimination can remedy anticipated healthcare burden to improve the care and quality of life for all older Americans and Brazilians.

A vital contribution of this study is to clearly and interpretably present one measurable assessment of the potential returns to the health of aging population from broad efforts to close racial health inequity and other inequity in society. These efforts might materialize through concentrated efforts to mitigate perceived discrimination in the healthcare setting. Additionally, the calculation of race-specific PAR%s guides our understanding that different prevalence levels may yield different consequences on racial groups. Consequently, our study clarifies that perceptions of discrimination in healthcare settings, even absent assignment to an explicit racial/color-based attribution, can have important implications for efforts to achieve racial health equity.

The findings of this study must be considered within the context of several limitations. Given the cross-sectional nature of this study, we are unable to assess causality. However, prior longitudinal studies have established that perceived discrimination is causally associated with poor health and depression (Schulz et al., 2006). Future studies using longitudinal data examining perceived healthcare discrimination and aging will allow for examining the causal links and directionality of these associations. Although there are multiple waves of the HRS-US, only the first wave of ELSI-Brazil has been released and was included in our study. Additional longitudinal waves of the ELSI-Brazil data set are forthcoming, which would allow future research to extend this investigation beyond our cross-sectional approach. Additionally, although our HRS-US and ELSI-Brazil data sets were intentionally harmonized, differences in the timeframe referenced in the question and in response options for the healthcare discrimination question (e.g., the ELSI-Brazil's "in the past 12 months" vs. the HRS-US's "In your day-to-day life") may contribute to fewer reports of discrimination in the Brazilian context observed in this study.

Another limitation of this study is its reliance on self-reports of depression diagnosis. Given that perceived discrimination is associated with avoiding or delaying seeking healthcare (Burgess et al., 2008), those who perceive discrimination may be less likely to receive a diagnosis because they may have fewer points of interaction with the healthcare system. However, our inclusion of depressive symptoms as assessed using the CES-D finds a similar overall pattern of association, although with different magnitudes, which mitigates concerns about self-reported depression diagnoses. Additionally evidence suggests that individuals may be reluctant to report discrimination because it may reduce one's sense of locus of self-control, resulting in minimization or avoidance of naming the experience altogether (Lewis et al., 2015). Therefore, we anticipate a conservative account of the true level of healthcare discrimination that could be potentially mitigated through national public health strategies. Future research should focus on disentangling salient attributes of healthcare discrimination and addressing potential biases identified by self-report, with a focus on sensitive periods in the lifecourse during which healthcare discrimination is particularly detrimental to healthcare utilization, such as late adulthood.

An additional limitation of our study focuses on the validity of the self-rated health measures used in both country contexts. Although self-rated health is considered to be one of the most commonly used measures in public health, there may have been differences in the interpretation and meaning of the word "health" across respondents in the United States and Brazil. These country settings may have varying definitions in different contexts, cultures, and categories that may influence the perceptions and rating of overall health (Jylhä, 2009). Yet, despite the possibility of variability in self-rated health measurement across countries, the measure is known to show strong effectiveness in predicting future mortality (Dowd & Anna, 2007).

Despite these limitations, this study is among the first to use harmonized nationally representative data on older adults in the US and Brazil to document the prevalence, health associations, and contributions to well-being of perceived discrimination in the healthcare setting. Moreover, our study provides further insight regarding the impact of addressing unfair treatment in the healthcare setting to quantify the magnitude of the potential return to societies from mitigating or eliminating perceptions of healthcare discrimination. Rapidly aging societies will require diverse strategies to address the impending increases in chronic conditions and multi-morbidity. Therefore, our investigation of the importance of perceived healthcare discrimination as an underexplored risk factor for poor health and depression for older adults has important implications for future scholarship and policy approaches across multiple national contexts.

Declaration of competing interest

The authors declare that they have no competing interests for this study.

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