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The Paradox of Perceived Discrimination in Later Life: Evidence from a Nationally Representative Study in Brazil

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Abstract

Background: Perceived discrimination is a social determinant of health associated with poorer physical and mental outcomes, reflecting structural inequalities that manifest intersectionally through age, gender, race, and social class. This study analyzed variations in perceived discrimination across age groups among Brazilian adults and older adults (≥50 years), using data from the Brazilian Longitudinal Study of Aging (ELSI-Brazil, 2019–2021).

Methods: This is a cross-sectional, population-based study with probabilistic sampling and national representativeness. Perceived discrimination was measured using five items from the Everyday Discrimination Scale (EDS). Given the high proportion of zero counts (77.2%) and data overdispersion, a Zero-Inflated Negative Binomial (ZINB) model with robust variance was applied to estimate Incidence Rate Ratios (IRR), accounting for the complex survey design.

Results:The Wald F test indicated significant differences across age groups (p=0.012), with the highest mean observed among participants aged 50–59 years (1.16; 95% CI: 0.87–1.45) and the lowest among those aged 80 years or older (0.69; 95% CI: 0.45–0.93). The ZINB model confirmed the adequacy of the approach (alpha: p<0.001; zero-inflation term: p<0.001). In the count process, age was a significant predictor: individuals aged 80 years or older had a 20% lower expected discrimination rate (IRR = 0.80; 95% CI: 0.67–0.97) compared to those aged 50–59 years.

Conclusions: These findings support the "Paradox of Perceived Discrimination", indicating that reports of unfair treatment tend to decline with advancing age despite increased objective vulnerability. This trend potentially reflects psychosocial self-protection mechanisms and internalized age-related beliefs, suggesting the need for intersectional approaches in health policies.

Background

The guarantee of health as a fundamental human right underpins universal health systems worldwide. International organizations, such as the World Health Organization (WHO), advocate for the construction of systems that ensure comprehensive, universal, and equitable access to services, with Primary Health Care (PHC) as the central axis for equity [1]. In Brazil, this ideal is embodied in the Unified Health System (SUS), which, founded on the principles of universality, comprehensiveness, and equity [2], reflects the commitment enshrined in the 1988 Federal Constitution [2].

However, the achievement of equity is constantly challenged by the structural inequities that permeate society [3]. Opportunities to live healthily are directly influenced by the Social Determinants of Health (SDH), according to the model proposed by the WHO, which considers the complex interaction between structural and intermediary factors [4]. SDH, such as income, schooling, gender, race, and territory, directly influence health outcomes, revealing persistent inequalities. For example, the chronic stress generated by adverse socioeconomic conditions and low control over life (psychosocial factors) are associated

with negative health outcomes, such as increased prevalence of mental disorders and chronic diseases [5]. Understanding how these determinants operate is crucial, and in this scenario, perceived discrimination emerges as a fundamental SDH.

Perceived discrimination is defined as subjective experiences of unfair treatment in everyday situations. This chronic exposure to psychosocial stress, often measured by general instruments such as the Everyday Discrimination Scale, can predict adverse health outcomes, regardless of access to services [6]. Chronic exposure to discriminatory events, even those of low intensity and frequency, has been associated with negative outcomes for physical and mental health, acting as a persistent psychosocial stressor [7]. Evidence indicates that experiences of prejudice related to age (ageism), gender, race/color, and socioeconomic status negatively affect health, reinforcing inequities in the social system [8]. It cannot be viewed merely as an individual event, but as a reflection of structural inequalities, where factors such as race/color, social class, and gender directly influence the experiences of unfair treatment [9]. Discrimination, in its various forms, constitutes a socially structured phenomenon that affects both individual and institutional experiences, and its analysis is fundamental for guiding actions aimed at equity [10].

The transition to old age intensifies exposure to the Social Determinants of Health (SDH), and in this context, perceived discrimination assumes an even more critical dimension. The older population is not homogenous: aging is a heterogeneous process, where chronological age intersects with factors such as race/color, socioeconomic status, gender, and culture, creating a complex web of intersectionality, adopted here as an interpretative lens, that shapes individual vulnerabilities [11]. Thus, the way discrimination is experienced and reported can vary significantly throughout later life, reflecting both social structures and cultural patterns that define the value of the individual [12, 13]. Analyzing this variation is crucial, as it may reveal that the most acute inequities are not due to age alone, but rather to the intersection of multiple social stigmas.

Therefore, the present study aims to analyze the variation in the perception of general discrimination by specific age groups in the adult and older Brazilian population, in order to contribute to the understanding of the inequities that affect this population.

Methodology

This is a cross-sectional, population-based study, developed from a secondary analysis of data from the Brazilian Longitudinal Study of Aging (ELSI-Brasil), conducted between 2019 and 2021 in 70 municipalities across all regions of the country [14]. Individuals aged 50 years or older were included, selected through a multi-stage probabilistic sampling process, ensuring national and regional representativeness [14]. For this study, only participants who responded to the module related to perceived discrimination were considered.

The ELSI-Brasil sample was specifically designed to represent the non-institutionalized Brazilian population aged 50 years or older [14]. The complex sampling design was executed in multiple stages: in the first three strata of municipalities, selection occurred in three stages (municipalities, census tracts, and households), while in the fourth stratum (large municipalities), two stages were considered (census tracts and households). All residents aged 50 years or older found in the selected households were eligible, totaling approximately 10,000 participants. Calibrated sample weights were applied to ensure valid estimates for the Brazilian population [14].

Data were collected through in-person household interviews using standardized and structured questionnaires administered by trained interviewers [14]. Among the information collected were demographic and socioeconomic characteristics, health conditions, and the experiences of perceived discrimination in daily life [14].

The dependent variable was perceived discrimination, measured using five items from the Everyday Discrimination Scale (EDS), adapted in Brazil as the Escala de Discriminação no Dia a Dia (EDD) [6]. This instrument assesses the frequency of unfair treatment experiences in everyday situations.

The score was calculated by summing the five questionnaire items that capture how often participants felt they had been treated unfairly or disrespectfully in social contexts. The items included in the scale were:

a. Being treated with less kindness or courtesy than other people;
b. Being treated with less respect or receiving poorer quality service;
c. People acting as if they think you are not intelligent;
d. People acting as if they are afraid of you;
e. Being threatened or harassed.

The original response options for each item ranged from 0 to 5. The lowest value, 0, corresponded to “never,” indicating the absence of perceived discrimination. The subsequent categories represented increasing frequencies of discriminatory experiences: 1 = less than once a year, 2 = a few times a year, 3 = a few times a month, 4 = once a week, and 5 = almost every day.

The final score was obtained by summing these item values, generating a continuous discrete scale ranging from 0 to 25, in which higher scores indicate a greater perception of unfair treatment. The EDS has been validated and shown to be psychometrically robust in Brazil [15], supporting its application in nationally representative samples such as ELSI-Brasil. Although the measurement invariance of the EDS has been confirmed for certain social groups, studies conducted in the United States highlight the need for caution when comparing mean scores across age groups [16].

The independent variable of interest was age group, originally recorded in the ELSI-Brasil dataset as the participant’s exact age in full years. This variable was categorized into four groups, following

methodological and epidemiological practices commonly applied in ELSI-Brasil analyses: 50–59 years, 60–69 years, 70–79 years, and 80 years or older [14]. This categorization is essential for capturing specific health and functional transitions that occur across different stages of aging, from midlife to advanced old age. Covariates included in the adjustment set were race/color, sex, and household income, all treated as control variables in the subsequent regression models.

Statistical analyses were conducted using Stata software, version 19.5, accounting for the complex survey design through the svy prefix. To obtain adjusted estimates of standard errors and confidence intervals, the Taylor linearization method (vce(linearized)) was applied, which is appropriate for survey data with complex sampling structures [17].

The analysis of mean discrimination scores across age groups was performed using Analysis of Variance (ANOVA) adjusted for complex survey data, implemented through the Wald F-test (Adjusted Wald Test), as it correctly accounts for the survey design features and provides robust variance estimates [18]. This decision was supported by the asymptotic robustness of the F-test, which given the large sample size is less sensitive to deviations from normality than to violations of homoscedasticity or independence of errors [19, 20]. The variance correction provided by the Taylor linearization method ensures statistical adjustment for the lack of independence among sample observations [17] and mitigates the effects of the complex sampling design [18], thus maintaining the validity of the inferential results. When the global test indicated a statistically significant difference ($p < 0.05$), pairwise comparisons based on the Wald test were conducted to identify which age groups differed significantly from one another [18]. All analyses adopted a 5% significance level.

The distribution of the discrimination score exhibited a high prevalence of zeros (77.2%) and significant overdispersion. Consequently, a Zero-Inflated Negative Binomial (ZINB) regression model with robust variance estimation was employed, given the non-random nature of the excess zeros and the complex sample design of the survey [21,22]. The ZINB model estimates two latent processes simultaneously: 1. a logistic component for the probability of *structural zeros* (never experiencing discrimination), and 2. a negative binomial count component for the intensity of discrimination among those susceptible. The ZINB approach was essential due to the high fraction of zero counts and the statistically significant overdispersion. The model was implemented using the full specification, incorporating all covariates in both the Count and the Zero-Inflated components, and all analyses accounted for the complex sample design through the *svy* prefix in Stata (StataCorp LLC, College Station, TX, USA). The primary hypothesis test focused on the main independent variable, age, using the 50–59 years group as the reference category. The primary outcome measure was the Incidence Rate Ratio (IRR) obtained from the Count Process.

Model adequacy was assessed by examining the significance of the overdispersion parameter (alpha) and the intercept of the inflate block, confirming the statistical necessity of the ZINB approach over standard Poisson or Negative Binomial models. Furthermore, the Zero-Inflated component was specifically used to evaluate whether age and the control variables were significant predictors of

structural zero status. For this process, the coefficients and respective 95% confidence intervals were exponentiated to report the appropriate Odds Ratios (OR).

The ELSI-Brasil study was approved by the Ethics Committee of the Fundação Oswaldo Cruz - Minas Gerais. (CAAE: 34649814.3.0000.5091).

Results

The weighted analysis of the sample revealed that the final sample comprised 9,564 individuals aged 50 years or older. The descriptive distribution of the discrimination items showed that the most frequently reported situation was *"being treated with less courtesy"*, reported by 14.8% of the sample, followed by *"people acting as if the respondent was not smart"* (13.4%). Situations involving fear or threats were less common, reported by approximately 5.5% and 6.1% of the sample, respectively. The overall mean discrimination score in the studied population was 1.03 (SD = 2.52) (Table 1).

Table 1
Prevalence of specific discrimination items and descriptive characteristics of the Everyday Discrimination Scale (EDS) among Brazilian adults and older adults (ELSI-Brazil, 2019–2021).

Variable	**Prevalence of "Ever Experienced"a % (95% CI)**
Individual Items Treated with less courtesy	14.76 (13.2–16.5)
People acted as if not smart	13.43 (12.0–15.0)
Received poorer service	9.59 (8.4–10.9)
Felt threatened or harassed	6.07 (5.1–7.2)
People acted as if afraid	5.46 (4.6–6.5)
Overall Discrimination Score	22.78 (20.9–24.8)
Age Distribution – Proportion (%)	
50–59 years	47.2
60–69 years	29.1
70–79 years	16.2
80 years or older	7.5
Notes: SD = Standard Deviation. Estimates calculated using complex survey weights. a Percentage of individuals who reported a frequency other than "Never" (Score ≥ 1).	

The analysis of mean discrimination scores across age groups indicated a statistically significant difference (p = 0.012). The mean discrimination scores ranged from 1.16 in the 50–59 years group to 0.69 among individuals aged 80 years or older. The post-hoc tests revealed that the oldest-old group

presented the lowest mean score of perceived discrimination, which was significantly lower than that of the 50–59-year group (p = 0.002), as detailed in Table 2.

Table 2
Comparison of mean perceived discrimination scores stratified by age group (ELSI-Brazil, 2019–2021).

Age GroupMean Score	**IC 95%**	**p-value**
50–59 years. 1.16	0.87–1.45	Ref.
60–69 years0,91	0.69–1.12	0.013 c
70–79 years1.03	0.70–1.37	0.398 c
80 years or older0.69	0.45–0.93	0.002 c
Notes: Results based on linearized variance estimation (*svy: mean*).		
c P-value for the pairwise comparison against the reference group (50–59 years).		

The count outcome data, characterized by a substantial fraction of 77.2% zero observations, necessitated the implementation of the Zero-Inflated Negative Binomial (ZINB) model within a complex survey design framework. Statistical assessment of the ZINB model confirmed its necessity: the dispersion parameter (alpha) was significantly different from zero ($F(1,269) = 20.59$; $p < 0.001$), confirming overdispersion, and the intercept of the 'inflate' block was highly significant ($F(1,269) = 63.03$; $p < 0.001$), validating the presence of excess structural zeros and the superiority of the ZINB over simpler Negative Binomial or Poisson models.

In the ZINB's count process, which estimates the rate of events among the susceptible population, age emerged as a significant predictor only for the oldest age group. After adjustment for sociodemographic factors, individuals aged 80 years or older had a 20% lower expected rate of discrimination when compared to the reference group (Adjusted IRR = 0.80; 95% CI: 0.67–0.97; p = 0.021) (Table 3). No significant differences in intensity were observed for the 60–69 and 70–79-year groups in comparison to the 50–59-year group. Conversely, within the Zero-Inflated Process ('inflate' block), age, sex, and income were not statistically significant predictors, suggesting that the factors driving the distinction between structural zeros and sampling zeros remain unaccounted for by the included sociodemographic covariates.

Table 3
Association between age and the intensity of perceived discrimination: Incidence Rate Ratios (IRR) estimated by the Zero-Inflated Negative Binomial (ZINB) model.

Age Group	Crude Analysis IRR (95% CI)	Adjusted Analysis d IRR (95% CI)	P-value (Adjusted)
50–59 years	1.00 (Reference)	1.00 (Reference)	
60–69 years	0.88 (0.77–0.99)	0.89 (0.78–1.01)	0.060
70–79 years	1.02 (0.84–1.23)	1.01 (0.84–1.21)	0.951
80 years or older	0.79 (0.65–0.96)	0.80 (0.67–0.97)	0.021
Notes: IRR = Incidence Rate Ratio; 95% CI = 95% Confidence Interval.			
d Adjusted for sex, self-reported race/colour, and household income.			
Model Diagnostics:			
• Dispersion test (alpha): $p < 0.001$			
• Zero-inflation test: $p < 0.001$			

Discussion

This population-based study found a significant prevalence of perceived discrimination in daily life, with variation across age groups: younger individuals (50–59 years) reported higher levels of discrimination, whereas those aged 80 years and older presented the lowest mean scores. The use of the *Everyday Discrimination Scale* (EDS) reinforces the need to interpret these findings through the lens of intersectionality, which recognizes how different axes of marginalization (age, race, and social class) intersect to shape inequitable experiences [23].

The higher report of perceived discrimination among the 50–59 age group suggests that the main source of inequity for this cohort stems from the intersection of social vulnerabilities, rather than chronological age alone. At this life stage, individuals are often more socially active but also more exposed to stigmas related to socioeconomic and class conditions. The chronic stress captured by the EDS (e.g., “receiving poorer quality service” or “being treated with less respect”) may reflect financial insecurity and dependency on public services. This group, in transition between adulthood and old age, tends to be more vigilant and sensitive to signs of stigma, which amplifies the perception of unfair treatment[24]. Thus, the greater perception of inequity in this cohort is linked to the intersection of class markers and early aging [23].

In contrast, the finding that the group aged 80 years or older showed the lowest mean of perceived discrimination reflects the *Paradox of Perceived Discrimination in Older Adults* [25]. This paradox suggests

that the perception of discrimination decreases with advancing age, despite increased vulnerability and exposure to ageism. Although not directly assessed in our data, the literature suggests that the central mechanism behind this discrepancy lies in cognitive self-protective strategies that preserve self-esteem [26].

Self-directed ageism was primarily determined by the mental and physical health status of older adults. This finding suggests the bidirectional nature of the association between self-directed ageism and health. Little is known about the processes that connect age stereotypes to self-stereotypes, especially regarding how negative stereotypes widely present in society become self-directed ageism through their self-relevance.

This internalization of negative stereotypes may influence not only self-image but also how older individuals perceive, or fail to perceive situations of discrimination, shaping their interpretation of events and their positioning in relation to age-related inequalities[27].

For the oldest adults, avoiding attributing negative treatment to ageism may function as a defense mechanism that helps maintain a positive self-image [28]. Older individuals may dissociate themselves from the stereotype of frailty [14], which prevents them from identifying as legitimate targets of discrimination. Alternatively, they may readjust their standards of evaluation through downward social comparison (with peers in worse health conditions), leading to lower feelings of injustice and the maintenance of subjective well-being [29]. Therefore, the lower discrimination score observed among the 80 + group does not indicate the absence of inequity, but rather the effectiveness of psychosocial mechanisms in mitigating the perception of injustice.

The main strength of this study lies in the use of data from ELSI-Brazil, a nationally representative, population-based longitudinal study. The core finding of the study reveals that perceived discrimination functions as a complex social stressor whose intensity and nature vary according to the stage of aging. The primary methodological contribution of this study is the application of the Zero-Inflated Negative Binomial (ZINB) model within a complex survey design framework. The substantial proportion of 75% zero counts and the observed overdispersion rendered simpler models, such as Poisson or standard Negative Binomial regression, inappropriate, as they would yield underestimated standard errors and inflated conclusions. Second, the use of the Wald F Test (adjusted ANOVA) and Taylor Linearization ensures robust estimates when handling the complex sampling design [17,18].

However, the cross-sectional nature of this analysis prevents causal inference. Additionally, because the discrimination variable is subjective, it may be affected by recall bias, and as psychometric research suggests [16], the potential lack of full scalar invariance of the EDS across age groups requires caution when interpreting mean differences although robust statistical procedures were applied. Finally, despite age being a significant predictor in the Count Process, its lack of significance in the Zero-Inflated block (non-significant ORs) indicates that age and the adjusting covariates (race, sex, and income) do not effectively differentiate between structural zeros and sampling zeros. In other words, these factors are

poor predictors of the outcome status. This limitation suggests that membership in the 'structural zero' group may be driven by unmeasured confounders or latent factors, which operate independently of sociodemographic variables.

Conclusion

This study demonstrated that perceived discrimination is a significant phenomenon among Brazilian adults and older adults, showing distinct variations across age groups. The central finding the *Paradox of Perceived Discrimination* indicates that younger individuals (50–59 years) reported the highest levels of discrimination, while the oldest group (80 + years) presented the lowest means. Thus, perceived discrimination operates as a social determinant of health in a complex and nonlinear way throughout the aging process.

It is essential that public policies, healthcare systems and researchers adopt an intersectional approach, to investigate and address health and social inequities, acknowledging that experiences of unfair treatment are not solely age-related. This analytical lens is crucial for informing more effective and targeted social and health policies and combating multiple forms of stigma.

Declarations

Ethics approval and consent to participate: The ELSI-Brazil study was approved by the Research Ethics Committee of the Fundação Oswaldo Cruz (Fiocruz-Minas) (CAAE: 34649814.3.0000.5091). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments. Written informed consent was obtained from all individual participants included in the study.

Consent for publication: Not applicable.

Availability of data and materials The datasets generated and/or analysed during the current study are available in the ELSI-Brazil repository, https://elsi.cpqrr.fiocruz.br/en/access-to-data/.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: JMAG conceived and designed the study and provided methodological guidance. ASR was responsible for data analysis, interpretation of results, and drafting the initial version of the manuscript. OLAJ, MBG, and MLBF contributed to the interpretation of the data and critically reviewed the manuscript for important intellectual content. JMAG supervised the study and critically reviewed the final manuscript. All authors read and approved the final manuscript.

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