The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 2025, **80(11)**, gbaf143
https://doi.org/10.1093/geronb/gbaf143
Advance access publication: 30 July 2025
Research Article

Midlife gender discrimination and later-life cognition: results from the National Survey of Midlife Development in the United States

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Decision Editor: Kenzie Latham-Mintus, PhD, FGSA (Social Sciences Section)

Abstract

Objective: Discrimination of various types is associated with social stress, which in turn is implicated in later-life cognitive decline. However, women who have higher socioeconomic status and who are younger are more likely to perceive gender discrimination. This leaves unclear whether gender discrimination bears independent, detrimental links to later-life cognition.

Methods: We implement longitudinal regression analyses of the 1995–2015 National Survey of Midlife Development in the United States (baseline ages 25–74) that consider follow-up cognitive performance as it relates to midlife gender discrimination.

Results: Contrary to a social stress perspective, we find positive associations between women's midlife experiences of gender discrimination and cognitive performance at 10- and 20-year follow-up. These consistent, robust associations are mostly accounted for by differences in age and socioeconomic status, consistent with tokenism in the workplace and changing consciousness and experiences of discrimination across generations. They remain intact after probability-based adjustments for survey attrition and across analyses of discrimination subscores.

Discussion: Following our results, we propose that future research on gender discrimination should pay closer attention to positionalities that intersect gender with age and other social statuses. Meanwhile, we urge greater research attention to other aspects of structural sexism at the cultural, organizational, or internalized levels that are still likely to be harmful for women's cognitive health in some capacity. We also encourage further attention to intersectional discrimination involving ethno-racial statuses in particular.

Keywords: Cognitive health, Age, Race, Socioeconomic status

Numerous studies link various types of perceived discrimination to heightened social stress as well as diminished general health outcomes (Emmer et al., 2024; Harnois & Bastos, 2018; Pascoe & Smart Richman, 2009), including cognitive decline or dementia risk (see Hsieh et al., 2024; Lindert, 2022; Livingston, 2020; Zahodne et al., 2019). A major limitation of this body of work, however, is that it does not sufficiently address women's experiences of gender discrimination. Dementia is one of the leading causes of death in the United States (U.S.), and women are more likely than men to develop later-life dementia (Hsieh et al., 2024). Meanwhile, women are far more likely than men to report gender discrimination (Harnois & Bastos, 2018; Roscigno et al., 2021). However, existing research leaves unclear whether women's experiences of gender discrimination bear independent, detrimental links to their later-life cognitive outcomes.

Several studies already highlight multifaceted health risks associated with gender discrimination, including diminished general mental or physical health (Andersson & Harnois, 2020; Harnois & Bastos, 2018). However, these studies and others also find that women's perceptions of gender discrimination intersect with their other positionalities, especially their socioeconomic status or age (Andersson & Harnois, 2020; Shu & Meagher, 2018; Yoder, 1994). Thus, although experiences of discrimination have the potential to produce chronic social stress because of how they interfere with psychosocial and economic resources (Dark, 2023; Emmer et al., 2024; Hsieh et al., 2024; Zahodne et al., 2019), a growing segment of research also emphasizes how discrimination experiences or perceptions may be more likely among advantaged women who are exposed to tokenism in the workplace or who work in male-dominated occupations (Kanter, 1977; Turco, 2010), for example, or who have a greater consciousness or awareness of structural injustices in society (Andersson & Harnois, 2020; Roscigno et al., 2021; Valentino & Warren, 2025). Although discrimination is generally found to be detrimentally linked to cognitive health, demographic positionalities involving higher socioeconomic status (SES) and younger age are associated with greater cognitive health (Livingston, 2020; Yang, 2024) as well as heightened experiences or reports of discrimination (Andersson & Harnois, 2020; Shu & Meagher, 2018). Thus, the overall link between gender discrimination and cognitive outcomes remains unknown.

Received: February 7 2025; Editorial Decision Date: July 16 2025.

To evaluate these different perspectives on gender discrimination and later-life cognitive health, we conduct multiple sets of longitudinal analyses that relate later-life overall cognitive functioning to diverse forms of gender discrimination reported at midlife, by using data from the National Survey of Midlife Development in the United States (MIDUS). Using 10- and 20-year follow-up cognitive assessments, we find that associations between midlife gender discrimination and later-life cognition are positive, which is contrary to a social stress perspective. Differences in age and socioeconomic status among women play significant roles in explaining these associations. Following our results, we urge greater research attention to other aspects of structural sexism at the cultural, organizational, and internalized levels that still could matter for women's cognitive health.

Perceived gender discrimination and the relevance of sociodemographic positionality

Discrimination can diminish health through chronic stress, particularly stress that results from the loss of valuable psychosocial and economic resources (see Emmer et al., 2024; Pascoe & Smart Richman, 2009). For example, acute discrimination—such as being denied a scholarship or essential service or being unfairly fired or not hired for a position—can directly or indirectly result in lower wages, loss of health insurance and healthcare, and diminished social support. Discrimination also is a social stressor and moral affront to the self, as it powerfully invokes notions of fairness, dignity, and social justice (Roscigno et al., 2021; Valentino & Warren, 2025). Relatedly, perceiving oneself as a victim of unfair treatment and discrimination can activate physiological and psychological stress responses, including elevated cortisol levels and ultimately the dysregulation of biological stress pathways (Emmer et al., 2024). These psychosocial and health risk factors, in turn, have been implicated in cognitive impairment or decline (Livingston, 2020; Mielke, 2022).

Discrimination stress has been linked to a variety of health problems (Pascoe & Richman, 2009), including cognitive problems in particular. Chronic stress impedes memory functioning and overall brain health, in part through acute as well as chronic secretions of cortisol (Law & Clow, 2020). Other potential neurobiological mechanisms include the glucocorticoid cascade hypothesis (Sapolsky et al., 2002) or allostatic load (Juster, McEwen, & Lupien, 2010). In line with a chronic stress perspective on discrimination and cognition, several recent studies find associations between perceived discrimination and impaired cognitive outcomes, including dementia (e.g., Dark, 2023; Hsieh et al., 2024; Lindert, 2022; Zahodne et al., 2019). However, they rely either on general measures of discrimination or on indices of perceived racial or weight discrimination in particular.

Analyzing longitudinal data from the United States, Sutin et al. (2015, 2020) offer evidence for potentially null or even positive—rather than detrimental—associations between cognitive performance and experiencing discrimination. Although these results are potentially quite important for advancing our understanding of the complexities of discrimination experiences, follow-up is limited, and some analyses combine several different kinds of discrimination. They also do not consider acute or event-based lifetime discrimination, which could have significant consequences for cognition, especially if it creates lasting stress by blocking economic or social resources. Finally, the relationship of cognitive outcomes to intersectional experiences among women, involving their gender as well as their age or socioeconomic status, remains underexplored.

Specific aspects of women's sociodemographic positionality, such as women's ethno-racial identity, age, and social class, profoundly shape their opportunities, experiences, and perceptions (e.g., England et al., 2020; Erving & Smith, 2022). This signals attention to meaningful, substantive processes of demographic inequality among women that too often are "canceled out" due to overreliance on statistical controlling (Ferraro & Schafer, 2017). For instance, demographic statuses powerfully shape perceptions of social issues, which include social injustice or unfair treatment (Andersson & Harnois, 2020; Foley et al., 2006; Roscigno et al., 2021; Valentino & Warren, 2025).

Across generations, women with varied ethno-racial backgrounds have had different experiences with sexism and discrimination (Erving & Smith, 2022; Harnois et al., 2022). Generally, perceptions of discrimination tend to be positively associated: those who perceive experiencing one form of discrimination tend to perceive additional forms of discrimination (Harnois et al., 2022). But the types of sexism and gender discrimination that women perceive and experience vary. Racially and ethnically minoritized women are likely to be tokenized and scrutinized in labor, community, and informal settings (Chow, 2024; Wingfield, 2019), in ways that are simultaneously infused with ethno-racial stereotypes. Consequently, minoritized women's struggle against sexism is often intertwined with a struggle against intersecting forces of racism and classism (Collins, 1990; King, 1988). In addition, societal understandings of sexism and gender discrimination, as well as feminist rhetoric, have changed significantly over the past century (Ferree & Hess, 2002; Schnittker et al., 2003), with more recent feminist movements centralizing intersectionality (Collins & Bilge, 2020).

Age is related to changing views about and experiences of gender discrimination and sexism more generally, due to life-course patterns of work as well as generational differences in opportunity and inequality (England et al., 2020; Valentino & Warren, 2025). Gender inequality across the family and work realms has decreased markedly in recent decades (Carlson et al., 2018), while consciousness of inequality and discrimination generally has increased (Shu & Meagher, 2018). As a result of these changing norms and contexts, younger women may be more likely to perceive gender discrimination (Scarborough et al., 2019; Shu & Meagher, 2018).

Socioeconomic status also matters to women's experiences of gender discrimination. Increased education can influence exposure to specific types of discriminatory treatment related to gender and can also increase disadvantaged groups' awareness and perceptions of discrimination more generally (Andersson & Harnois, 2020). Early work by Kessler, Mickelson, and Williams (1999, p. 219) found that, among the general U.S. population, increased education was associated with greater perceptions of acute forms of discrimination but was not a significant predictor of perceived day-to-day discrimination. More recently, Andersson and Harnois (2020) found that women with higher levels of education were more likely to perceive workplace gender discrimination than those with less education, with much of this difference explained by working in male-dominated jobs. Similarly, Bertogg and Leist (2023)

showed that cognitive benefits linked to women's full-time employment depend on prevailing gender norms. However, they did not examine the role of women's experiences of gender discrimination within this relationship.

Earlier research raises fundamental questions about how cohort changes in traditional or sexist cultures (see Shu & Meagher, 2018) might change perceptions of gender discrimination at the same time as they change women's upward socioeconomic mobility, and what both of these changes might mean for women's evolving levels of cognitive health. Kanter's (1977) theory of tokenism argues that skewed sex ratios in the workplace can lead to tokenization, but as those ratios are corrected, women experience fewer challenges related to discrimination or limited upward mobility in the workplace (see also Yoder 1994). Yoder (1994, p. 178) draws on Blalock's theory of intrusiveness to contend that "surges in the number of lower-status members" present a threat to men who work in male-dominated fields, leading to social backlash in the form of increased gender discrimination directed toward women. This may have been especially true for 20th-century cohorts, who worked at a time when women sharply increased their labor force participation and also dramatically increased their college attendance (England et al., 2020). Some critiques of tokenism focus on how numerical minority status is not sufficient to induce backlash, since men who work within female-dominated occupations do not face similar obstacles to promotion or status (Turco, 2010; Williams, 2013). Even though gender pervasively structures social interaction across a variety of organizational, institutional, and informal settings, gender inequality may not be perceived consistently at the level of individual experience across different generations of women (Scarborough et al., 2019; Yoder, 1994).

Although scholars disagree on the conditions under which being in the gender minority matters for women's work outcomes or levels of social stress (Yoder, 1994; Turco, 2010), each of these different perspectives on tokenism lead us to expect that the entrance of women into high-status occupations—as signaled by their higher socioeconomic status—might cause greater perceptions of discrimination. However, because higher socioeconomic status is so strongly and consistently related to better cognitive health outcomes (Livingston, 2020), it is by no means clear that the cognitive benefits of women's higher SES would be undermined by any heightened experiences of gender discrimination.

Meanwhile, these studies and others focus on work-based discrimination in particular, and they do not draw explicit ties to later-life cognitive health. Moving forward, a broader coverage of gender discrimination is essential, because sexism is broadly recognized and understood by the public and academics alike to operate in terms of intentionality, unequal treatment and/or outcomes, and power balances or imbalances, across a diverse range of organizational, community, and institutional settings (see Valentino & Warren, 2025). *This wider approach to discrimination has yet to be applied to our understanding of women's cognition in later life.*

Discrimination, health, and later-life cognition

Within social science and gerontological research, scholars differentiate between acute or event-based discrimination across a lifetime and chronic or everyday forms of being treated with less courtesy or respect than other people (Essed, 1991; Hsieh et al., 2024; Williams et al., 1997; Zahodne et al., 2019). Accordingly, the overwhelming majority of studies linking perceived interpersonal discrimination to health outcomes utilize the Major Experiences of Discrimination Scale (MEDS; Williams et al., 2008) and/or the Everyday Discrimination Scale (EDS; Williams et al., 1997).

Building on these valuable efforts, we make several contributions in the present study. First, we take a wider approach to the measurement of discrimination. Studies to date either have relied on a dichotomous measure of ever experiencing everyday discrimination (Sutin et al., 2015, 2020) or on examinations of racial/ethnic discrimination (Hsieh et al., 2024; Zahodne et al., 2019). To capture "everyday discrimination"—as articulated and proposed by Essed (1991) and Williams et al. (1997)—either a continuous scale or a dichotomy that more clearly separates higher levels of discrimination from lower levels would provide greater conceptual and empirical robustness (Hsieh et al., 2024; Zahodne et al., 2019). In addition, acute or event-based forms of discrimination across one's lifetime need to be addressed. *To our knowledge, no studies have systematically assessed how these event-based forms of perceived gender discrimination—which arguably may more directly impact women's material, financial, and health resources—associate with later-life cognition* (but see Dark, 2023 on event-based racial discrimination and later dementia). In addition to taking a more comprehensive and rigorous approach to discrimination measurement, we also examine the differing contributions of sociodemographic background to varying links between gender discrimination and cognition among women across 10- and 20-year follow-up measurements. *This enables us to investigate how or why these links may exist.*

Overview of the present study

Building on a promising, nascent line of research that considers whether and how exposure to discrimination relates to later-life cognition, we specifically investigate the role of perceived gender discrimination. The present study aims at three main, interrelated contributions and is thus structured by the following research questions: *What are the longitudinal relationships between midlife gender discrimination and later-life cognition for event-based and everyday forms of discrimination? Are these relationships consistent into older age? What are the roles of age, race, and socioeconomic status in producing these varying associations?*

Data and methods

Our longitudinal data come from Waves 1, 2, and 3 of the National Survey of MIDUS. We make use of the random digit dial (RDD) sample, which is a national probability sample of English-speaking, noninstitutionalized individuals aged 25–74 residing in the United States for a total of about 2 decades, from 1995 (Wave 1) to 2005 (Wave 2) to 2015 (Wave 3). Thus, MIDUS offers unique coverage of midlife to older age while also administering a portfolio of discrimination measures and cognitive assessments. With a Wave I response rate of about 70%, attrition across the remaining two decades is comparable to other national, longitudinal surveys; about half of the sample did not complete both remaining waves or was lost to death, withdrawal, or inability to reach, resulting in a 45%

completion rate from Wave 1 to Wave 3 (Song, 2021). In general, retained MIDUS respondents are younger, more educated, healthier, and less likely to be ethno-racial minorities (see Song, 2021). As detailed below, we explicitly incorporate differential survey attrition due to respondent loss and/or unavailability for cognitive assessment into our estimation procedure by the use of inverse probability weighting (IPW), although our results do not change without this adjustment. We focus the analysis on perceived gender discrimination among women (women in RDD sample; $n = 1{,}561$). Once matched with women who participated in the MIDUS cognitive project at Waves 2 and 3 and have a valid inverse probability weight, the available sample sizes are $n = 877$ (Wave 2) and $n = 556$ (Wave 3).

Composite cognitive functioning

At Waves 2 and 3, MIDUS administered the Brief Test of Adult Cognition by Telephone(see Lindert, 2022). Although other research suggests that episodic memory or executive functioning may be especially impacted by discrimination (Sutin et al., 2020), we refrain from presenting results from subscales since preliminary analyses revealed no negative or detrimental associations between gender discrimination and any of the Brief Test of Adult Cognition by Telephone subscales. The composite score correlates at $r = 0.9$ with executive functioning (measured by digits backward, category fluency, number series, backward counting, and stop and go switch task) and $r = 0.7$ with episodic memory (measured by immediate and delayed word lists) (Robinson & Lachman, 2018).

Midlife gender discrimination (everyday and event-based; baseline, Wave 1)

We assess everyday discrimination with an expanded version of the EDS scale, which focuses on different aspects of interpersonal treatment: "How often on a day-to-day basis do you experience each of the following types of discrimination," such as "you are treated with less courtesy, less respect, receive poorer service, people act as if they think you are not smart, people act as if they are afraid of you" and other items (9 items, each scored from 0 = never to 3 = often). The EDS is highly reliable, especially if scored to focus on a particular attribution such as race, gender, or weight (Harnois, 2019; Sutin et al., 2020; in MIDUS women sample, alpha = 0.97 for gender discrimination). Following recommended treatments of this construct (Essed, 1991; Williams et al., 1997), we assess everyday discrimination by scoring 1 (yes, discrimination is present) if a response of "rarely," "sometimes," or "often" is given for at least one of the nine scale items. We also consider alternative ways of dichotomizing the EDS items in our supplemental analyses.

We also use the MEDS (e.g., Ong & Williams, 2019) to measure lifetime event-based or acute discrimination. In this scale, the respondent is presented with a series of life events (e.g., discouraged from seeking higher education, denied scholarship, not hired for a job, not given a job promotion, fired, prevented from renting or buying a home, denied or provided inferior medical care, denied or provided inferior service of another kind). For each event, they are asked for the number of times that this has occurred in their life (ranging from 0/never to any respondent-given count). If the respondent states that at least one of these events has occurred at least once, this identifies major lifetime discrimination (1 = one or more events at least once; 0 = no events at least once).

After completing these items, the respondent is asked to select one or more attributions ("What was the main reason for the discrimination you experienced?"; age, gender, race, ethnicity/nationality, religion, height or weight, appearance, physical disability, sexual orientation, or other reason). If gender is selected, then all major and everyday discrimination responses above are coded as perceived gender discrimination. Because 17.9% of women did not provide an attribution when asked, we estimated findings first by treating these as missing cases in the main analyses and then by treating these cases as zero in supplemental analyses.

Sociodemographic variables (baseline, Wave 1)

Midlife Development in the United States assessed ethno-racial background as follows: "What race do you consider yourself to be?" (White, Black and/or African American, Native American or Aleutian Islander/Eskimo, Asian or Pacific Islander, Other, or Multiracial). The latter categories are joined within the main analyses into "other" race due to insufficient longitudinal cell sizes (baseline or initial cognitive assessment in 2005: Black $n = 54$; Other Race/Ethnicity $n = 35$; confirmed Hispanic origin $n = 18$; follow-up cognitive assessment in 2015: Black $n = 29$; Other Race/Ethnicity $n = 19$; confirmed Hispanic origin $n = 10$). Age is measured in years. Education is given in response to the question, "What is the highest grade of school or year of college you completed?," which we convert to a continuous measure ranging from 4 to 20 years of schooling. Occupational prestige—operationalized here as the socioeconomic index (SEI) based on the 1980 census occupational classifications (Stevens & Cho, 1985)—is determined based on current SEI among those working or most recently held occupation among those not currently working (ranging from 7.13 to 80.53).

Analytic strategy

We conduct a series of longitudinal multiple regression analyses using weighted full-information maximum likelihood estimation, with total cognitive score at Waves 2 and 3 as our key outcome measure. The key predictor is baseline (Wave 1) perceived gender discrimination. Bivariate and multivariate estimates between follow-up cognition scores and baseline perceived gender discrimination are obtained. We fit models of major experiences of lifetime discrimination and everyday discrimination separately.

Model specification checks supported linear forms for age, education, and occupational SEI based on the Bayesian Information Criterion. Two-way statistical interaction terms between any gender discrimination and age, education, and occupational SEI were not robustly significant and are not presented. In other preliminary analyses, we generally found no bivariate or multivariate associations between men's experiences of gender discrimination and their later-life cognition. Thus, our focus on women is consistent with their far more robust associations.

To help correct for nonrandom persistence across MIDUS waves (Song, 2021), we estimated regression models under IPW. A weight was generated for each participant in each wave (either Wave 2 or Wave 3), based on the inverse of the predicted probability of retention given baseline (Wave 1) sociodemographic covariates in this study (age, ethno-racial identity, education, and occupational SEI) plus baseline self-rated health

("How would you rate your current physical health?" 1 = excellent to 5 = poor). IPW upweights those less likely to persist and thereby moves toward simulating a randomly attrited sample conditional on covariates (Seaman & White, 2013). Our analyses focus on those women with valid IPW values who required all sociodemographic covariates and baseline self-rated health information. Results without the IPW applied were highly similar.

In further sets of analyses that ultimately justified our focus on baseline or Wave 1 gender discrimination (not shown), we integrated measurements of event-based and everyday discrimination from Wave 2 (2005). These analyses all supported the existence of positive associations between cognition and gender discrimination. First, we estimated associations between Wave 2 discrimination and cognition at Waves 2 and 3. Although these associations often were positive and significant in their own right, they generally did not remain statistically significant net of baseline or Wave 1 discrimination. Second, we calculated change scores in discrimination across Waves 1 and 2 and estimated relationships between changes in discrimination and Wave 2 and Wave 3 cognition. Like the Wave 2 discrimination measure, discrimination change scores generally showed no significant relationship to cognitive outcomes net of baseline or Wave 1 discrimination. Finally, we implemented a lagged first-differenced individual fixed-effects specification, in which the change in cognition from Waves 2 and 3 was regressed on the change in discrimination from Wave 1 to Wave 2. These first-differenced estimates often approached or achieved statistical significance and were positive in magnitude.

Results

MIDUS women respondents at baseline (Wave 1) are 47.3 years old on average (*SD* = 12.73; range = 25–74), 6.3% Black or African American, and 3.9% another race or multiracial. Average educational attainment is 13.9 years (*SD* = 2.4; range = 4–20 years), while average occupational SEI is 37.3 (*SD* = 14.1; range = 7.1–80.5).

Table 1 overviews gender discrimination and cognitive outcomes by key demographic variables, among those women who completed the initial (2005) cognitive assessment of cognitive functioning. Overall, 30.8% of women reported experiencing at least one form of everyday gender discrimination, and 26.3% reported at least one form of major or event-based discrimination due to gender ($r = 0.746$). Composite cognitive scores are normed within waves (10-year test-retest r = 0.749; Wave 2 $M = -0.060$, $SD = 0.991$; Wave 3 $M = -0.004$, $SD = 0.679$). Perceived gender discrimination and mean cognitive scores vary significantly across ethno-racial status, age, education, and occupational SEI (all Chi squares $p < .001$). For ease of presentation, we group age, education, and occupational SEI into ordered bins, although we treat them as continuous in our main regression analyses. Perceptions of gender discrimination are about twice as high among White respondents ($n = 693$ and 679; 32.3% everyday and 27.4% lifetime) compared to Black or African American ($n = 51$ and 50; 13.7% and 14.0%) and other race/ethnicity respondents ($n = 31$; 19.4% and 19.4%). These rates differ about fourfold from the lowest to highest age categories and about three- to fourfold across the lowest and highest educational and occupational categories.

Table 2 displays parameter estimates from multiple regressions of any lifetime discrimination, focused on the reporting of one or more acute events pertaining to gender discrimination (compared to no events). Women with any lifetime discrimination in Wave 1 had greater cognitive outcomes in Wave 2 at 10-year follow-up (Model 1, Any Lifetime Discrimination $b = 0.476$, $p < .001$), approximately one-half standard deviation in size ($SD = 0.991$). As expected, ethno-racial background attenuates this coefficient in Model 2 ($b = 0.438$), as does age in Model 3 ($b = 0.279$). The lifetime discrimination coefficient loses statistical significance in Model 4, where years of education and occupational SEI are included ($b = 0.090$, *ns*). Taken together, these four models reveal significant ethno-racial (Model 2; Black or African American $b = -0.625$, $p < .001$; Other Race/Ethnicity $b = -0.390$, $p < .05$) and age-based (Model 3; Age $b = -0.035$, $p < .001$) disparities in cognitive performance. In addition, respondents' SEI and education are positively associated with cognitive performance (Model 4; Education [Years] $b = 0.105$, $p < .001$, Occupational SEI $b = 0.010$, $p < .001$). The right panel of Table 2 displays the same model sequence for Wave 3 cognition (20-year follow-up). Although the baseline coefficient for any everyday discrimination (Model 1, Any Lifetime Discrimination $b = 0.201$, $p < .01$) is quantitatively smaller compared to 10-year follow-up, age and socioeconomic status continue to explain the coefficient to statistical insignificance and to display significant associations with prospective cognition in their own right, although

Table 1. Rates of gender discrimination and cognitive outcomes (MIDUS RDD women).

Variable	Rates of gender discrimination		Composite cognition score (z score)	
	Everyday	Lifetime (Major)	Wave 2 *M* (*SD*)	Wave 3 *M* (*SD*)
Entire sample	30.8%	26.3%	−0.060 (0.991)	−0.004 (0.679)
Race				
White	32.3%	27.4%	0.007	0.016
Black or African American	13.7%	14.0%	−0.673	−0.342
Other race/ethnicity	19.4%	19.4%	−0.330	0.032
Age				
25–32	41.7%	33.6%	0.450	0.446
33–39	31.7%	28.8%	0.329	0.275
40–46	41.2%	41.2%	0.135	0.043
47–53	31.3%	30.3%	−0.083	−0.033
54–60	26.7%	22.7%	−0.272	−0.345
61–74	11.9%	8.4%	−0.895	−0.673
Education				
High school or less	15.4%	12.2%	−0.447	−0.316
Some college	31.1%	31.1%	−0.088	−0.071
Four-year college	47.6%	45.2%	0.494	0.338
Graduate school	49.1%	43.0%	0.512	0.346
Occupational socioeconomic index				
7–24	13.9%	10.9%	−0.614	−0.317
24–30	25.4%	21.0%	−0.232	−0.179
30–35	20.2%	15.3%	−0.156	−0.069
35–43	35.9%	31.0%	−0.022	−0.034
43–54	39.9%	38.2%	0.173	0.098
54–81	45.5%	37.6%	0.489	0.332

Note. MIDUS RDD = Midlife Development in the United States random digit dial.

Table 2. Multiple regressions of lifetime (major) gender discrimination and composite cognition score (1995–2015 MIDUS RDD women).

	Wave 2 (2005)				Wave 3 (2015)			
Variable	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Lifetime (major) gender discrimination	0.476***	0.438***	0.279***	0.090	0.201**	0.195**	0.076	−0.033
	(0.080)	(0.079)	(0.075)	(0.070)	(0.071)	(0.070)	(0.063)	(0.061)
Black or African American		−0.625***	−0.651***	−0.644***		−0.315*	−0.345**	−0.401***
		(0.130)	(0.114)	(0.100)		(0.132)	(0.119)	(0.112)
Other race/ethnicity		−0.390*	−0.578***	−0.575***		0.015	−0.084	−0.144
		(0.185)	(0.156)	(0.137)		(0.144)	(0.127)	(0.123)
Age			−0.035***	−0.032***			−0.029***	−0.027***
			(0.002)	(0.002)			(0.002)	(0.002)
Education (years)				0.105***				0.081***
				(0.016)				(0.014)
Occupational SEI				0.010***				0.004
				(0.003)				(0.002)
Constant	−0.240***	−0.147***	1.566***	−0.344	−0.117**	−0.093*	1.273***	−0.096
	(0.044)	(0.044)	(0.125)	(0.221)	(0.036)	(0.038)	(0.107)	(0.196)
R^2	0.044	0.083	0.280	0.391	0.019	0.033	0.260	0.371

Note. MIDUS RDD = Midlife Development in the United States random digit dial; SEI = socioeconomic index. $N = 877$ for Wave 2 and $N = 556$ for Wave 3. Unstandardized estimates were obtained using full-information maximum likelihood. All independent variables were measured at Wave 1 (1995). Inverse probability weighting for survey attrition was based on Wave 1 covariates.
$^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$ (two-tailed).

occupational SEI is not significant in the fully adjusted, final model.

Table 3 focuses on the most commonly reported lifetime events and how each relates to later-life cognition at Wave 2. These event-specific estimates continue to support the presence of positive associations with later-life cognition. For instance, 9.6% of the sample was discouraged from pursuing higher education on the basis of gender ($b = 0.295$, $p < .01$) and 11.0% were denied a job ($b = 0.276$, $p < .05$). While being denied service shows a somewhat quantitatively larger estimate (14.1% of the sample; $b = 0.403$). As was seen for the omnibus estimates reported in Table 2 pertaining to any event (ie, one or more events of major discrimination), these event-specific estimates show a similar pattern of attenuation, whereby age (Model 3) and socioeconomic status (Model 4) render the positive coefficients weaker and eventually nonsignificant. A parallel set of results for Wave 3 is not tabled because these were less consistently significant and weaker in magnitude, given the singular events and limited statistical power surrounding their estimates (available on request).

Table 4 reports later-life cognition estimates for everyday discrimination by using two approaches to binarization: either "never" versus "rarely," "sometimes," or "often" (30.80% of the MIDUS women RDD sample; Sutin et al. 2015, 2020) or "never" or "rarely" versus "sometimes" and "often" (15.20% of the sample; Essed, 1991; Harnois, 2019; Williams et al., 1997). The positive bivariate relationship found in the top panel under the less stringent measurement approach echoes Sutin's (2015, 2020) finding that perceptions of gender discrimination were positively associated with some aspects of cognition. As before, results are presented separately for Wave 2 (left) and Wave 3 (right). Across these measurement strategies and follow-up time points, results mirror those obtained for the MDS, in terms of larger coefficient magnitudes at Wave 2 than at Wave 3 and the more pivotal roles of age and socioeconomic variables in explaining these discrimination-cognition links to statistical insignificance.

Finally, Table 5 reports later-life cognition differences related to different levels of event-based (MDS) or everyday (EDS) discrimination. For everyday discrimination, a median split is performed on the continuous scale score among those with non-zero scores, thus forming two groups of similar size (16.6% and 14.2% of the sample). They are compared to those reporting no discrimination. For lifetime (major) discrimination, those reporting two or more events (14.8%) are contrasted with those reporting only one event (10.6%). The same sequence of models and covariates applies. These estimates support the attenuation patterns shown earlier. They also clearly illustrate a threshold whereby high amounts of either event-based or everyday discrimination do not significantly differ in their relationship to cognition, compared to moderate levels. This valuable, consistent threshold finding not only supports a binary approach to perceived gender discrimination taken across Tables 1–4 but also suggests that the underlying mechanism relating perceived gender discrimination to later-life cognition does not operate according to dose-response.

Supplemental analyses established that findings are generally robust across extended operationalizations of gender discrimination. Findings from the main analyses proved insensitive to zero-coding of missing discrimination attribution or use of IPW (Supplementary Table 1). Finally, we found that any everyday racial discrimination among women showed *negative or detrimental* associations with later-life cognition, thus helping to confirm the uniquely positive character of gender discrimination associations (Supplementary Table 2).

Discussion

This article is among the first longitudinal investigations of gender discrimination and women's cognitive health. We robustly demonstrate positive relationships between midlife gender discrimination and later-life cognition, highlighting the importance of sociodemographic positionality for

Table 3. Common major lifetime events for gender discrimination and composite cognition score (1995–2005 MIDUS RDD women).

Variable	Model 1	Model 2	Model 3	Model 4
Panel A (discouraged from higher education)—9.6% of sample				
Yes/this occurred	0.295**	0.310**	0.121	−0.077
	(0.103)	(0.102)	(0.105)	(0.095)
R^2	0.007	0.054	0.267	0.390
Panel B (denied job)—11.0% of sample				
Yes/this occurred	0.276*	0.302**	0.194	0.050
	(0.115)	(0.114)	(0.104)	(0.097)
R^2	0.008	0.055	0.269	0.389
Panel C (not given promotion)—10.7% of sample				
Yes/this occurred	0.366**	0.337**	0.269*	0.174
	(0.119)	(0.118)	(0.112)	(0.089)
R^2	0.013	0.057	0.272	0.392
Panel D (denied service)—14.1% of sample				
Yes/this occurred	0.403***	0.379***	0.225*	0.065
	(0.101)	(0.103)	(0.093)	(0.088)
R^2	0.019	0.063	0.271	0.390
Panel E (any other event)—11.0% of sample				
Yes/this occurred	0.392***	0.401***	0.284**	0.166
	(0.107)	(0.102)	(0.095)	(0.085)
R^2	0.015	0.062	0.273	0.391

Note. MIDUS RDD = Midlife Development in the United States random digit dial. $N = 877$. Events are specific items from the lifetime (major) discrimination inventory. Unstandardized estimates were obtained using full-information maximum likelihood. All independent variables were measured at Wave 1 (1995). Model 1 is bivariate; Model 2 controls race/ethnicity; Model 3 controls race/ethnicity and age; Model 4 controls race/ethnicity, age, education (years), and occupational socioeconomic index (coefficients not displayed).
$^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$ (two-tailed).

Table 4. Multiple regressions of everyday gender discrimination and composite cognition score (1995–2015 MIDUS RDD women).

	Wave 2 (2005)				Wave 3 (2015)			
Variable	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Any everyday discrimination (rarely/sometimes/often)[a]	0.531***	0.482***	0.288***	0.096	0.236***	0.229***	0.075	−0.040
	(0.077)	(0.075)	(0.072)	(0.068)	(0.066)	(0.065)	(0.058)	(0.056)
Race/ethnicity		✓	✓	✓		✓	✓	✓
Age			✓	✓			✓	✓
Education and occupation				✓				✓
R^2	0.060	0.094	0.282	0.391	0.028	0.042	0.260	0.371
Any everyday discrimination (sometimes/often)[b]	0.427***	0.427***	0.229***	0.104	0.209*	0.211**	0.062	−0.010
	(0.092)	(0.088)	(0.082)	(0.075)	(0.082)	(0.081)	(0.072)	(0.067)
Race/ethnicity		✓	✓	✓		✓	✓	✓
Age			✓	✓			✓	✓
Education and occupation				✓				✓
R^2	0.025	0.070	0.272	0.391	0.014	0.030	0.259	0.371

Note. MIDUS RDD = Midlife Development in the United States random digit dial. $N = 877$ for Wave 2 and $N = 556$ for Wave 3. Unstandardized estimates were obtained using full-information maximum likelihood. All independent variables were measured at Wave 1 (1995). Inverse probability weighting for survey attrition based on Wave 1 covariates.
[a]Any everyday discrimination is measured as answering "rarely," "sometimes," or "often" for at least one of the nine scale items (30.80% of the sample).
[b]Any everyday discrimination is measured as answering "sometimes" or "often" for at least one of the nine scale items (15.20% of the sample).
$^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$ (two-tailed).

understanding this relationship. Gender intersects powerfully with age and socioeconomic status to shape the likelihood of experiencing gender discrimination as well as later-life cognitive impairment. These findings complement existing theories of discrimination and cognition, which emphasize how social stress activates neurobiological pathways that diminish cognitive health (e.g., Dark, 2023; Hsieh et al., 2024; Zahodne et al., 2019). Our results point to an alternative, complementary possibility: that discrimination is experienced and perceived differently across demographic backgrounds, with perceptions

Table 5. Multiple regressions of composite cognition score with nonlinear gender discrimination effects (MIDUS RDD women).

Variable	Wave 2 (2005)				Wave 3 (2015)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Event-based discrimination								
1 Event of major discrimination	0.505***	0.443***	0.268*	0.050	0.185	0.164	0.037	−0.058
	(0.108)	(0.110)	(0.105)	(0.096)	(0.109)	(0.109)	(0.100)	(0.089)
2+ Events of major discrimination	0.492***	0.469***	0.301**	0.122	0.221**	0.223**	0.099	−0.018
	(0.098)	(0.095)	(0.092)	(0.086)	(0.082)	(0.081)	(0.073)	(0.072)
R^2	0.047	0.086	0.281	0.391	0.019	0.033	0.260	0.371
Everyday discrimination								
Any everyday discrimination (low)	0.648***	0.564***	0.385***	0.142	0.311***	0.293***	0.158*	0.004
	(0.102)	(0.102)	(0.099)	(0.094)	(0.081)	(0.081)	(0.074)	(0.067)
Any everyday discrimination (high)	0.406***	0.397***	0.188*	0.052	0.156	0.162	−0.014	−0.083
	(0.092)	(0.089)	(0.081)	(0.074)	(0.086)	(0.085)	(0.073)	(0.072)
R^2	0.064	0.096	0.285	0.392	0.033	0.045	0.266	0.373

Note. MIDUS RDD = Midlife Development in the United States random digit dial. $N = 877$ for Wave 2 and $N = 556$ for Wave 3. Unstandardized estimates were obtained using full-information maximum likelihood. All independent variables were measured at Wave 1 (1995). Model 1 is bivariate; Model 2 controls race/ethnicity; Model 3 controls race/ethnicity and age; Model 4 controls race/ethnicity, age, education (years), and occupational socioeconomic index (coefficients not displayed).
$^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$ (two-tailed).

of gender discrimination most likely among younger women with higher SES who are also most likely to have favorable cognitive health. This situated, sociodemographic account of how discrimination is perceived or experienced differently by women depending on their intersecting personal characteristics offers a substantive interpretation for a positive relationship between discrimination and cognition, which too often is dismissed on atheoretical grounds as "selection bias" on demographic variables (see Ferraro, 2018; Ferraro & Schafer, 2017).

Although age is a key risk factor for cognitive impairment and incident dementia (Livingston, 2020), age also informs exposure to school-, family-, community-, and work-related gender discrimination across the life span and across generations (Andersson & Harnois, 2020; Shu & Meagher, 2018; Valentino & Warren, 2025). Meanwhile, ethno-racial disparities in cognition are well-established, with White women showing greater cognitive functioning across midlife and older ages compared to women of other ethno-racial groups (Yang, 2024), likely stemming from their structural advantage in the racial hierarchy. Higher socioeconomic status is strongly related cross-sectionally and prospectively to better cognitive functioning (Livingston, 2020; Yang, 2024)—even as it may increase experiences of gender discrimination due to greater consciousness and more frequent inhabitation of male-dominated social spaces (e.g., Andersson & Harnois, 2020; Roscigno et al., 2021).

Indeed, for lifetime, event-based discrimination in particular, we consider the possibility that positive associations with cognition are observed precisely because being denied educational or occupational opportunities restricts women from male-dominated environments that could lead to further interpersonal stress with implications for long-term cognition, although future research will need to evaluate any relative contribution of this deleterious pattern by using work stress measures and ideally measures of full-time work persistence as well (e.g., Greenberg & Burgard, 2021). Future research using multi-cohort data could more precisely disentangle the contributions of the life course, generational succession, and historical change not only to perceptions of discrimination but also to the discrimination-cognition link. In additional analyses, we found no evidence of differential vulnerability to gender discrimination's estimated cognitive effects across age, education, or occupational standing, thus reinforcing support for our contention that women's sociodemographic positions structure cognition as well as exposure to discrimination.

Given its limited racial and ethnic diversity, the MIDUS findings pertain predominantly to non-Hispanic White women. Use of representative data would enable a more robust investigation of any intersectional hypotheses pertaining also to differences in rates or effects of perceived gender discrimination across ethno-racial status. Meanwhile, the MIDUS survey provides coverage of discrimination and cognitive measures from midlife (when baseline mean age is ~45) to later-life (10- and 20-year follow-ups), thus providing sufficient time and exposure for diverse forms of discrimination among middle-aged adults that can have cascading or cumulative effects on cognitive health as individuals move toward retirement age.

For gender in particular, it will be important to direct research attention to other macro-level and microlevel processes by which structural sexism may influence women's later-life cognitive functioning (Homan, 2024). Perceived discrimination is distinguished from structural discrimination, which occurs through cultures, institutions, and practices that may or may not be perceived by individuals as discriminatory. Typically, perceptions of discrimination are related to worsened health outcomes through elevated social stress that is tied to denied social opportunities or experiences of injustice, harassment, or abuse. Another important possibility to consider is that internalized sexism—for instance, in terms of holding traditional gender beliefs—may diminish women's mental health as well as their sense of mastery (Andersson & McSwain, 2025; Homan, 2024) and thereby contribute to later cognitive decline even in the absence of any perceived discriminatory events. Relatedly, we note that, although scholars routinely use the EDS and MEDS to assess diverse types of discrimination (Harnois, 2019), these scales may not measure perceptions of gender discrimination as well as they measure other forms of discrimination (see Harnois et al., 2022; Williams et al., 1997).

Conclusion

Our results reveal how a positive—rather than negative—association between gender discrimination and later-life cognition is profoundly affected by sociodemographic positionality within the life course. Because understandings of discrimination related to sexism, racism, and classism are deeply related to generational and historical change (England et al., 2020; Shu & Meagher, 2018; Valentino & Warren, 2025), we urge future research to conceptualize women's perceived discrimination as a sociological phenomenon that is profoundly situated in the life course and social history (Ferraro, 2018), and to turn to structural measures of oppression as a complementary approach for understanding emergent, later-life cognitive inequities.

Supplementary material

Supplementary material is available at *The Journals of Gerontology, Series B: Psychological and Social Sciences* online.

Data availability

All data are publicly available through the Inter-university Consortium for Political and Social Research. This study is not preregistered.

Funding

None declared.

Conflict of interest

None declared.

Acknowledgments

Thank you to participants at the 2024 Midlife Development in the United States Meeting in Madison, Wisconsin for their useful feedback on this project.

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