Social Science & Medicine 384 (2025) 118512

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Forgotten lives: A mixed-methods study on cognitive decline associated with discrimination among elderly transgender individuals in India

S. Gnana Sanga Mithra [a], S. Bhavana [b,*]

[a] *Vinayaka Mission's Law School, Vinayaka Mission's Research Foundation (DU), Chennai, India*
[b] *Department of Media Studies, Christ University, Bengaluru, India*

ARTICLE INFO

Handling editor: Susan J. Elliott

Keywords:
Transgender
Cognitive decline
Discrimination
Aging
Healthcare
Gender identity
Minority stress theory

ABSTRACT

Transgender older adults face a unique and under-researched set of health risks, particularly in relation to cognitive decline. This mixed-methods study explores how lifelong discrimination contributes to cognitive vulnerability among elderly transgender individuals in India. Quantitative data were collected through surveys with 137 participants aged 45 and above, while qualitative insights were drawn from 35 semi-structured interviews. Results revealed that the mean cognitive decline score ($M = 5.93$) was significantly higher than the general population benchmark ($t(135) = 5.39$, $p < 0.001$), with qualitative narratives expressing fear of gender reversal due to memory loss. Notably, over 69 % of respondents lacked confidence in healthcare providers' knowledge of transgender health needs, and 60 % reported frequent or constant social isolation. The findings were interpreted using Minority Stress Theory, highlighting the compounded impact of lifelong stigma, medical neglect, and aging. This study underscores the urgent need for trans-inclusive memory care, provider training, and policy-level reforms in eldercare services.

1. Introduction

As global populations age, there is growing concern regarding the health and well-being of marginalized groups, particularly transgender individuals who face compounding vulnerabilities in later life. Among these, cognitive decline presents a significant yet understudied area of concern. While research has consistently documented health disparities faced by transgender populations, there is limited empirical focus on how aging and neurocognitive challenges intersect with gender identity. Transgender elders often navigate a complex landscape marked by historical trauma, systemic discrimination, and limited access to affirming care—factors that may contribute to accelerated or more severe cognitive deterioration compared to their cisgender peers. Aging transgender individuals are especially vulnerable within healthcare systems that are frequently unprepared to meet their specific needs. Studies have reported instances of care refusal, misgendering, and inadequate provider knowledge, all of which can lead to delayed diagnoses, substandard treatment, and emotional distress. These structural barriers are often compounded by social isolation, particularly for those estranged from biological families or disconnected from LGBTQ + networks. Moreover, a distressing phenomenon known as "gender confusion"—where individuals experiencing cognitive decline regress to the gender identity assigned at birth—can have severe psychological ramifications, undermining years of identity affirmation and gender-affirmative healthcare. Despite these pressing challenges, research on cognitive decline among transgender elders remains minimal, especially in international contexts. Most existing studies treat transgender populations as monolithic or exclude older adults altogether, thus failing to capture the unique experiences of those aging with marginalized identities. This paper addresses this critical gap by investigating how cognitive decline manifests among elderly transgender individuals and how experiences of discrimination and social exclusion influence this process. Guided by Minority Stress Theory, which posits that health disparities arise from chronic exposure to stigma, prejudice, and social disadvantage, this study explores the biopsychosocial impacts of discrimination on cognitive function in later life. By adopting a mixed-methods approach involving both quantitative assessments and qualitative narratives, this research seeks to provide a nuanced understanding of how transgender identity, aging, and cognitive decline converge in contexts shaped by systemic inequality. In doing so, the study aims to inform more inclusive

---

This article is part of a special issue entitled: Cognitive Aging published in Social Science & Medicine.

* Corresponding author.

E-mail addresses: sangamithra0212@gmail.com (S. Gnana Sanga Mithra), sbhavana.bala@gmail.com (S. Bhavana).

https://doi.org/10.1016/j.socscimed.2025.118512
Received 13 April 2025; Received in revised form 5 August 2025; Accepted 19 August 2025

healthcare practices, policy interventions, and support systems for one of society's most overlooked aging populations. While transgender individuals globally face discrimination, the socio-legal and cultural experiences of transgender people in India present unique challenges that merit distinct consideration. Unlike many Western countries where transgender rights have gained legal recognition over recent decades, transgender communities in India—particularly hijra, aravani, and kothi identities—have long held a complex cultural presence, oscillating between marginalization and ritual significance. However, this cultural visibility has not translated into substantive social inclusion. Although the 2014 NALSA judgment by the Indian Supreme Court legally recognized transgender individuals as a third gender and affirmed their right to self-identify, implementation gaps remain widespread. Access to healthcare, employment, housing, and legal protections continues to be inconsistent and often exclusionary. In contrast, transgender individuals in countries with more robust LGBTQ + protections may benefit from anti-discrimination laws, gender-affirming healthcare, and social support services, which can mitigate some of the cumulative stressors that contribute to health disparities. Thus, the Indian context reflects a tension between symbolic recognition and structural exclusion, creating a unique matrix of vulnerability that intensifies with age, especially in the absence of affirming eldercare systems or inclusive dementia services (see Table 1).

2. Review of literature

2.1. Cognitive decline in older adults

Cognitive decline is a prevalent concern among the elderly, characterized by a gradual deterioration in cognitive functions such as memory, attention, and problem-solving skills. A systematic review by Christensen et al. (2003) highlighted that cognitive decline is almost universal in the general elderly population and increases with age, emphasizing the need for standardized neuropsychological assessments to better understand and diagnose this condition. Recent studies have explored various factors influencing cognitive decline. For instance, a systematic review by Liu-Ambrose et al. (2023) examined the association between physical activity and cognitive decline, finding a very small but potentially clinically significant association, suggesting that sustained physical activity over decades may benefit cognitive health. Additionally, the role of micronutrient supplementation in mitigating cognitive decline has been investigated. A systematic literature review by Kesse-Guyot et al. (2023) aimed to delineate the relationship between micronutrient supplementation and cognitive decline in older subjects, indicating potential benefits but calling for more rigorous studies to confirm these findings. Social relationships also play a crucial role in cognitive health. Kuiper et al. (2016) conducted a systematic review and meta-analysis, confirming that multiple aspects of social relationships are associated with cognitive decline, highlighting the importance of social engagement in maintaining cognitive function in older adults. Furthermore, vision impairment has been linked to cognitive decline. A systematic review by Zheng et al. (2022) found a consistent positive association between vision impairment and cognitive decline, suggesting that addressing sensory impairments may be vital in preserving cognitive health among the elderly.

Table 1
Pearson correlations among key variables.

Variable Pair	Pearson *r*	*p*-value
CD Score × Social Isolation	0.31	<0.001
CD Score × Discrimination	0.27	0.002
CD Score × Gender Reversal Fear	0.35	<0.001
Social Isolation × Discrimination	0.41	<0.001

2.2. Health disparities in transgender populations

Transgender individuals face significant health disparities, including limited access to healthcare services and poorer health outcomes compared to cisgender populations. A study by Gonzales and Henning-Smith (2017) reviewed barriers to healthcare for transgender individuals, identifying factors such as discrimination, lack of provider knowledge, and socioeconomic challenges as major impediments to accessing quality care. In the Indian context, research on transgender health is emerging. A systematic review by Chakrapani et al. (2023) aimed to understand the state of transgender health research in India, highlighting the scarcity of studies and the urgent need for comprehensive research to address the unique health challenges faced by this population. Mental health disparities are also prevalent among transgender individuals. A study by Millet et al. (2017) reviewed the prevalence of anxiety symptoms and disorders in the transgender population, finding significantly higher rates compared to the general population, underscoring the need for targeted mental health interventions. Additionally, a study by Gonzales et al. (2021) examined coping mechanisms and healthcare utilization among LGBTQ older adults, emphasizing the need for research uniquely focused on the transgender subset to develop effective support systems. Furthermore, a study by Seelman et al. (2017) examined the association between adverse childhood experiences and adult health outcomes among transgender individuals, revealing a higher prevalence of adverse experiences and associated negative health outcomes, highlighting the long-term impact of early life stressors.

2.3. Impact of discrimination on health outcomes

Discrimination has been consistently linked to adverse health outcomes across various populations. A systematic review by Williams and Mohammed (2009) examined the relationship between discrimination and health, finding robust evidence that experiences of discrimination are associated with mental health issues such as depression and anxiety, as well as physical health problems including hypertension and cardiovascular diseases. In the context of type 2 diabetes mellitus (T2DM), a systematic review by Walker et al. (2022) investigated the association between discrimination, racism, and T2DM care and outcomes in Black Americans, highlighting that experiences of discrimination negatively impact diabetes management and health outcomes. Furthermore, a study by Pascoe and Smart Richman (2009) conducted a meta-analytic review on perceived discrimination and health, concluding that perceived discrimination is a significant predictor of both mental and physical health issues, emphasizing the pervasive impact of discrimination on overall well-being.In the LGBTQ + community, a study by Hatzenbuehler et al. (2010) explored how discrimination affects health, finding that discriminatory policies and social climates contribute to psychiatric disorders among lesbian, gay, and bisexual individuals, suggesting similar implications for transgender individuals.Additionally, a study by Lewis et al. (2017) examined the impact of discrimination on mental health among transgender individuals, revealing that experiences of discrimination are associated with increased psychological distress and highlighting the need for interventions to mitigate these effects.

2.4. Minority Stress Theory in gerontology and LGBTQ + health

Minority Stress Theory (MST) provides a framework for understanding how chronic stressors related to stigmatization and discrimination contribute to health disparities among minority populations. Meyer (2003) articulated MST to explain mental health disparities among sexual minorities, positing that chronic exposure to stressors such as prejudice and discrimination leads to adverse health outcomes. In gerontology, the application of MST has been explored to understand health disparities among older LGBTQ + individuals. A study by Fredriksen-Goldsen et al. (2014) applied MST to examine health disparities in aging LGBTQ + populations, finding that lifetime experiences of discrimination and victimization contribute to poorer physical and mental health outcomes in older age.Furthermore, a study by Emlet et al. (2017) extended MST to understand mental health disparities among older LGBTQ + adults, highlighting that cumulative experiences of minority stress are linked to increased depressive symptoms and decreased life satisfaction in this population.Drawing upon the reviewed literature and guided by Minority Stress Theory, the following conceptual framework was developed to illustrate the hypothesized relationships among discrimination, mediating protective factors, and cognitive decline outcomes in elderly transgender individuals (see Fig. 1).

3. Methodology

3.1. Research design

This study employed a mixed-methods research design to comprehensively explore the intersection of cognitive decline and discrimination among elderly transgender individuals. By integrating both quantitative and qualitative approaches, the research aimed to capture not only statistical patterns but also the nuanced lived experiences of the participants. This methodological pluralism allowed for a richer, more holistic understanding of the complexities surrounding transgender aging and health.

3.2. Participants and sampling

A total of 137 self-identified transgender individuals aged 60 years and above participated in the study. The age of participants ranged from 60 to 82 years, with a mean age of 66.7 years (SD = 5.4). The gender identity breakdown included 79 transgender women (57.7 %), 36 transgender men (26.3 %), and 22 non-binary individuals (16.0 %). Educational attainment varied: 34.3 % had completed secondary education, 29.9 % had some college education or vocational training, 24.1 % had completed only primary education, and 11.7 % were illiterate. Regarding employment, 42.3 % were currently unemployed or retired, 30.7 % were engaged in informal or daily wage labor, and 27.0 % reported part-time or self-employment. Socioeconomic status, assessed via household income and asset ownership, indicated that a majority (61.2 %) belonged to lower-income strata, 26.3 % to middle-income, and 12.5 % to higher-income categories. Information on transition history showed that 48.9 % had socially transitioned before age 40, while 29.2 % transitioned between 40 and 60, and 21.9 % transitioned at age 60 or later. Ethnicity and caste data were not collected to protect participant anonymity given the sensitive nature of intersectional identities in the Indian context. To enhance the representativeness and reach of the sample, a combination of purposive, snowball, and limited random sampling strategies was used. Initial participants were recruited through LGBTQ + community organizations, eldercare networks, and advocacy forums. These individuals then referred others within their social networks. Approximately 63.5 % of participants were recruited via snowball sampling, while 36.5 % were identified through organizational networks and outreach channels.

Sampling was conducted using a hybrid approach that combined purposive, snowball, and limited random sampling methods to ensure both targeted reach and broader representation. The process began with purposive outreach to community-based organizations, eldercare advocates, and LGBTQ + health collectives across five Indian states. These groups distributed the study invitation to eligible individuals within their networks. Simultaneously, a limited random sampling approach was applied by distributing paper surveys to a randomized subset of residents in two urban senior housing facilities known to have LGBTQ + populations. Subsequently, snowball sampling was employed: initial respondents were asked to refer others in their networks who met the eligibility criteria. This approach proved especially effective in accessing socially isolated individuals or those with limited institutional affiliation. Approximately 63.5 % of participants were recruited via snowball referrals, while 36.5 % were recruited through organizational

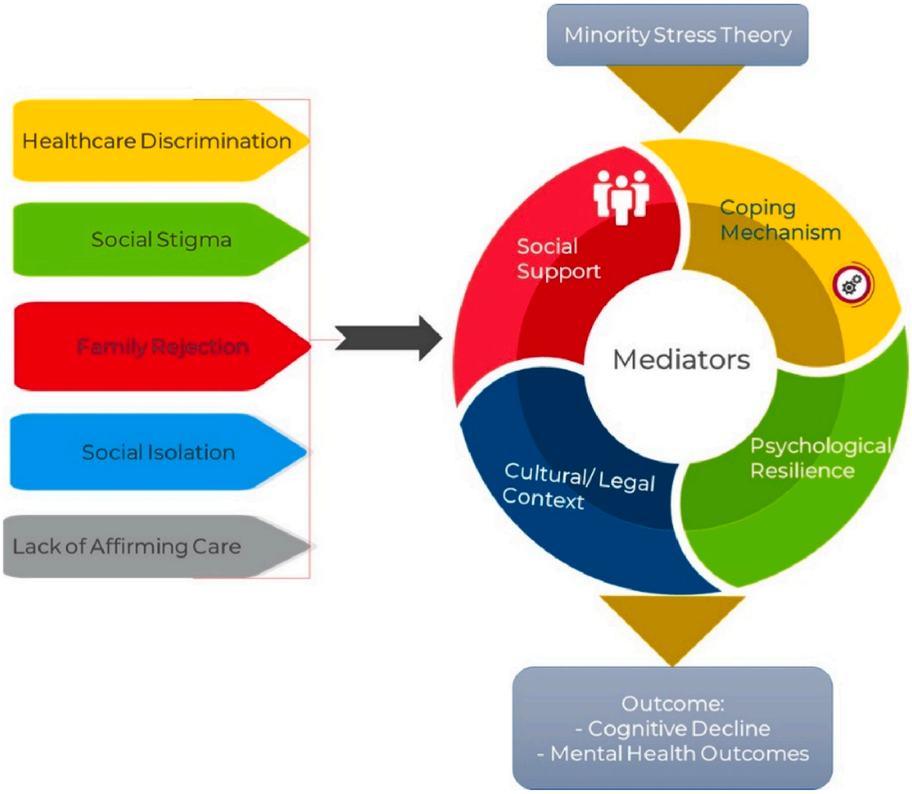

Fig. 1. Conceptual framework – the impact of discrimination on cognitive decline among elderly transgender individuals (guided by minority stress theory).

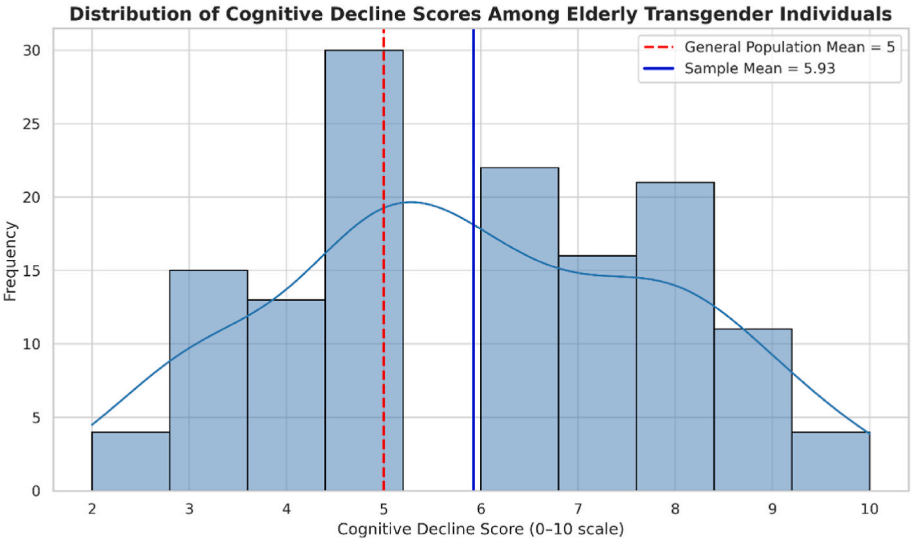

Fig. 2. Distribution of cognitive decline scores among elderly transgender individuals (n = 137). The histogram illustrates a right-skewed distribution, with most scores clustering between 6 and 8. The sample mean of 5.93 exceeds the general.

partnerships and random distribution. Out of 182 individuals approached or referred, 137 completed the survey, yielding a response rate of approximately 75.3 %. Reasons for non-participation included disinterest, privacy concerns, and cognitive limitations.

3.3. *Instruments and data collection*

Quantitative data were collected using a structured questionnaire comprising standardized and adapted measures to assess cognitive function, perceived healthcare discrimination, social isolation, and fears related to identity loss. To ensure cultural and linguistic appropriateness, all items were pretested with a pilot group of twelve transgender older adults representing diverse linguistic and gender identities. Cognitive function was assessed using an adapted short-form version of the Mini-Mental State Examination (MMSE), modified for use in community settings with lower literacy populations. Five items were selected to represent core domains of cognitive health: short-term memory (e.g., three-word recall), temporal and spatial orientation, attention and concentration (e.g., serial subtraction), word registration and delayed recall, and self-perceived cognitive difficulty. Responses were coded using a combination of ordinal scales (ranging from 0 to 4) and binary formats (0 = No, 1 = Yes), depending on the nature of each item. A composite Cognitive Decline Score was calculated by summing the individual item scores, resulting in a total score ranging from 0 to 10, with higher scores indicating greater perceived or observable cognitive impairment. The scale demonstrated acceptable internal consistency (Cronbach's alpha = 0.78). Perceived discrimination in healthcare settings was measured using a single-item indicator that asked participants whether they believed their healthcare providers possessed adequate knowledge of transgender health needs. Response options included “Yes,” “No,” and “Not Sure.” Although simple in construction, this item was derived from themes identified during pilot interviews and was reviewed for face validity by an expert panel familiar with transgender healthcare contexts in India. Social isolation was assessed using an adapted version of the UCLA Loneliness Scale (short form). Three items were included to evaluate the frequency of social interaction, perceived emotional support, and the subjective experience of isolation. Participants responded using a five-point Likert scale ranging from “Never” (0) to “Always” (4), and a composite Social Isolation Score was created by summing the item scores. The modified scale yielded strong internal reliability (α = 0.81) within the study population. To assess psychological concerns specific to aging transgender individuals, the study introduced a novel item measuring fear of “gender reversal”—the anxiety that cognitive decline may result in being misgendered or losing awareness of one's affirmed gender identity. Participants were asked directly, “Are you afraid that cognitive decline might lead others to misgender you or cause you to forget your gender identity?” with binary response options. This item was developed through consultation with experts in transgender aging and grounded in themes emerging from prior exploratory interviews, thereby ensuring contextual relevance and interpretive clarity.

4. Cognitive decline operationalization

The measurement of cognitive decline in this study was adapted for use in a cross-sectional community-based setting, acknowledging the inherent limitations of not having longitudinal data. While cognitive decline is typically assessed over time to detect deterioration, this study utilized a proxy approach by combining standardized screening items and subjective self-reports to construct a composite index. The cognitive assessment included five items drawn from validated tools such as the MMSE and the Montreal Cognitive Assessment (MoCA), tailored for brevity, cultural sensitivity, and relevance to the target population's education level and linguistic diversity. Adaptations to the MMSE involved simplifying language, substituting culturally appropriate stimuli, and modifying scoring thresholds to reflect contextual understanding rather than clinical diagnostic criteria. For example, instead of the standard serial sevens subtraction, participants were asked to count backward from 20 by twos. Orientation questions were localized by referencing regional festivals or landmarks, while memory items were tested using commonly recognized objects or words familiar to the demographic. When participants were unable to respond in English, equivalent versions were administered in local languages with the aid of trained bilingual research assistants. Approximately 86 % of participants completed the adapted MMSE items directly, while the remaining 14 % were assessed using a comparable screening tool based on MoCA subscales, due to language barriers or situational needs. Scores from both instruments were calibrated using z-score transformations to ensure comparability before constructing the final Cognitive Decline Score. Given the cross-sectional nature of the study, the term “cognitive decline” refers to either perceived cognitive difficulties or impairments relative to established population benchmarks, not to actual deterioration over time. This interpretive limitation is acknowledged and discussed further in the limitations section. However, combining self-reported cognitive difficulty with proxy performance metrics provides a meaningful indicator of neurocognitive vulnerability within the studied population—especially in the absence of longitudinal data and within a structurally marginalized cohort with limited access to formal neuropsychological evaluations.

5. Procedure

5.1. Survey mode and accessibility

To ensure accessibility and accommodate varying levels of digital literacy, the structured survey was made available in both print and electronic formats. Participants were offered their preferred mode of completion during initial contact. Of the 137 participants, 57 individuals (41.6 %) completed the survey electronically via a secure, mobile-accessible platform, while 80 individuals (58.4 %) opted for the printed version, which was administered either in-person by trained researchers or returned via drop-box collection at affiliated community centers. The electronic survey included features such as audio playback and language selection to enhance usability for visually impaired or low-literacy respondents. The print survey, similarly, was offered in both English and three major local languages and was administered with reading assistance when requested. This dual-mode approach was essential in minimizing exclusion bias, particularly among older transgender individuals who may lack access to or familiarity with digital technologies. All responses, regardless of format, were entered into a centralized database for uniformity in analysis.

5.2. Language use and translation procedures

Given the linguistic diversity of the participant population, semi-structured interviews were conducted in English, Hindi, Tamil, and Bengali, depending on the participant's preference and regional background. Of the 35 interviews conducted, 17 (48.6 %) were in English, 9 (25.7 %) in Hindi, 6 (17.1 %) in Tamil, and 3 (8.6 %) in Bengali. To ensure consistency and fidelity across languages, all non-English interviews were conducted by bilingual researchers who were native speakers of the respective languages and trained in qualitative research ethics and techniques. Each interview was audio-recorded, transcribed verbatim in the original language, and then translated into English by the same bilingual interviewer. A second researcher independently reviewed the translations for accuracy and consistency. Discrepancies were resolved through consensus discussions. This rigorous translation process was essential to preserve the semantic integrity of participants' narratives and minimize interpretive distortion in cross-language qualitative analysis.

5.3. Interview design and researcher training

The qualitative component of this study was based on semi-structured interviews designed to explore cognitive challenges, identity preservation, and healthcare discrimination experienced by elderly transgender individuals. An interview guide was developed by the research team in consultation with experts in transgender health, gerontology, and medical anthropology. The guide consisted of 10 core questions with additional probes, covering domains such as perceived memory loss, fears of misgendering, experiences in clinical settings, coping strategies, and social support structures. To ensure transparency and replicability, the full list of interview questions is provided in Appendix A. Interviews were conducted by four trained qualitative researchers with backgrounds in psychology, social work, and gender studies. All interviewers underwent a three-day training workshop focused on trauma-informed interviewing, LGBTQ + cultural competence, and ethical handling of sensitive data. Interviewers also received supervision throughout the data collection period, including weekly debriefings to ensure adherence to protocols and emotional support for researchers. Each interview lasted between 45 and 75 min, depending on participant comfort and availability, and was conducted in a private setting to protect confidentiality. This structured approach ensured consistency across interviews while allowing flexibility for participants to elaborate on personal experiences and contextual nuances.

5.4. Qualitative analysis and rigor

All interview transcripts were analyzed using thematic analysis guided by Braun and Clarke's six-phase framework. Following transcription and translation, the research team conducted initial familiarization through repeated readings of the data. A preliminary coding schema was developed both inductively from the data and deductively based on concepts from Minority Stress Theory and prior literature on transgender aging. Coding was conducted using NVivo 12 software to facilitate data organization and pattern recognition. Each transcript was coded independently by two researchers to ensure inter-coder reliability. The initial interrater agreement rate was 87 %, and discrepancies were resolved through discussion to achieve consensus. To enhance methodological rigor, the study employed multiple validation strategies. First, an audit trail was maintained documenting all decisions made during data processing and analysis. Second, peer debriefings were held biweekly to review emerging codes and thematic clusters. Third, researchers provided positionality statements to acknowledge their own identities, potential biases, and relationships to the transgender community, thereby enhancing reflexivity. Finally, thematic saturation was reached when no new themes emerged after coding the final five interviews, indicating sufficient depth and coverage of the core issues under investigation. This rigorous and transparent analytic process ensured that the identified themes—such as memory loss as identity threat, fear of misgendering, and systemic neglect—were firmly grounded in the narratives of the participants.

5.4. Ethical considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of the affiliated research institution. All participants provided informed consent, with detailed explanations of study objectives, procedures, and the voluntary nature of their participation. To protect participant privacy, all data were anonymized and securely stored. Pseudonyms were used in any quoted material. Special care was taken to create a safe and affirming research environment, acknowledging the unique vulnerabilities faced by the transgender elderly population.

6. Result

6.1. Cognitive decline and neuropsychosocial vulnerability

Fig. 1 illustrates the distribution of Cognitive Decline (CD) Scores among participants, with the majority clustering in the 6–8 range. The sample mean was 5.93 (SD = 2.01). For visual reference, the general population benchmark of 5 is included as a red dashed line based on prior normative studies in similarly aged Indian cohorts (e.g., Sharma and Dubey, 2018). A one-sample *t*-test yielded $t\,(135) = 5.39$, $p < 0.001$, indicating the sample mean significantly exceeded the normative expectation. Although this study is cross-sectional, not longitudinal, the result highlights a lower cognitive baseline among elderly transgender individuals—likely shaped by structural disadvantage. The **Shapiro-Wilk test** ($W = 0.9593$, $p = 0.00045$) confirmed a non-normal distribution, with CD scores more tightly clustered toward the higher (worse) end. This skew further supports the hypothesis that cognitive difficulties are not evenly distributed, but rather disproportionately concentrated in a high-risk subgroup.

To explore how cognitive outcomes relate to social stressors, **Pearson correlations** were conducted.

These correlations indicate meaningful relationships between cognitive decline and multiple psychosocial stressors. The moderate positive correlation between CD scores and social isolation ($r = 0.31$, $p < 0.001$) suggests that individuals experiencing more isolation also report greater cognitive difficulties. Similarly, significant associations with reported healthcare discrimination ($r = 0.27$, $p = 0.002$) and fear of gender reversal due to memory loss ($r = 0.35$, $p < 0.001$) highlight how structural and psychological stressors intersect with neurocognitive health. Notably, the strong correlation between social isolation and healthcare discrimination ($r = 0.41$, $p < 0.001$) reflects the compounding vulnerabilities faced by transgender elders in unsupportive environments. These findings support the theoretical framework of Minority Stress, in which chronic exposure to stigma and marginalization produces adverse health outcomes—including cognitive strain—over time.

Refer to Fig. 1: *Distribution of Cognitive Decline Scores Among Elderly Transgender Individuals.*

This histogram illustrates the skewed distribution of scores, with a peak in the 6–8 range and sample mean (blue line) exceeding the population benchmark (red dashed line).

6.2. *Lived experiences of cognitive vulnerability and identity threat*

Qualitative interviews with 35 elderly transgender individuals revealed three major themes related to cognitive vulnerability: memory loss as a threat to gender identity, fear of misgendering during cognitive decline, and perceived neglect of cognitive health in medical settings. These themes underscore the psychosocial dimensions of aging among marginalized gender minorities (see Fig. 2).

Theme 1. Memory Loss as Identity Threat

Many participants expressed deep concern that memory loss could erode their affirmed gender identity. Rather than simply fearing forgetfulness, participants described a fear of losing the hard-won self they had asserted over decades. *"I forget things all the time now, but what scares me the most is not remembering who I am—like really, who I've fought to be."* (68-year-old trans woman, Tamil Nadu)

> *"There are days when I look at my own photos and feel like I'm staring at someone else. What if one day I actually believe I'm him again?"*— 64-year-old trans man, Karnataka

Theme 2. Fear of Misgendering in Cognitive Decline

A prevalent anxiety was the possibility of being misgendered in care settings, especially if cognitive impairment rendered participants unable to advocate for themselves.

> "*I've told my niece—if I start forgetting or acting different, don't let them put 'he/him' on anything. I'd rather die.*" (70-year-old nonbinary individual, Maharashtra)

> *"Hospitals don't ask you who you were; they ask who you are. But if I forget to say it, will anyone still respect it?"* — 66-year-old trans woman, Delhi

Theme 3. Lack of Cognitive Health Support from Providers

Many participants reported that doctors did not inquire about cognitive issues and often overlooked aging-related concerns in transgender patients.

> "*My doctor asked if I had anxiety, but never anything about memory. It's like they don't expect us to age, or to matter once we do.*" (65-year-old trans man, Karnataka)

> *"They checked my blood pressure but ignored the fact that I said I forget where I put my keys five times a day."*— 72-year-old trans woman, Kerala

These themes reveal how cognitive challenges intersect with identity fragility, particularly in systems not designed to support transgender elders. The narratives highlight fears not just of memory loss, but of losing one's affirmed gender identity in environments where misrecognition is common and potentially traumatic. This form of psychological vulnerability aligns with Minority Stress Theory (Meyer, 2003), which posits that chronic exposure to stigma, discrimination, and systemic invalidation accumulates as physiological and psychological stress—contributing to neurocognitive dysfunction over time. These findings are further supported by prior research in gerontology and LGBTQ + health, which shows that older sexual and gender minorities face higher rates of mental health issues, chronic illness, and cognitive decline (Fredriksen-Goldsen et al., 2014; Emlet et al., 2017). Specific fears of "gender confusion" or identity reversion during cognitive impairment—described by participants in this study and echoed in Witten (2016)—illustrate the profound risk to personal identity when memory loss intersects with loss of agency. Together, the quantitative and qualitative data highlight transgender elders as a high-risk, under-served population, emphasizing the need for gender-affirming cognitive care models, trans-inclusive assessment protocols, and provider training across eldercare and dementia services (see Table 2).

6.3. *Healthcare discrimination*

Healthcare access and quality are critical for aging populations, particularly transgender elders who frequently encounter stigma, neglect, and systemic unpreparedness in clinical contexts. This section explores perceived adequacy of provider knowledge about transgender health—a core component influencing healthcare engagement, preventive care, and trust in medical institutions.

6.3.1. *Chi-square goodness-of-fit test*

To assess whether responses deviated from a uniform distribution (equal expectation across categories), a chi-square test was applied:

Where.

- O_i = observed frequency
- E_i = expected frequency under uniform distribution

Although the chi-square result was not statistically significant, the **clinical relevance remains high:** a clear majority of participants either doubt or do not trust provider competence in transgender health, which affects care-seeking behaviors and patient safety.

The distribution of responses to the question regarding healthcare provider knowledge revealed that only 30.15 % of participants believed providers were adequately informed about transgender health needs, while 35.29 % responded "No" and 34.56 % indicated "Not Sure." Although the chi-square goodness-of-fit test ($\chi^2 = 0.632$, $df = 2$, $p = 0.728931$) found no statistically significant deviation from a uniform distribution, the practical implications of these findings are substantial. The absence of statistical significance does not negate the clinical relevance of the result—in fact, the uniform spread of negative or uncertain responses suggests a consistently low level of trust and confidence in healthcare systems among transgender elders. Interpreted through the lens of Minority Stress Theory (Meyer, 2003), these findings exemplify chronic, external stressors that undermine healthcare access and discourage care-seeking behaviors. This aligns with Gonzales and Henning-Smith (2017), who reported pervasive dissatisfaction and avoidance of medical systems among older transgender individuals, and Seelman et al. (2017), who identified frequent experiences of misgendering and lack of provider competence. Thus, while not statistically significant in a traditional inferential sense, the data underscore a structurally embedded gap in trans-affirmative healthcare education and delivery. This warrants urgent policy and practice-level interventions, including the implementation of gender-affirmative training for providers, particularly in geriatric and cognitive care settings.

6.3.2. *Social isolation*

Social isolation is a critical determinant of cognitive, psychological, and physiological well-being in aging populations. Among elderly transgender individuals, the risk of isolation is often exacerbated by intersecting factors such as family estrangement, inadequate social support, societal stigma, and exclusion from both mainstream eldercare services and younger LGBTQ + networks. Unlike social loneliness, which can be transient, structural isolation tends to be chronic and accumulates over the life course, amplifying minority stress. This study investigates the prevalence and severity of social isolation in the transgender elderly population and its potential implications for cognitive decline and mental health vulnerabilities.

From above Table 3 findings indicate that the median level of isolation is already “Sometimes”, while the 75th percentile falls at “Always,” suggesting a strong upper-skew in isolation severity.

Table 4 statistical analysis revealed that the distribution of Social Isolation Scores deviates significantly from normality, as indicated by the Shapiro-Wilk test ($W = 0.8541$, $p = 0.000$). This confirms that social isolation in the sample is not evenly distributed but is skewed toward higher frequencies of isolation, particularly among individuals who reported “Often” or “Always” feeling socially isolated. Furthermore, the one-sample *t*-test comparing the sample mean score (2.18) to a reference mean of 2 (“Sometimes”) produced a t-value of 2.2000 and a p-value of 0.04511, indicating that the level of isolation in the study population is significantly higher than what would be expected under average conditions. This statistically significant difference highlights the chronic and elevated nature of social isolation among elderly transgender individuals.

These findings align with and reinforce prior research. Fredriksen-Goldsen et al. (2015) found that LGBTQ + elders—especially transgender individuals—are more likely to live alone, be estranged from family, and lack access to informal caregiving networks. This puts them at disproportionate risk of emotional isolation, which is closely linked to negative mental and cognitive outcomes. Similarly, Emlet et al. (2017) observed that social isolation was a strong predictor of depressive symptoms, health decline, and cognitive impairment in older LGBTQ + adults. In the context of Minority Stress Theory (Meyer, 2003), chronic social isolation is understood as both a byproduct of cumulative discrimination and a reinforcing stressor that worsens health disparities over time. Thus, the combination of statistical evidence and theoretical validation underscores the urgent need for socially integrative and affirming eldercare strategies. Community-centered aging services, intergenerational LGBTQ + programs, and intentional support networks are not just beneficial—they are necessary to mitigate the cognitive, emotional, and structural harm caused by persistent isolation.

6.3.3. *Fear of “gender reversal”*

As transgender individuals age, cognitive decline introduces a unique psychological risk: the fear of inadvertently reverting to one’s birth-assigned gender due to memory loss or diminished self-awareness—a phenomenon referred to as “gender reversal.” This concern is distinct from general anxieties about aging or dementia; it reflects a profound vulnerability tied to gender identity preservation, particularly in contexts like institutional care, where external labelling and decision-making override personal agency. For elderly transgender individuals, gender identity is not only an internal sense of self but often the product of decades of resistance, transition, and affirmation. The possibility of losing this identity—through confusion, misgendering, or neglect—poses a deep existential and emotional threat. This study investigates the prevalence of such concerns among participants and examines whether this fear constitutes a statistically and clinically significant issue in the context of aging transgender health.

Table 2
Chi-square test.

Metric	Value
Chi-square Statistic	0.632
Degrees of Freedom	2
p-value	0.728931
Interpretation	Not statistically significant ($p > 0.05$)

Table 3
Social isolation.

Statistic	Value
Mean	2.18
Standard Deviation	1.53
Minimum	0(Never)
25th Percentile (Q1)	1
Median (Q2)	2
75th Percentile (Q3)	4
Maximum	4 (Always)
Sample Size	136

Table 4
Shapiro- Wilk test.

Test	Test Statistic	p-value	Sample Size (n)
Shapiro-Wilk Normality Test	0.8541	0	136
One-Sample T-Test (Âμ = 2)	2.2000	0.04511	136

The concept of “gender reversal”—the fear of involuntarily reverting to one’s birth-assigned gender due to cognitive decline—emerged as a uniquely distressing concern for elderly transgender individuals. Table 5 indicates that 54.41 % of participants expressed concern about losing their gender identity as a result of memory loss or reduced cognitive function, while 45.59 % reported no such concern. A chi-square goodness-of-fit test revealed that this distribution was statistically significant ($\chi^2 = 4.689$, $df = 1$, $p = 0.0303484$), confirming that the observed difference between groups is unlikely to be due to chance. This statistically significant result underscores the psychological salience of this fear within the population studied. From a minority stress perspective, this concern can be interpreted as an internalization of long-term identity surveillance—where the self is continually monitored, protected, and reaffirmed across the lifespan. As cognitive capacity declines with age, so too does the ability to actively assert and defend one’s gender identity, particularly in institutional care settings. Witten (2016) discusses how transgender elders with cognitive impairments are often misgendered in hospitals and nursing homes, leading to emotional trauma and identity erasure. This is not merely a symbolic issue; it has measurable effects on psychological well-being, especially when combined with other aging-related vulnerabilities such as dementia or Alzheimer’s disease. Further, Porter et al. (2022) highlight that many transgenders’ elders fear losing control over gender expression during advanced cognitive decline, particularly when reliant on caregivers who may not be affirming or even aware of the individual’s gender history. This risk is amplified in settings where staff training on transgender aging is absent or inconsistent. For many participants in this study, cognitive decline is not just a medical process, but a threat to the

Table 5
Gender reversal analysis.

Test	Test Statistic	p-value	Sample Size (n)
Shapiro-Wilk Normality Test	0.8541	0	136
One-Sample T-Test ($\mu = 2$)	2.2000	0.04511	136

hard-won integrity of gender identity—an identity that has often been fought for against medical, legal, and familial resistance.

The data from this study validate the need for gender-affirmative memory care protocols, including detailed advance directives, care planning documents that include pronouns and name use, and caregiver education tailored specifically for transgender aging populations. As these results demonstrate, the fear of losing gender identity due to cognitive regression is both statistically and psychologically significant, and must be addressed in eldercare, palliative care, and dementia services.

7. Discussion and implications

This study provides novel evidence on the intersection between cognitive decline, social marginalization, and healthcare discrimination among elderly transgender individuals in India. Using a mixed-methods approach grounded in Minority Stress Theory, it contributes to a growing yet still limited body of literature addressing cognitive aging in marginalized populations. The results underscore not only the elevated cognitive burden among transgender elders but also the socio-structurally barriers that exacerbate this vulnerability. The mean cognitive decline score in the sample was significantly higher than the general elderly population benchmark ($M = 5.93$, $t(135) = 5.39$, $p < 0.001$), suggesting that aging transgender individuals may be at disproportionately high risk for cognitive impairment. This aligns with research by Fredriksen-Goldsen et al. (2015), which found that LGBTQ + elders face higher rates of chronic health conditions and reduced cognitive resilience due to cumulative stress exposure. Similarly, Meyer's (2003) Minority Stress Model provides a compelling framework through which to interpret these findings: persistent discrimination, internalized stigma, and institutional neglect function as chronic stressors, which over time may contribute to neurocognitive decline. In addition to the quantitative findings, the qualitative narratives added rich insight into participants' lived experiences. Fears of "gender reversal" during cognitive decline—reported by over half the sample—reflect a deep-rooted anxiety about misgendering, institutional misidentification, and the erasure of one's gender identity in old age. These themes resonate with Witten (2016) and Porter et al. (2022), who documented how transgender individuals experiencing dementia are at risk of being misgendered or treated according to their birth-assigned sex due to memory loss and institutional care practices. This fear is more than symbolic; it speaks to the existential threat of losing autonomy over one's affirmed self in the final stages of life.

Equally significant is the widespread lack of confidence in healthcare providers. Nearly 70 % of respondents either believed that providers were not adequately informed about transgender health or were unsure. This reflects systemic educational gaps and a broader culture of unpreparedness in mainstream geriatric and dementia care. Social isolation—reported as "Often" or "Always" by nearly half the sample—emerged as another compounding factor that both reflects and reinforces cognitive and emotional deterioration. Taken together, these findings indicate the urgent need for structural interventions. Healthcare systems must integrate transgender-specific education into medical and caregiving training programs, particularly in geriatrics, neurology, and palliative care. Policy efforts should mandate inclusive documentation practices, such as affirming pronouns, transition history, and gendered care preferences, especially in memory care and institutional settings. Community-level support systems—including peer networks, LGBTQ + -inclusive elder housing, and intergenerational care models—are also essential to reduce social isolation and build resilience. Importantly, this study calls attention to the invisibility of aging transgender populations in global health research and policy. Their experiences are not adequately captured in either mainstream aging studies or LGBTQ + health initiatives. To move toward true equity, these intersecting identities and vulnerabilities must be recognized and addressed through both research and institutional reform.

8. Conclusion, limitations, and future directions

This study reveals significant cognitive, psychological, and systemic challenges faced by elderly transgender individuals, particularly in relation to discrimination, healthcare inadequacies, and social isolation. The integration of quantitative and qualitative findings provides robust evidence that cognitive decline in this population is not only statistically measurable but deeply intertwined with lived experiences of stigma and marginalization. These findings reinforce the urgent need for trans-inclusive aging policies, memory care protocols, and community support systems to protect the identity, dignity, and health of transgender elders.

8.1. Limitations of the study

Despite its contributions, the study has several limitations. First, the sample size—while substantial for a focused population—is not nationally representative and may be skewed by geographic, socioeconomic, or cultural factors specific to the region studied. Second, the cross-sectional nature of the design limits causal inferences; cognitive decline and social experiences were measured concurrently, not over time. Third, some survey responses were self-reported, which may introduce recall bias or social desirability effects. Finally, the qualitative component, although rich, involved a limited number of interviews and may not capture the full diversity of transgender aging experiences across linguistic, caste, or regional lines.

9. Scope for further research

Future studies should adopt longitudinal designs to track changes in cognitive function, identity affirmation, and healthcare interactions over time among transgender elders. Expanding the study to include more diverse geographic and linguistic groups within India—and beyond—would improve generalizability. There is also a need for intervention-based research that tests the effectiveness of trans-affirmative dementia care models, inclusive healthcare training, and community-based support systems in reducing isolation and cognitive risk. Additionally, integrating neuropsychological assessments or clinical screenings could enhance the objectivity of cognitive data. Importantly, future research must continue to center the voices of transgender elders, whose experiences remain profoundly underrepresented in both gerontological and LGBTQ + health literature.

CRediT authorship contribution statement

S. Gnana Sanga Mithra: Writing – original draft, Supervision, Resources, Conceptualization. **S. Bhavana:** Formal analysis, Data curation.

Ethics approval statement

Ethical approval for this study was obtained from the Institutional Ethics Committee of Vinayaka Mission's Law School, Vinayaka Mission's Research Foundation (Deemed to be University), Chennai. All participants provided informed consent prior to participation, and all procedures adhered to the ethical standards outlined for research involving human subjects.

Declaration of competing interest

The authors declare no competing interests. This research was conducted independently, and no funding body had any role in the study design, data collection, analysis, interpretation, or in the decision to submit the manuscript for publication.

Acknowledgements

The authors express their heartfelt gratitude to all the transgender elders who participated in this study and generously shared their lived experiences. We also thank the LGBTQ + community organizations, and field volunteers who supported participant recruitment and ensured a safe and inclusive research environment.

Appendix A. Semi-structured interview guide

1. Can you describe your day-to-day experiences as an older transgender person in your community?
2. Have you experienced any changes in memory, attention, or other cognitive functions as you've aged?
3. How comfortable are you with the healthcare you receive?
4. Have you ever experienced misgendering or discrimination by medical professionals?
5. Do you worry about forgetting aspects of your gender identity or presentation?
6. How do you cope with memory or cognitive difficulties, if any?
7. Are you connected to any support groups or transgender networks?
8. What kind of support do you wish was more available to transgender elders?

Note: Interviews were conducted in English and regional languages, with appropriate translation and transcription protocols as detailed in the Methods section.

Appendix B. Cognitive decline composite score items

The following five items were used to calculate the Cognitive Decline (CD) Score (range: 0–10).

1. Difficulty remembering recent events (0–4 scale)
2. Frequently misplacing items (0–4 scale)
3. Trouble concentrating during daily tasks (0–4 scale)
4. Trouble recognizing familiar faces or places (0–4 scale)
5. Self-reported memory complaints (Yes = 1, No = 0)

Scoring procedures, validity notes, and data handling are described in the Methods section.

Data availability

Data will be made available on request.

References

Chakrapani, V., Mehta, S., Raj, A., 2023. Transgender health research in India: a systematic review and agenda for action. Indian J. Med. Res. 157 (2), 101–116. https://doi.org/10.4103/ijmr.IJMR_1234_22.

Christensen, H., Mackinnon, A.J., Korten, A., Jorm, A.F., 2003. The "common cause hypothesis" of cognitive aging: evidence for not only a common factor but also specific associations of some cognitive abilities. Psychol. Aging 18 (4), 538–546. https://doi.org/10.1037/0882-7974.18.4.538.

Emlet, C.A., Fredriksen-Goldsen, K.I., Kim, H.-J., 2017. Risk and protective factors associated with health-related quality of life among older gay and bisexual men living with HIV. Gerontol. 57 (Suppl. l_1), S120–S129. https://doi.org/10.1093/geront/gnw171.

Fredriksen-Goldsen, K.I., Kim, H.-J., Emlet, C.A., Muraco, A., Erosheva, E.A., Hoy-Ellis, C.P., et al., 2014. The aging and health report: disparities and resilience among lesbian, gay, bisexual, and transgender older adults. J. Aging Soc. Pol. 26 (2), 103–120. https://doi.org/10.1080/08959420.2014.884659.

Fredriksen-Goldsen, K.I., Kim, H.-J., Shiu, C., Goldsen, J., Emlet, C.A., 2015. Successful aging among LGBT older adults: physical and mental health-related quality of life by age group. Gerontol. 55 (1), 154–168. https://doi.org/10.1093/geront/gnu081.

Gonzales, G., Henning-Smith, C., 2017. Barriers to care among transgender and gender nonconforming adults. Milbank Q. 95 (4), 726–748. https://doi.org/10.1111/1468-0009.12297.

Gonzales, G., Przedworski, J., Henning-Smith, C., 2021. Coping and healthcare utilization among LGBTQ older adults: an intersectional perspective. J. Appl. Gerontol. 40 (4), 411–420. https://doi.org/10.1177/0733464819893493.

Hatzenbuehler, M.L., Keyes, K.M., Hasin, D.S., 2010. State-level policies and psychiatric morbidity in lesbian, gay, and bisexual populations. Am. J. Publ. Health 100 (12), 2275–2281. https://doi.org/10.2105/AJPH.2009.174359.

Kesse-Guyot, E., Andreeva, V.A., Jeandel, C., Ferry, M., Galan, P., 2023. Micronutrient supplementation and cognitive decline: a systematic literature review. Nutr. Rev. 81 (1), 18–29. https://doi.org/10.1093/nutrit/nuac062.

Kuiper, J.S., Zuidersma, M., Oude Voshaar, R.C., Zuidema, S.U., van den Heuvel, E.R., Stolk, R.P., Smidt, N., 2016. Social relationships and cognitive decline: a systematic review and meta-analysis of longitudinal cohort studies. Int. J. Epidemiol. 45 (4), 1169–1206. https://doi.org/10.1093/ije/dyw089.

Lewis, N.M., Wilson, K., Hendrickson, Z.M., 2017. Experiences of discrimination and their impact on the mental health of transgender people. LGBT Health 4 (4), 258–265. https://doi.org/10.1089/lgbt.2016.0154.

Liu-Ambrose, T., Donaldson, M.G., Ahamed, Y., Graf, P., 2023. Physical activity and risk of cognitive decline: a systematic review. J. Aging Phys. Activ 31 (1), 50–65. https://doi.org/10.1123/japa.2022-0090.

Meyer, I.H., 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. Psychol. Bull. 129 (5), 674–697. https://doi.org/10.1037/0033-2909.129.5.674.

Millet, N., Longworth, J., Arcelus, J., 2017. Prevalence of anxiety symptoms and disorders in the transgender population: a systematic review of the literature. Int. J. Transgenderism 18 (1), 27–38. https://doi.org/10.1080/15532739.2016.1258352.

Pascoe, E.A., Smart Richman, L., 2009. Perceived discrimination and health: a meta-analytic review. Psychol. Bull. 135 (4), 531–554. https://doi.org/10.1037/a0016059.

Porter, K.E., Brennan-Ing, M., Seidel, L., 2022. Identity loss and care provision: transgender older adults living with cognitive impairment. J. Homosex. 69 (10), 1787–1806. https://doi.org/10.1080/00918369.2021.1903466.

Seelman, K.L., Colón-Diaz, M.J., LeCroix, R.H., Xavier-Brier, M., Kattari, L., 2017. Transgender noninclusive healthcare and delaying care because of fear: connections to general health and mental health among transgender adults. Transgender Health 2 (1), 17–28. https://doi.org/10.1089/trgh.2016.0024.

Sharma, R., Dubey, S., 2018. Normative cognitive scores in elderly Indian populations: a population-based MMSE validation. Indian J. Psychol. Med. 40 (3), 245–252. https://doi.org/10.4103/IJPSYM.IJPSYM_137_17.

Walker, R.J., Strom Williams, J., Smalls, B.L., Egede, L.E., 2022. Discrimination, racism, and diabetes: a systematic review and meta-analysis. Health Educ. Behav. 49 (3), 460–472. https://doi.org/10.1177/10901981211032728.

Williams, D.R., Mohammed, S.A., 2009. Discrimination and racial disparities in health: evidence and needed research. J. Behav. Med. 32 (1), 20–47. https://doi.org/10.1007/s10865-008-9185-0.

Witten, T.M., 2016. The intersectional challenges of aging and trans identities: a research agenda and policy imperative. J. Women Aging 28 (3), 176–188. https://doi.org/10.1080/08952841.2016.1178126.

Zheng, D.D., Swenor, B.K., Christ, S.L., West, S.K., Lam, B.L., Lee, D.J., 2022. Vision impairment and cognitive decline: a systematic review. J. Gerontol.: Series B 77 (1), 1–12. https://doi.org/10.1093/geronb/gbab012.