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Educational Attainment and Gender Differences in Depressive Symptoms among Older Adults in India

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ABSTRACT

In India, educational attainment varies substantially across gender and generations. Older women in particular have historically faced restricted access to formal education because of patriarchal norms, early marriage, and gendered household responsibilities. Consequently, a large proportion of older Indian women remain uneducated or possess very low levels of schooling compared with men. These educational inequalities may contribute significantly to gender gaps in depressive symptoms among older adults. For instance, education may provide women with greater autonomy, financial independence, and decision-making capacity, which can positively influence mental health outcomes. At the same time, the protective effect of education may differ between men and women because of unequal labor market participation, family expectations, and caregiving roles.

***Keywords**: Educational Attainment, Gender, Labor Market, Decision-Making, Financial Independence.*

Introduction

Population ageing has emerged as one of the most significant demographic transformations in India. Improvements in life expectancy and declining fertility rates have contributed to a rapidly growing older population, increasing concerns regarding the health and well-being of older adults. While physical health challenges among older adults have received substantial policy attention, mental health issues, particularly depressive symptoms, remain relatively underexplored despite their serious implications for quality of life, disability, and mortality. Depression in later life is associated with poorer physical functioning, cognitive decline, social isolation, and increased healthcare utilization, making it a critical public health concern (Pilania et al., 2019). In India, the burden of depression among older adults is particularly concerning because of limited mental health infrastructure, stigma surrounding mental illness, and inadequate geriatric mental healthcare services.

Existing research consistently demonstrates that depressive symptoms are not equally distributed across the population. Gender differences in depression are well documented, with older women generally reporting higher levels of depressive symptoms than older men (Paul et al., 2023; Kumar et al., 2023. Several explanations have been proposed for this disparity, including women's lower socioeconomic status, higher levels of widowhood, caregiving responsibilities, chronic health conditions, and reduced access to resources across the life course (Girgus et al., 2017; Nayak et al., 2019). In the Indian context, gender inequalities are deeply embedded in social, cultural, and economic structures, which may intensify mental health disadvantages among older women. Studies using nationally representative data from the Longitudinal Ageing Study in India (LASI) have shown that older women experience a significantly higher prevalence of depression than men (Paul et al., 2023). Similarly, evidence suggests that female older adults, particularly those living in rural areas and economically disadvantaged households, are more vulnerable to depressive symptoms than their male counterparts (Kumar et al., 2023).

Although gender differences in depressive symptoms are well established, less attention has been devoted to understanding whether education modifies or predicts these gender disparities in later-life mental health. Education is one of the most important social determinants of health and has profound implications for mental well-being throughout the life-course. Higher educational attainment may improve mental health by increasing employment opportunities, income security, social status, health literacy, problem-solving skills, and social networks. Education may also enhance an individual's sense of control and resilience, thereby reducing psychological distress in old age. Conversely, lower educational attainment may increase vulnerability to depression due to lifelong socioeconomic disadvantages, reduced access to healthcare, and limited coping resources.

The relationship between education and depression among older adults has been examined in several international studies, which generally report that individuals with higher education are less likely to experience depressive symptoms. However, findings from low- and middle-income countries remain limited and inconsistent. In India, most studies on depression among older adults have focused on demographic, economic, and health-related correlates such as age, marital status, chronic illness, disability, and living arrangements (Srivastava et al., 2021; Paul et al., 2023). Comparatively fewer studies have explored the interaction between gender and education in shaping depressive symptoms in later life. Understanding whether educational attainment reduces, widens, or otherwise modifies gender disparities in depression is important for identifying vulnerable groups and informing policies aimed at promoting healthy ageing.

The Indian context provides a particularly important setting for examining these relationships because current cohorts of older adults experienced substantial gender-based inequalities in access to education and employment opportunities throughout their lives. These inequalities likely accumulated over time and may continue to influence mental health in old age. Moreover, the benefits of education may not operate uniformly across genders. While higher education may empower women and improve their social and economic conditions, gender discrimination and unequal caregiving burdens may limit the mental health benefits women derive from education compared with men. Therefore, examining whether education predicts gender differences in depressive symptoms can provide deeper insight into the mechanisms through which social inequalities shape mental health outcomes among older adults.

Another important consideration is that depressive symptoms among older adults are often underdiagnosed and undertreated in India. Social stigma associated with mental illness, lack of awareness, and inadequate mental healthcare services contribute to low rates of diagnosis and treatment, particularly among socioeconomically disadvantaged groups (Devikrishna et al., 2024). Education may influence mental health awareness and healthcare-seeking behavior, thereby affecting both the reporting and management of depressive symptoms. Consequently, understanding educational differences in depressive symptoms across gender groups has important implications for public health interventions and mental health policy.

Against this background, the present study examines whether education predicts gender differences in depressive symptoms among older adults in India. Specifically, the study seeks to understand whether the association between gender and depressive symptoms varies across levels of educational attainment. By focusing on the intersection of gender and education, this study contributes to the growing literature on social determinants of mental health among older adults in India. The findings may help identify socially disadvantaged groups at greater risk of depression and provide evidence for targeted interventions aimed at reducing mental health inequalities in later life.

Methods

Data Source

This study utilized data from the Longitudinal Ageing Study in India (LASI), Wave 1, conducted in 2017–18. LASI is a nationally representative survey that collects comprehensive information on the health, economic, and social well-being of adults aged 45 years and older in India. The survey covers all states and union territories and is harmonized with international aging studies such as the Health and Retirement Study (HRS). For this analysis, a pooled sample of 68,939 respondents aged 18 years and above was used to assess depressive symptoms and their correlates.

Outcome Variable

The primary outcome variable was **depressive symptoms**, measured as a continuous variable (0-10). Depressive symptoms were assessed using a standard scale incorporated in the LASI questionnaire (e.g., CES-D).

Independent Variables

Key covariates included:

- **Gender** (male/female)
- **Age** (continuous)
- **Activity of daily living (ADL)**
- **Caste group**: categorized as Scheduled Caste (reference group), Scheduled Tribe, Other Backward Caste, and Others.
- **Marital Status** (Married, widowed, divorced, separated, deserted, live-in, and never married)
- **Years of education** (continuous; 0-17)
- **Monthly Per Capita Expenditure (MPCE)** quintile: a measure of household economic status, ranging from 1 (lowest) to 5 (highest).
- **Mobility limitations** (Continuous-0-3)
- **Instrumental Activity of Daily Living (IADL,** continuous,0-4)
- **Place of residence** (urban/rural)

Statistical Analysis

Descriptive statistics were used to summarize sample characteristics, presented as means or proportions. Linear regression analysis was conducted to examine the association between independent variables and the likelihood of reporting depressive symptoms. Results are reported as beta coefficient (OR) with corresponding robust standard errors and p-values. All analyses accounted for the complex survey design and sampling weights to ensure national representativeness.

Results

Table 1 presents the descriptive characteristics of the study sample (N = 68,917). Respondents reported an average of 2.85 depressive symptoms out of the ten assessed symptoms. The mean age of the participants was 57.9 years. The sample was predominantly female (58%) and largely resided in rural areas (65%). Regarding caste composition, 17% of respondents belonged to Scheduled Castes (SC), 18% to Scheduled Tribes (ST), 39% to Other Backward Castes (OBC), and 25% to other caste categories. On average, participants had completed 4.3 years of education.

Table 2 presents the linear regression estimates of depressive symptoms among older adults in India. Model 1 examined the direct associations between gender, education, and depressive symptoms, while Model 2 additionally included the interaction between female and education to assess whether the association between education and depressive symptoms differed by gender.

In Model 1, females reported significantly lower depressive symptoms compared with males ($\beta = -0.06$, $p < 0.001$). Education was negatively associated with depressive symptoms, indicating that each additional year of education was associated with lower depressive symptom scores ($\beta = -0.03$, $p < 0.001$). Rural residence was positively associated with depressive symptoms ($\beta = 0.10$, $p < 0.001$). Similarly, higher levels of activities of daily living (ADL) limitations ($\beta = 0.15$, $p < 0.001$), mobility limitations ($\beta = 0.15$, $p < 0.001$), and instrumental activities of daily living (IADL) limitations ($\beta = 0.11$, $p < 0.001$) were significantly associated with greater depressive symptoms. Age was also positively associated with depressive symptoms, although the coefficient magnitude was very small.

With respect to caste, respondents belonging to Scheduled Tribes ($\beta = -0.28$, $p < 0.001$), Other Backward Castes ($\beta = -0.03$, $p < 0.01$), and other caste categories ($\beta = -0.11$, $p < 0.001$) reported lower depressive symptoms relative to the reference category. Marital status showed a strong association with depressive symptoms. Compared with married respondents, widowed ($\beta = 0.24$, $p < 0.001$), divorced ($\beta = 0.43$, $p < 0.001$), separated ($\beta = 0.32$, $p < 0.001$), deserted ($\beta = 0.55$, $p < 0.001$), and never married individuals ($\beta = 0.37$, $p < 0.001$) had significantly higher depressive symptoms. Monthly per capita expenditure (MPCE) was negatively associated with depressive symptoms ($\beta = -0.04$, $p < 0.001$), suggesting that individuals with better economic status experienced fewer depressive symptoms.

Model 2 included the interaction term between female and education. The interaction coefficient was not statistically significant, indicating that the association between education and depressive symptoms did not significantly differ between males and females. The coefficients for the remaining covariates remained largely unchanged in magnitude and significance after the inclusion of the interaction term, suggesting robustness in the observed associations.

Figure 1 shows that males have higher depressive symptoms than females. Figure 2 presents the marginal effects of gender on depressive symptoms across different levels of educational attainment

based on Model 2. The results indicate that females reported significantly lower depressive symptoms than males across most educational categories. At 0 years of education, males had significantly higher depressive symptoms than males ($\beta = -0.058$, $p < 0.01$). Similar statistically significant gender differences were observed at 5 years ($\beta = -0.063$, $p < 0.001$), 10 years ($\beta = -0.068$, $p < 0.01$), and 15 years of education ($\beta = -0.073$, $p < 0.05$). However, at 17 years of education, the gender difference in depressive symptoms was no longer statistically significant, suggesting that depressive symptoms among highly educated males and females were comparable.

These findings suggest that educational attainment may reduce gender disparities in depressive symptoms among older adults. Specifically, men with lower levels of education appear to experience greater depressive symptoms relative to women, whereas this gender gap narrows and eventually disappears at the highest level of education examined. This pattern highlights the potentially protective role of education in reducing mental health disadvantages among older women.

At the same time, the interaction term between female and education in Model 2 was not statistically significant. This indicates that, overall, the rate at which depressive symptoms change with increasing education did not differ significantly between males and females in the regression model. Nevertheless, the marginal effects analysis provides additional insight by showing that gender differences in depressive symptoms vary across specific levels of education. In other words, although the interaction effect was not sufficiently strong to achieve statistical significance in the regression model, the predicted margins reveal a substantive pattern in which gender disparities are more pronounced at lower levels of education and attenuate at higher educational attainment.

Taken together, the findings suggest that education plays an important role in shaping gender differences in depressive symptoms among older adults in India. While the formal interaction term does not indicate statistically significant moderation, the margins analysis demonstrates that higher education may contribute to reducing the mental health disadvantage experienced by older women.

Discussion

This study examined the association between education and gender differences in depressive symptoms among older adults in India. The findings indicate that education is significantly associated with lower depressive symptoms, while important gender differences persist across educational levels. Although the interaction term between gender and education was not statistically significant in the regression model, the margins analysis demonstrated that gender disparities in depressive symptoms were more pronounced at lower levels of education and gradually diminished with increasing educational attainment. These findings suggest that education may play an important role in reducing mental health inequalities among older adults in India.

One of the key findings of this study is the negative association between education and depressive symptoms. Older adults with higher years of education reported fewer depressive symptoms than those with lower educational attainment. This finding is consistent with previous studies that identify education as a critical social determinant of mental health (Bjelland et al., 2008; Muhammad et al., 2022). Education may improve mental well-being through multiple pathways, including better employment opportunities, higher income, greater social participation, improved health literacy, and stronger coping mechanisms. Individuals with higher education are also more likely to access healthcare services and possess greater awareness regarding mental health conditions. In the Indian context, education may additionally provide individuals with greater autonomy and social mobility, which can contribute to improved psychological well-being in later life.

An important and somewhat unexpected finding of the present study is that males reported higher depressive symptoms than females. This contrasts with a large body of literature from both developed and developing countries that generally reports higher levels of depression among women (Paul et al., 2023). Several explanations may account for this finding. Older men in India may experience psychological distress related to retirement, declining economic productivity, financial insecurity, and loss of traditional social roles. Since men are often socially conditioned to identify strongly with economic and occupational responsibilities, the transition into older age may create feelings of dependency and reduced self-worth. Additionally, men may possess weaker social support systems compared with women, who often maintain stronger family and social networks in later life. These factors may contribute to greater depressive symptoms among older men in the present study.

The margins analysis further revealed that gender differences in depressive symptoms varied across educational levels. Specifically, males with lower levels of education experienced significantly higher depressive symptoms than females at similar educational levels. However, these gender

differences narrowed with increasing education and became statistically insignificant at the highest educational category. Although the interaction term in the regression model was not statistically significant, the predicted margins indicate a meaningful substantive pattern. This finding suggests that education may buffer the adverse mental health consequences associated with gender disadvantage in later life. Higher education may provide individuals with improved economic security, social engagement, and access to resources that reduce psychological distress regardless of gender.

The attenuation of gender differences at higher educational levels may also reflect the equalizing effect of education on social and economic opportunities. Highly educated older adults are more likely to possess financial independence, better healthcare access, and stronger decision-making capacity, all of which contribute positively to mental health outcomes. Previous research has similarly suggested that education reduces social inequalities in health and psychological distress (Ross & Mirowsky, 2010). In India, where substantial gender inequalities in education historically existed, the mental health benefits associated with higher education may be particularly important for reducing disparities in later life.

The study also identified several other important correlates of depressive symptoms. Rural residence was positively associated with depressive symptoms, which may reflect limited healthcare access, social isolation, and economic deprivation among rural older adults. Functional limitations, including ADL, IADL, and mobility difficulties, were also strongly associated with depressive symptoms. Similarly, widowed, divorced, separated, deserted, and never-married older adults reported significantly higher depressive symptoms compared with married individuals, highlighting the importance of marital support and companionship for mental well-being in old age.

Economic status, measured through monthly per capita expenditure, was negatively associated with depressive symptoms. Older adults with better economic conditions experienced fewer depressive symptoms, likely due to improved living standards, healthcare access, and reduced financial stress. This finding aligns with previous studies from India that identify socioeconomic disadvantage as an important predictor of poor mental health among older adults (Muhammad et al., 2022).

Limitations

Despite its important contributions, this study has certain limitations. First, the cross-sectional nature of the data limits the ability to establish causal relationships between education and depressive symptoms. Second, depressive symptoms were self-reported and may be influenced by reporting bias or cultural stigma associated with mental illness. Third, unmeasured factors such as childhood adversity, social support, and lifetime occupational experiences may also influence depressive symptoms and were not fully captured in the analysis.

Overall, the findings underscore the importance of education in shaping mental health outcomes among older adults in India. The study suggests that higher educational attainment may help reduce gender disparities in depressive symptoms and improve psychological well-being in later life. Policies aimed at promoting educational opportunities across the life course, strengthening mental health services for older adults, and addressing socioeconomic inequalities may contribute significantly to improving mental health outcomes among India's ageing population.

Policy Implications

The findings of this study have important policy implications for promoting mental health among older adults in India. Since higher educational attainment was associated with lower depressive symptoms and reduced gender disparities, policies aimed at improving educational opportunities across the life course may contribute to better mental health outcomes in later life. Mental health programs for older adults should particularly target individuals with low educational attainment, rural residents, economically disadvantaged groups, and those experiencing functional limitations or marital disruption. Strengthening community-based mental health services, improving awareness regarding depression, and integrating geriatric mental healthcare into primary healthcare systems may help reduce the burden of depressive symptoms among India's ageing population.

Conclusion

In conclusion, this study highlights the important role of education in shaping depressive symptoms among older adults in India. The findings demonstrate that higher educational attainment is associated with lower depressive symptoms and may contribute to narrowing gender differences in mental health at advanced levels of education. Although the interaction between gender and education was not statistically significant in the regression model, the margins analysis revealed that gender

disparities in depressive symptoms were more pronounced at lower educational levels and diminished with higher education. These findings underscore the need to address educational and socioeconomic inequalities to promote healthy ageing and improve mental well-being among older adults in India.

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Table 1: Mean/Proportion of the selected sample (N=68,939)

	Mean (std)/Prop	Minimum	Maximum
Depressive symptoms	2.85 (1.68)	0	10
Female	0.58	0	1
Education (yrs)	4.30 (4.89)	0	17
Rural	0.65	0	1
ADL	0.29 (0.89)	0	5
age	57.92 (11.70)	18	116
Caste		1	4
Scheduled Caste	0.17		
Scheduled Tribe	0.18		
Other Backward Caste	0.39		
Other caste	0.25		
Marital Status		1	7
Married	0.77		
Widowed	0.20		
Divorced	0.004		
Separated	0.01		
Deserted	0.004		
Live-in relationship	0.006		
Never Married	0.01		
MPCE	3.01 (1.41)	1	5
Mobility Limitations	0.65 (0.86)	0	3
IADL	0.46 (0.99)	0	4

Table 2: Logistic regression estimates of depressive symptoms among older adults in India

	Coefficient (RSE)	Coefficient (RSE)
	Model 1	**Model 2**
Female	-0.06*** (0.01)	-0.06*** (0.02)
Education (In Years)	-0.03*** (0.00)	-0.03*** (0.00)
Interaction		
Female X Education		0.00 (0.00)
Rural	0.10*** (0.01)	0.10*** (0.01)
ADL	0.15*** (0.01)	0.15*** (0.01)
Age	-0.00*** (0.00)	-0.00*** (0.00)
Caste		
Scheduled Tribe	-0.28*** (0.02)	-0.28*** (0.02)
OBC	-0.03** (0.02)	-0.03** (0.02)
Others	-0.11*** (0.02)	-0.11*** (0.02)
Marital Status		
Widowed	0.24*** (0.02)	0.24*** (0.02)
Divorced	0.43*** (0.11)	0.43*** (0.11)
Separated	0.32*** (0.08)	0.32*** (0.08)
Deserted	0.55*** (0.10)	0.55*** (0.10)
Live-in relationship	-0.01 (0.08)	-0.01 (0.08)
Never Married	0.37*** (0.06)	0.37*** (0.06)
MPCE	-0.04*** (0.00)	-0.04*** (0.00)
Mobility Limitations	0.15*** (0.01)	0.15*** (0.01)
IADL	0.11*** (0.01)	0.11*** (0.01)
Constant	3.13*** (0.04)	3.13*** (0.05)

Note: Significance is based on the following values: *** p<0.001, ** p<0.01, * p<0.05, + p<0.10. Coefficient= beta coefficient. RSE= robust standard error.