

Impact of Occupational and Financial Stress on Cognitive Decline Among Elderly in India: Insights from the Diagnostic Assessment of Dementia for the Longitudinal Aging Study in India (LASI-DAD) Study

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Introduction:

A leading cause of disability and morbidity among elderly is dementia and related cognitive decline. Dementia and related diseases don't have any confirmed preventive or curative solutions once they occur; understanding and employing interventions at the early and preclinical phases of life could delay or reduce the early onsets (Prince et al., 2016). With the rapid change in the speed of ageing, prolonged life expectancies and widening socio-economic inequality in India (Asaria et al., 2019; Sharma and Pradhan, 2023), the impact of life course stressors on the individual's cognitive functions is inevitable. In India, 8% of the population was found to be elderly in 2011, which will grow to 20% in 2050 marking around 15% of global elderly will live in India. The prevalence of dementia was 7.4% in India during 2017-2020 (LASI wave 1), with stark differentials across age groups, sex and educational subgroups (Lee et al., 2022). Studies done on the cumulative effect of stressors appearing in childhood and early adulthood suggest that work-related physical stress or work-family conflict stressors do not directly influence cognitive functions at later ages, however, repeated incidence and co-occurrence with other factors could lead to cognitive decline (Chen et al., 2022).

Work and financial stress are fundamental in the individual's life and can result in a decline in normal physio-pathological functions and brain volume. Adequate cognitive reserves which is crystallized memory are a protector to physiological stressors. This matures until the age of 60 years and provides great support in decision-making, knowledge and experience, while fluid memory matures during adolescent ages and declines subsequently, and is not noted to be influenced by occupational stressors. However, repeated stressors can increase the wear and tear – allostatic loads on the brain activities by altering the hypothalamus-pituitary -adrenalin axis functions (Scott et al., 2015). In India, a large share of the population engaged in the informal/ unorganized sector (Hammer et al., 2022), and often devoid of any employment-related financial security benefits are exposed to multiple and complex stress phenomena that involve income insecurities, occupational stress, health hazards etc. Many elderly remain active in the labor force till late ages to meet their financial demands in the absence of a strong social/financial security system. In such circumstances, unconstructive repetitive thinking regarding life situations could directly impact cognitive functions in the long run (Watkins, 2008; Scott et al., 2015). Despite such complex and deep-driven effects on the psycho-somatic level due to high-level stressors and ageing, we rarely have any estimation of the cognitive outcomes of the elderly in the Indian context. As India is rapidly ageing with a significant differential effect across its demographic and socio-economic subgroups, it is essential to

estimate the cognitive declines due to occupational and financial stressors in their life course. The objective of the study is to measure the association of stressors related to work and finances among the elderly with cognitive outcomes in India. Further, we also measure the extent and pattern of cognitive decline across work status and financially secure groups among elderly. To measure the cognitive decline, a discrepancy analysis is done by taking the difference between fluid memory and crystallized memory. According to the Hindi Mental State Examination (HMSE) and Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE), and a higher negative discrepancy score explains cognitive decline and indicates an early Alzheimer's disease neuropathy (Bajpei et al., 2022; McDonough et al., 2016).

Data and methods:

The Diagnostic Assessment of Dementia for the Longitudinal Aging Study in India (LASI-DAD) is a comprehensive examination of cognitive function and dementia in older adults, focusing on a subset of participants from the Longitudinal Aging Study in India (LASI). LASI is a nationwide survey that assesses the health, economic status, and social well-being of Indians aged 45 and above. With a substantial sample of over 72,000 adults, it provides a representative snapshot of the entire country as well as each individual state. The data obtained from LASI-DAD is comparable to other cross-sectional studies employing the Harmonized Cognitive Assessment Protocol (HCAP). This study utilizes a subsample of 3,798 individuals aged 60 years and older from the parent LASI survey. This cohort possesses comprehensive data on cognitive assessments from LASI-DAD, as well as biomarkers and prior work-life information derived from the parent LASI survey.

We have used cognitive markers of dementia as an outcome variable, it has been divided into two types of cognition: fluid memory and crystallized memory. A battery of neuropsychological tests has been run to capture these two types of memory. Fluid memory is captured through Raven's Progressive Matrices, Symbol Cancellation Test, Go-no-Go test, and Hand sequencing; while crystallized memory is captured through Community Screening Interviews for Dementia (CSID), Retrieval Fluency Test, Health and Retirement Study-Telephone Interview for Cognitive Status (HRS-TICS), and Token test. Eight cognitive scores are Z transformed and factor analysis using Principal Component extraction following varimax rotation has been employed for each cognitive domain. As mentioned earlier, cognitive discrepancy scores have been calculated by taking the difference between fluid (gf) and crystallized cognitive (gc) scores. The distribution of the score is shown Graph 1. The study is going to employ Descriptive statistics and logistic regression to estimate the association of work status, work stress and financial stress adjusting selected demographic and socio-economic variables. Further to measure, the second objective study will employ Latent Class Analysis to measure the pattern of cognitive outcomes among elderly in conjunction with categories of work status, work stress and financial stress.

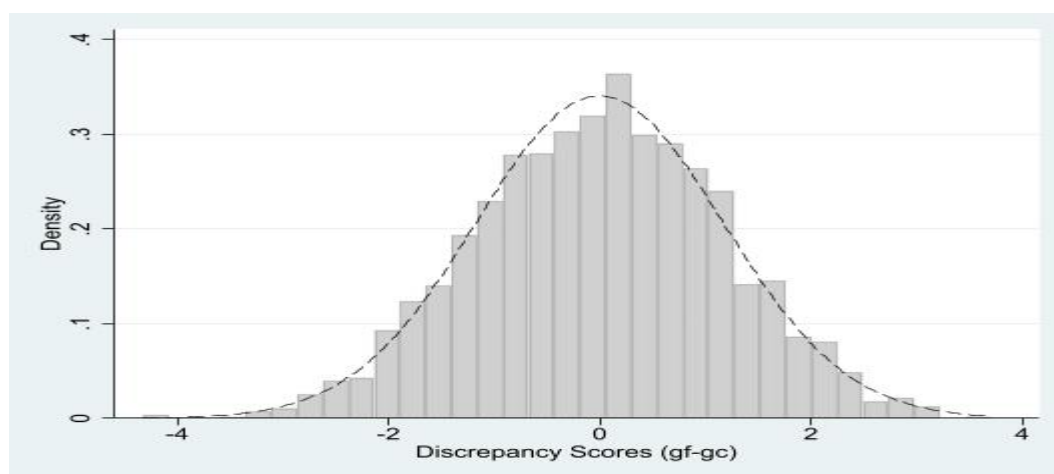
The explanatory variables mainly used here are work status, pension status, work stress defined through working hours and inconsistency in the presence at work, and working environment related physical stress. Work status has been categorized into Never worked (NW), Ever worked but not currently working (EW but no CW), Currently working (CW) in agriculture, CW in business, and CW in salaried. Pension status is categorized into NW, EW but no CW-

covered by Pension, EW but no CW- not covered by Pension, CW- covered by Pension and CW- not covered by Pension. Working hours and consistency are segregated into 9 different categories in combination with work status and working hours low (<40 hours) or high (>40 hours) and frequency of consistency at the week of work. Work environment-related stress has been categorized as high, moderate and low. Other demographics such as age, and socio-economic categories have been controlled to estimate the cognitive discrepancy scores.

Preliminary outcomes:

The results show that those who NW have a mean discrepancy score for cognition is -0.175 (SD 1.19). While those who have EW but not CW and those who are CW have a positive mean discrepancy score. A significant differential exists across the genders in work status categories. For NW category, elderly males (-0.336) have a higher cognitive decline than elderly females (mean -0.158). Those CW in agriculture and CW in salaried sectors have shown large negative mean discrepancy scores for cognition for elderly females in contrast to elderly males with a mean positive discrepancy score. Across pension status, those NW and covered by pension and also CW are showing a mean negative discrepancy score, explaining a higher decline in fluid memory. The mean discrepancy score for those elderly who have EW but not CW and are covered by pension is 0.326. This is the highest mean discrepancy score across categories. The work stress category measured through a composite score of working hours and consistency in working weeks shows a varying mean discrepancy score depicting a sharp decline in cognitive abilities of those who NW and EW-not CW and spend less than 40 hours inconsistently in previous working weeks. Despite the varying working hours and consistency in working weeks those who have EW but not CW have a higher mean positive discrepancy score for cognition (ranges from 0.244-0.546) (Graph 1). Further, higher working stress is more favourable for a better fluid memory than crystallized memory. This is depicted by increasing mean cognitive discrepancy scores as work stress increases among the elderly.

Graph 1: Distribution of cognitive discrepancy scores



Graph 2: Work status and related stress on the Cognitive discrepancy scores of elderly

