

Research Paper

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

Raj Kumar^{1*}, Santoshi¹, Annanya¹, Vaishali Gaur², Paran Gowda³

ABSTRACT

This research paper aims to build an intelligence data system with the help of pilot data. The intelligence data system is collected from banking facilities, health and wellness centers, government schemes, etc. Initially, the data will be collected from the older populations aged from 62 to 85 years age group. The methodology adopted Snowball sampling techniques. This technique adopts a non-probability method to increase the snowball effect sample size. Hence, we selected a small sample size of 18 participants, comprising 13 males and 5 females, with a mean age of 69.2 years (SD = 6.69, range = 22 years). Participants represented diverse professional backgrounds including government service, private employment, business, and household roles through educational qualifications that is ranging from higher secondary to postgraduate and doctoral levels. The sample was purposively associated with the study's stress measure as all participants reported moderate to high levels of psychological stress where it evaluated through self-reported measures adapted from the Perceived Stress Scale through particular importance on financial and emotional domains. Particularly, 14 participants (77.8%) indicated high stress attributable to financial insecurity also including concerns surrounding healthcare costs, retirement planning inadequacy, children's educational and marriage expenses, retirement pension insufficiency, debt management, tax obligations, inheritance decisions and susceptibility to financial scams. Moreover, 12 participants (66.7%) are reported significant stress associated with loneliness or extended family absence while it emphasizing the dual burden of financial and emotional adversity dominant among this demographic cohort. Concerning technology engagement twelve participants reported using mobile banking daily, while one participant trusted exclusively on internet banking and another merely on offline banking and also reflecting a moderate yet heterogeneous level of digital adoption within the sample. Furthermore, four participants self-assessed as knowledgeable about artificial intelligence through news media exposure whereas the majority identified themselves as novices also having encountered AI-embedded tools such as machine translators, smart speakers, and AI-assisted automobiles incidentally including without deliberate awareness. Especially, all 18 participants expressed undisputed interest in AI-assisted emotional support although affirming the viability and receptivity of this population toward technology-mediated psychological interventions. The

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Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

results evaluate the effectiveness of intelligence data to mitigate psychological stress in older adults. It is tailored to find the qualitative stress-reduction strategies for older adults based on real-time intelligence data for enhancing their emotional well-being and quality of life. In this research paper, snowball sampling methodology is used for selection of participants and the AI pilot study aimed to preliminarily examine the role of intelligence data in lightening psychological stress among older populations. The primary objective of the study was to examine older adults' attitudes, expectations, and potential requirements regarding the use of AI-based data services for managing daily financial concerns and reducing psychological stress, and to clarify preferred contexts for AI interaction and explore the potential of such technologies to provide both emotional companionship and practical support. The conclusion shows that managing psychological stress support in the form of emotional friendship and compassionate engagement holds significant promise for this population. This study recommends that for higher generalizability, a larger potential sample size data may be collected in future investigations.

Keywords: *Artificial Intelligence, Health and Wellness, Older Adults, Psychological Stress Support*

In recent years, the chatbot, intelligence data are used as assistant platforms that has become close pals and also facilitators to senior citizens of India (Prasad et.al,2025). A comprehensive literature review is carried out on senior citizens aging demographics, health challenges, social participation, caregiving, AI technology (Yobin choi, et al. 2023), and Indian government policies (Santa de, et al.2024; Naveen salins et al. 2024). Below is an overview of significant findings and trends from this literature. According to the United Nations, the global population aged 60+ years is expected to nearly double by 2050, reaching approximately 2.1 billion people. The aging populations pose challenges for healthcare, financial services, and labour markets (UN, 2017). Advances in healthcare have led to increased life expectancy.

The adoption of AI technology among senior citizens has been a growing area of interest (Jnr et.al,2025). While technology has the potential to enhance the quality of life and reducing psychological stress for seniors through telemedicine, social media and smart home devices, there is also evidence of a "digital divide" where older adults face barriers in access, (Choi & DiNitto, 2013). Research has also focused on the development of assistive technologies for elderly people, including wearable devices to monitor health, fall detection systems and virtual reality programs for cognitive training (Astell et al., 2009). These technologies have shown promise in improving health monitoring and reducing psychological stress and isolation among seniors. The loneliness and psychological stress among elderly people have become major concerns. Studies suggest that loneliness has severe implications. The need for psychological counselling social programs and policies that promote senior engagement in communities has gained traction. Community-based programs, volunteer opportunities and senior centres have been identified as effective means to combat psychological stress and loneliness (Victor et al., 2009). Many studies have highlighted the strain placed on family caregivers who support aging parents or spouses. These caregivers often face significant psychological support emotional, physical and financial stress. Research indicates the need for better caregiver support systems, including respite care, education and financial assistance (Pinquart & Sörensen, 2003).

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

The sustainability of pension systems and financial security and wellness for seniors have been a key concern. Several studies (Woo et.al,2022), (Knaack et.al,2020) have documented the challenges seniors face in maintaining financial independence post-retirement, especially in light of changing pension schemes, the decline of employer-sponsored retirement plans and economic recessions (Gordon, 2006). The Government of India have introduced initiatives to make urban and rural areas health and wellness are more senior-friendly. These initiatives focus on improving accessibility, healthcare infrastructure and creating environments that foster digital participation (www.nhrc.nic.in). Research highlights that older adults often face discrimination in various areas, including healthcare, psychological support and monetary concern. Efforts to combat ageism are increasing, with the government policy changes aiming to improve the rights and dignity of older individuals (Nelson, 2016). The integration of intelligence data into health and wellness strategies offers a promising approach to reducing psychological stress in older adults (Reynolds 3rd et.al 2022). By utilizing advanced technologies like artificial intelligence and data analytics, caregivers and healthcare providers can gain valuable insights into the emotional and mental states of older adults. These tools enable the identification of stress triggers through patterns in behaviour, sleep or social interactions allowing for timely and personalized interventions. For instance, (Hudson et.al 2020) predictive models can alert caregivers to early signs of anxiety or depression and enabling proactive measures such as specialized yoga for older adults, counselling, mindfulness activities or social engagement programs. This data-driven approach not only enhances the mental well-being of older adults but also adopts a sense of security and connection lead to ultimately improving their overall quality of life in a way that is both accessible and easy to understand for families and healthcare professionals.

Hypothesis

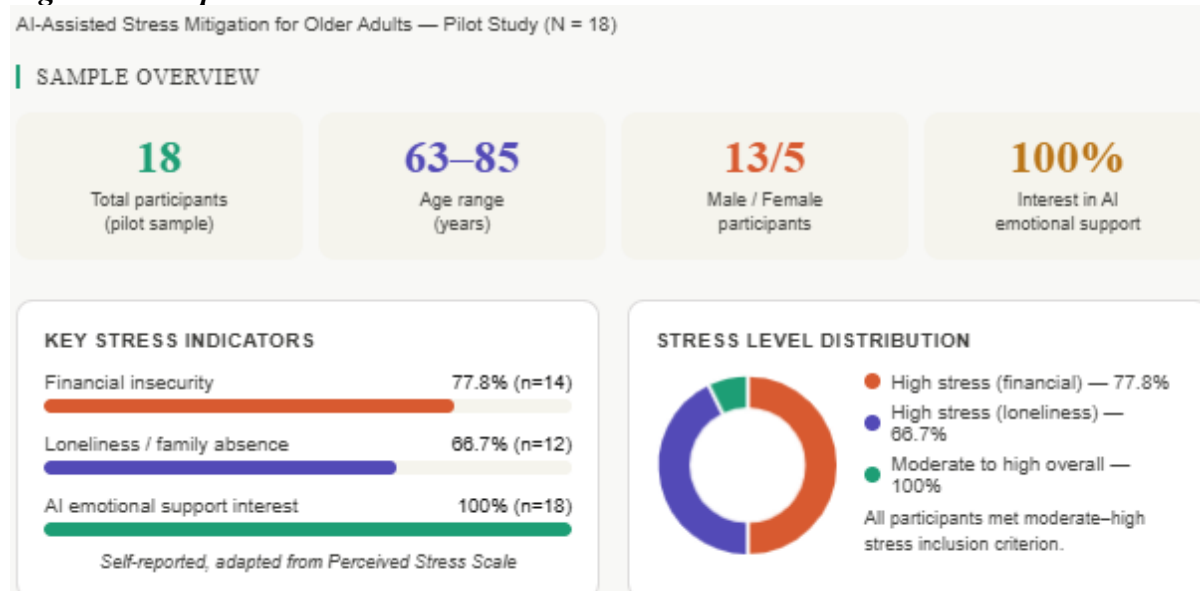
1. Older populations with positive attitudes toward AI-based data services and perceived fit with their functional requirements will show higher intention to use these services and lower financial-related psychological stress.
2. Older populations are preferring AI interaction in familiar with low-risks financial contexts and perceiving emotional companionship will report higher perceived practical support with greater satisfaction and greater overall acceptance of AI technologies.

Objectives

1. The objective of this study is to examine older population attitudes, expectations, and perceived requirements regarding the use of AI-based data services for managing day-to-day financial concerns and mitigating related psychological stress.
2. The objective is to identify preferred contexts for AI interaction and to explore the potential of these technologies to offer both emotional companionship and practical support in daily life.

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

Figure 1: Sample Overview



METHODOLOGY

The snowball methodology is used in the selection of participants which is ideal for AI designs like non probability methods. In this method, we select initial, two to three participants were recruited through flyers distributed at welfare centres, public libraries and yoga halls in Haridwar, to this end, and we conducted surveys among elderly people at Haridwar locations including Patanjali Seva Sadan, Rajiv Dixit Bhawan, Vanaprastha Ashram and Patanjali Phase-1-2. Demographic details are provided in Table 1. From an initial pool of 12 responses, 18 participants were selected to ensure diversity in retirement status, occupation, educational attainment and demographic background. This AI pilot study aimed to preliminarily examine the role of intelligence data in lightening psychological stress among older adults. Conducting pilot studies is especially crucial when engaging with vulnerable populations such as older adults, also as these studies facilitate the preliminary testing of research instruments and identification of methodological challenges for refinement of procedures prior to large-scale implementation. Such an approach enhances feasibility to ensures ethical soundness and safeguards participant well-being by minimizing risks such as fatigue or data inaccuracies, which are often heightened in stress-sensitive groups. In this context, the pilot study provided foundational insights into the potential of artificial intelligence (AI) applications for stress reduction and thereby informing the design of subsequent studies employing regression analyses.

RESULTS

The results of 18 older populations participated in the study, a sample size deemed appropriate for pilot research within psychological and social domains, where 10–20 participants are typically sufficient for identifying emerging patterns and refining data collection instruments. (Table 1). All participants reported moderate to high levels of psychological stress and assessed through self-reported measures adapted from the Perceived Stress Scale for highlighting financial and emotional domains. Specifically, 14 participants (77.8%) indicated high stress due to financial insecurity, 12 (66.7%) reported stress associated with loneliness or family absence and all expressed interest in AI-assisted emotional support. This stress criterion was essential for ensuring the sample's alignment with the study's objective of exploring stress mitigation strategies.

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

The primary objective of the study was to examine older adult's attitudes, expectations and potential requirements regarding the use of AI-based data services for managing daily financial concerns and reducing psychological stress. Additionally, the study sought to clarify preferred contexts for AI interaction and explore the potential of such technologies to provide both emotional companionship and practical support.

Table 1: Demographic details of the senior citizens.

Participant ID	Gender	Age in years	Retirement status	Pre-retirement or current Job	Education
P1	Male	75 years	10 years	Contractor	Graduation
P2	Male	65 years	5 years	Farmer	Graduation
P3	Male	74 years	13 years	Govt.job	Graduation
P4	Male	66 years	1 years	Private job	B.Tech.
P5	Male	69 years	42 years	Spiritu- social worker	Ph.D
P6	Female	63 years	1 years	House hold	Higher secondary
P7	Female	68 years	8 years	House hold	Higher secondary
P8	Male	65 years	5 years	Business	Graduation
P9	Male	85 years	20 years	Government teacher	Graduation
P10	Female	80 years	15 years	Government teacher	Graduation
P11	Male	63 years	2.5 years	CRPF, Govt. job	Graduation
P12	Male	78 years	19 years	Semi govt. job	Matric+ ITI
P13	Male	63 years	2 years	Army job, Business	Graduation
P14	Male	63 years	4 years	Govt. job	Graduation
P15	Male	64 years	3 years	Private job	Graduation
P16	Male	75 years	13 years	Govt. job	LLB
P17	Female	63 years	2 years	Govt. Teacher	PG
P18	Male	67 years	7 years	UP, Govt. job	Graduation

Table-2, shows the costs involved in healthcare including stress. Monetary is taken care by their pension's schemes which includes the government schemes for senior adults. All these are linked self-reported stress levels.

Table 2: Financial concerns of older adults.

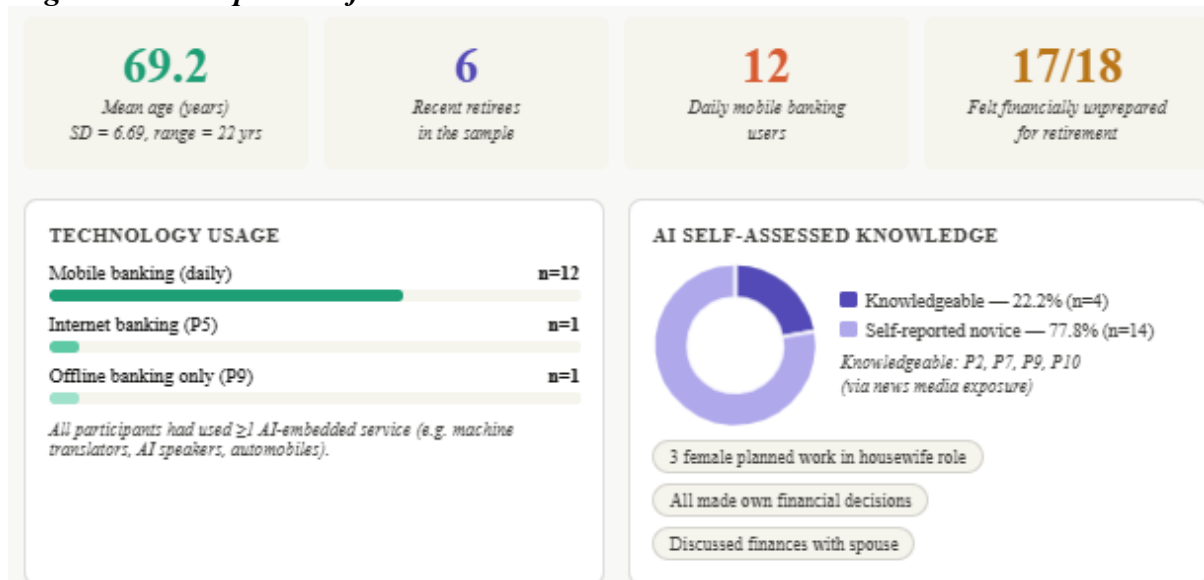
Monetary concern	Older adult details.
1. Healthcare cost including the stress.	Paying for the current healthcare cost of family members (e.g. spouse, aging parents) or concern about future healthcare costs stemming from aging.
2. Retirement Planning	Unsure how to plan retirement or whether the current plan will be feasible in the future.
3. Children's marriage/college tuition fee	Want to give money for children's marriage (especially housing fees), and college tuition but seems not enough.
4. Finding a bridge job	Want to find a bridge job before completely exiting the labour force because they want to earn more income or want to feel fulfilment working.

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

Monetary concern	Older adult details.
5.Living with pension	Pension is not enough to support the previous lifestyle (e.g., hobbies).
6.Spending	Want to spend less.
7.Debit	Paying the debt.
8.Inheritance	How and what to inherit to children
9.Financial Management	Which real estate, stock to invest
10.Saving Tax	How to pay less tax.
11.Avoiding Financial Scam	Prone to scams.
12. AI and Finance	Ignorant

The participants had a mean age of 69.2 years old (SD=6.69, range: 22 years), (figure-01). Six participants were recent retirees, nine participants desired to social work as long as possible, and three female participants planned to work in house wife . Regarding technology usage, twelve participants were using mobile banking daily, except for P5 (internet banking) and P9 (offline banking). Four participants (P2, P7, P9, and P10) considered themselves knowledgeable about AI, while others claimed to be novices, having only encountered AI through the news media. All participants had used at least one AI-embedded service (e.g., machine translators, AI speakers, automobiles), with or without knowing them. All participants made their own financial decisions regarding their finances, although they discussed them with their spouses. Apart from P5, all participants (including retirees) expressed feeling unprepared for retirement and contributing to their reported stress.

Figure 2. Participant Profile



DISCUSSION

The present study reported an average participant age of 69.2 years, indicating that the research sample primarily represented older adults within the typical senior citizen range. This finding aligns closely with previous studies in the field of artificial intelligence and aging. For instance, Eugene et al. (2025) reported a mean age of 64 years, reflecting the

Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

involvement of early-stage older adults who are often more technologically adaptive. Similarly, R. Imran (2025) observed an average age of 70 years, suggesting a comparable population profile to the current study. The slight variation in average age across studies may be attributed to differences in sampling criteria, geographic regions, or levels of digital literacy among participants. Collectively, these studies reinforce that AI-related research on senior citizens typically focuses on individuals aged between their mid-60s and early-70s, representing an active and cognitively capable segment of the older population that can effectively engage with AI-based interventions.

The findings illustrate that health and monetary concerns of older adults are unique and complex they often intertwined with family responsibilities and socioeconomic factors such as inflation, government policies and low birth rates affecting pensions. These concerns were strongly linked to psychological stress with participants reporting heightened anxiety, feelings of inadequacy and emotional isolation due to financial uncertainties. For instance, worries about healthcare costs and retirement planning exacerbated stress, leading to sleep disturbances and reduced well-being in 77.8% of the sample (Nunes, T. N. (2025), Amidi et al. (2024), Ibrahim et al (2024). This underscores the significance of intelligence data services that learn personal and socioeconomic contexts to provide tailored stress-relief interventions, such as real-time emotional support or predictive alerts for stress triggers.

Based on these findings, we suggest two design implications for financial intelligence data systems focused on stress reduction:

1. Provide daily financial information integrated with psychological support features, such as mindfulness prompts or virtual companionship to alleviate anxiety during monetary decision-making.
2. Empower older adults to take the initiative in interactions with intelligence data, allowing them to customize stress-management tools (e.g., AI chatbots offering empathetic responses to financial worries).

These implications aim to transform AI from a mere informational tool into a holistic stress mitigator to fostering emotional resilience.

CONCLUSION

The limitation is sample size. This pilot investigation offers preliminary evidence on the potential role of artificial intelligence (AI) in addressing stress and promoting psychological well-being among older adults. Although the limited sample size constrains the generalizability of the results and findings provide a valuable foundation for future large-scale research. This study identified retirement planning, healthcare costs and financial support for children's life milestones as primary stressors for highlighting the intergenerational and emotional dimensions in later life. Participants demonstrated interest in AI as a supportive and empowering technology and never replaces human judgment by providing reliable information and psychological reassurance while preserving autonomy in financial choices. These insights underscore the need for human-centered design principles in developing intelligent, data-driven health and wellness systems tailored to older adults. By emphasizing usability, trust and stress reduction, such systems can enhance emotional resilience and decision confidence. Overall, this study contributes to Human Computer Interaction and gerontology literature by reframing aging as a phase of continued growth, adaptability and empowerment rather than decline or isolation.

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Application of Intelligent Data Systems in The Reduction of Psychological Stress in Older Populations

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Conflict of Interest

The author(s) declared no conflict of interest.

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