Indian Journal of GERONTOLOGY

(a quarterly journal devoted to research on ageing)

Vol. 38 No. 4, 2024

Indian Journal of Gerontology

(A quarterly journal devoted to research on ageing)

PEER REVIEWED JOURNAL
ISSN : 0971-4189
Approved by UGC – (CARE List Group B – Science, 121)

SUBSCRIPTION RATES
Annual Subscription
US $ 80.00 (Including Postage)
UK £ 50.00 (Including Postage)
₹ 1000.00 Libraries in India

Subscriptions are for Calendar year only
Claims for missing issues can be made within two months of publication of the issue.

Financial Assistance Received from :
ICSSR, New Delhi

Printed in India at :
Aalekh Publishers
M.I. Road, Jaipur

Typeset by :
Rajeev Kumawat
Jaipur

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SCOPE OF THE JOURNAL

Indian Journal of Gerontology (ISSN : 0971-4189) is a peer-reviewed and UGC Approved Journal, and is indexed by - the Indian Ctation Index, Google Scholar, CNKI Scholar, EBSCO Discovery, and UGC Group 1. Started in the year 1969, is the first in India, and 18th in the world. It publishes papers related to the Biological aspects of Human ageing, animal ageing, and ageing of plants. It also publishes papers on geriatrics, geriatric nursing, and geriatric physiotherapy (Clinical aspects). The social aspects of ageing cover, Sociology, Social work, Anthropology, Psychology, Economics, Demography, and other Social Sciences.

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Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 395-406
ISSN : 0971-4189, UGC No. – List B, Science –121

Visceral Fat Relates with the Indicators of Increased Metabolic Complications and Comorbidities : A Study in Bengali Elderly

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ABSTRACT

The study aimed to find whether there is any relation between visceral fat content in the body and the indicators of increased metabolic complications and co-morbidities like waist circumference, waist-to-hip ratio, and body mass index. 102 Bengali elderly individuals residing in southern districts of West Bengal voluntarily participated in the study. Pearson's correlation (one-tailed) was performed using SPSS 29.0 Grad pack. Significant ($P<0.05$) correlations have been observed between the variables. The study revealed a strong relationship between visceral fat accumulation and increased risk of metabolic complications and comorbidities.

Keywords: Visceral fat, Nutritional status, Metabolic complications, Bengali elderly,

The increasing epidemic of obesity (affecting 1 in every eight people globally) leads to a steady rise in metabolic complications among people worldwide (WHO, 2024). In 2019, 17.9 crores of people died from cardiovascular diseases, among which 85 percent of them were due to heart failure or stroke and diabetes, causing about 20 lakh deaths globally (WHO, 2021). Metabolic complications are a set of complications, including metabolic disorders and diseases, i.e., cardiovascular diseases, stroke, and diabetes mellitus, through the progression of insulin resistance, which can be developed from excess accumulation of body fat, especially visceral fat (Moreira *et al*., 2014). Historically, body fat was recognized as a cushion and insulator of the human body, but recently, excess body fat deposition's critical and harmful role has been revealed (Banerjee *et al*., 2014; Zwick *et al.,* 2018). Usually, body fat tissue has been categorized as subcutaneous adipose tissue and visceral adipose tissue (Shuster *et al*., 2012), which is distributed in different segments of the human body (Mukherjee *et al*., 2013) and affected by factors like age, sex, ethnicity, race, genotype, physical activity, dietary practices and medication (Stefan, 2020; Mukherjee *et al*., 2014; Banerjee *et al*., 2014). While both adipose tissues are important for the human body, visceral adipose tissue gains more attention due to its linkage with increased medical complications (Saravana-Bawan, *et al*., 2021).

Diet and physical activity performances are essential factors for visceral fat accumulation in the body (Ratjen *et al.,* 2020; Banerjee *et al*., 2021). Adherence to a balanced and healthy diet, especially emphasizing the greater consumption of vitamins, minerals, complex carbohydrates, and proteins and a lower intake of saturated fats and oils, helps to reduce visceral fat deposition in the body (Huang, *et al*., 2021; Zamanillo-Campos, *et al*., 2022; Bardhan *et al*., 2024). Appropriate nutritional status, body balance, and physically active lifestyle, along with different forms of activities like dancing, cycling,

and sports, also help in reducing the visceral fat in the body and helps to prevent the occurrence of future health complications (Mondal, *et al*., 2024; Banerjee, *et al*., 2022; Bhattacharjee, *et al*., 2021; Chatterjee, *et al*., 2017).

The metabolic complications not only have their prevalence irrespective of age and sex but also increase the rate of mortality globally, and elderly persons suffer the complications more than other age groups (Silveira Rossi *et al.,* 2021; Spinelli *et al*., 2020). Waist circumference, waist-hip ratio, and waist-to-height ratio are well-recognized indicators of increased metabolic complications and are also related to the increased risk of all-cause of mortality (WHO, 2008; Banerjee *et al*., 2021). In this backdrop, the present study aimed to find whether there is any relation between the visceral fat and the indicators of increased metabolic complications and comorbidities present in the Bengali elderly.

Methodology

The present study, with HEC clearanec, was conducted on 102 Bengali elderly persons aged between 60 and 80 years, chosen with simple random procedure, residing in Hooghly and North 24 Parganas districts in southern region of West Bengal. Initially, 145 individuals agreed to participate, but those aged <60 years and >80 years, unable to complete all the procedures, were excluded from the study. After obtaining both written and verbal consent for voluntary participation, anthropometric measurements such as body height (nearest to 0.1 cm) were measured using an anthropometric measurement set while the participants stood erect, without holding any support and without shoes (Warrier *et al*., 2023). The body weight (nearest to 0.1 kg) of the study participants wearing socially acceptable minimum clothing was noted using a weighing scale (Santra *et al*., 2021). Waist circumference (WC) and hip circumference (HC) were measured (nearest to 0.1 cm) using a

flexible, non-stretchable measuring tape. WC was measured at the middle point between the lowest ribs and the iliac crest after a normal expiration (Ma *et al.,* 2013), and HC was measured at the widest point of the buttocks (Eaton–Evans, 2005). Body Mass Index (BMI), Waist to Hip Ratio (WHR), and Waist to Height Ratio (WHtR) were calculated (WHO, 2008).Visceral fat was measured using the usual BEI procedure (Xu *et al*., 2021). Pearson's bivariate correlation (one-tailed) was performed using SPSS Statistics Gradpack 29.0 Standard.

Results

The present study included 102 Bengali elderly individuals (39 males and 81 females). The average age of the study participants was 66.7. The anthropometric profile of the study participants has been presented in Table 1.

Table 1

The anthropometric information of the elderly study participants

Parameters	Values
Body height (cm)	154.8 ± 8.75
Body weight (kg)	56.0 ± 12.64
BMI	23.39 ± 4.332
WC (cm)	90.8 ± 11.72
HC (cm)	91.5 ± 10.08
WHR	0.91 ± 0.203
WHtR	0.67 ± 0.162

Data presented in AM±SD form

Table 2 presents the correlation coefficient (r) values between selected anthropometric parameters and the indicators of increased metabolic complications in the matrix form.

Table 2

The correlation coefficient values (r) between selected anthropometric parameters and the indicators of increased metabolic complications

	Body height	**Body weight**	**BMI**	**WC**	**WHR**	**WHtR**
Body height	—	0.59**	0.12^	0.22*	0.34**	-0.37
Body weight	—	—	0.85**	0.80**	0.20*	0.15^
BMI	—	—	—	0.86**	0.67^	0.40**
WC	—	—	—	—	0.36**	0.25**
WHR	—	—	—	—	—	-0.74**

**P<0.01, *P<0.05, ^not significant

Table 3 presents the correlation coefficient values (r) between visceral fat and selected anthropometric parameters

Table 3

The correlation coefficient values (r) of visceral fat and selected anthropometric parameters

Anthropometric parameters	Visceral fat
Body height	0.30**
Body weight	0.64**

**P<0.01

Table 4 presents the correlation coefficient values (r) between visceral fat and the indicators of increased metabolic complications.

Table 4

The correlation coefficient values (r) of visceral fat and the indicators of increased metabolic complications and comorbidities

Indicators of increased metabolic complications	**Visceral fat**
WC	0.58**
WHR	0.22*
WHtR	0.06^
BMI	0.63**

**P<0.01; *P<0.05, ^not significant

Discussion

United Nations and the World Health Organization have drawn up several strategies to combat the increasing prevalence of metabolic complications and promotion of Healthy Aging among the elderly worldwide (WHO, 2024). However, to achieve the targets, continuous screening and dissemination of preventive strategies are required (Abud *et al*., 2022). The present study shows that visceral fat has strong correlations with the increased metabolic complication indicators, i.e., WC and WHR, as well as with anthropometric parameters like body height, body weight, and BMI.

The initial findings of the present study, i.e., Visceral fat is correlated with the selected anthropometric variables, is found to be in agreement with studies carried out on healthy adults in Maharashtra and Haryana (Verma, *et al*., 2016; Gadekar, *et al*., 2020), as well as studies conducted on Australian adults (Staynor, *et al*., 2020), Canadian older adults (Andreacchi, *et al*., 2021) and older adults of Norway (Lundblad, *et al*., 2021). A study carried out on both Indian and Chinese elderly persons showed visceral fat not only correlated with WC but also more positively correlated with cardio-metabolic risk factors (Ng *et al*., 2012). Another study conducted on Chinese older adults showed that WC and WHtR were more closely related to the increasing risk of diabetes than BMI or WHR (Zhang *et al*., 2021).

Increasing overnutrition decreases the tissue protective responses in the body and induces inflammation of fat tissues with the help of visceral fat (Jensen, 2008). Initiation of chronic inflammation of fat tissues sustained over time and dysfunction in adipocytes, which increase the secretion of inflammatory adipokines, and decrease in the filtration of bone-marrow-derived immune cells, leading to signal transfer for the production of cytokines and chemokines, thereby promoting the development of metabolic complications by affecting multiple organs (Chait & Den Hartigh, 2020; Kawai, *et al*., 2021).

It may be mentioned that the number of study participants is not very high, and the study could not factor in body fat percentage and

body fat distribution. Still, an initial idea regarding the relationship between visceral fat, which impacts health and well-being, and other markers of metabolic complications/co-morbidities could be obtained for the Bengali elderly.

Conclusion

Visceral fat is found to have significant ($P<0.05$) positive correlation with WC, WHR and BMI- the indicators of increased metabolic complications and comorbidities.

References

Abud, T., Kounidas, G., Martin, K.R., Werth, M., Cooper, K., Myint, P.K. (2022): Determinants of healthy ageing: a systematic review of contemporary literature. *Aging Clin Exp Res.*, 34(6), 1215-1223.

Andreacchi, A.T., Griffith, L.E., Guindon, G.E., Mayhew, A., Bassim, C., Pigeyre, M. (2021): Body mass index, waist circumference, waist-to-hip ratio, and body fat in relation to health care use in the Canadian Longitudinal Study on Aging. *International Journal of Obesity*, 45(3), 666-676.

Banerjee, N., Chatterjee, S., Bhattacharjee, S., Mukherjee, S. (2014): Effect of regular practising Bharatnatyam dancing exercise on body fat of urban female teenagers. *Indian J Clin Anat Physiol*, 1(1), 29-33.

Banerjee, N., Chatterjee, S., Chatterjee, S., De, S., Mukherjee, S. (2014): Relationship between two body adiposity estimating methods: a study in Bengalee female adolescents being trained in bharatnatyam dance. *IntPhysiol*, 2(2), 41-49.

Banerjee, N., Biswas, P., Chatterjee, S., Santra, T., Chatterjee, S., Mukherjee, S. (2021): Impact of Bharatnatyam Dancing on Obesity and Diabetes Risk Status: A Study in Bengalee Female Human Resources Engaged in Sedentary Occupations. *Ergonomics for Improved Productivity*, pp 921-929, Springer Nature, Singapore.

Banerjee, N., Santra, T., Bardhan, S., De, S., Mukherjee, S. (2022): Impact of practicing Bharatnatyam dancing on obesity status in terms of adiposity indices in human resources engaged in white collar jobs: A study in Bangalee Females. *Ergonomics for Design and Innovation*, pp 1521-1529, Springer Nature, Singapore.

Banerjee, N., Chatterjee, S., Chatterjee, S., Bhattacherjee, S., De, S., Mukherjee, S. (2021): Relation between Occupational Sitting Duration and Central Obesity? A Study in Bengalee Female Human Resources Engaged in Sedentary Occupation. *Ergonomics for Improved Productivity*, pp 911-920, Springer Nature, Singapore.

Bardhan, S., Mondal, S., Mukherjee, S. (2024): Dietary intake and risk of Diabetes: a Study in Bengalee young adult females. *Brazilian Journal of Development*, 10(6), e70489.

Bhattacharjee, S., Santra, T., Chatterjee, S., Biswas, P., Banerjee, N., Mukherjee, S. (2021): A Study on flexibility and fitness status of adult Bengalee males undergoing training in football. *Ergonomics for Improved Productivity*, pp 869-881, Springer Nature, Singapore.

Chait, A., Den Hartigh, L.J. (2020): Adipose tissue distribution, inflammation and its metabolic consequences, including diabetes and cardiovascular disease. *Frontiers in Cardiovascular Medicine*, 7, 522637.

Chatterjee, S., Banerjee, N., Bhattacharjee, S., Santra, T., Chatterjee, A., Chatterjee, S., Mukherjee, S. (2017): Association of Muscular Strength and Flexibility with Select Anthropometric Markers of Obesity: A Study on Adult Bengalee Kathak Danseuses. *International Journal of Current Advanced Research*, 6, 2341 –2346.

Eaton–Evans, J. (2005): Nutritional Assessment |Anthropometry*, *Encyclopedia of Human Nutrition (Second Edition),* pp 311-318, Elsevier, Netherlands.

Gadekar, T., Dudeja, P., Basu, I., Vashisht, S., Mukherji, S. (2020): Correlation of visceral body fat with waist–hip ratio, waist circumference and body mass index in healthy adults: A cross sectional study. *Medical Journal Armed Forces India*, 76(1), 41-46.

Huang, G., Pencina, K., Li, Z., Apovian, C. M., Travison, T. G., Storer, T. W., et al. (2021): Effect of protein intake on visceral abdominal fat and metabolic biomarkers in older men with functional limitations: results from a randomized clinical trial. *The Journals of Gerontology: Series A*, 76(6), 1084-1089.

Jensen, M.D. (2008): Role of body fat distribution and the metabolic complications of obesity. *The Journal of Clinical Endocrinology & Metabolism*, 93(11_supplement_1), s57-s63.

Kawai, T., Autieri, M.V., Scalia, R. (2021): Adipose tissue inflammation and metabolic dysfunction in obesity. *American Journal of Physiology-Cell Physiology*, 320(3), C375-C391.

Lundblad, M.W., Jacobsen, B.K., Johansson, J., Grimsgaard, S., Andersen, L.F., Hopstock, L.A. (2021): Anthropometric measures are satisfactory substitutes for the DXA derived visceral adipose tissue in the association withcardiometabolic risk—The Tromso Study 2015–2016. *Obesity Science & Practice*, 7(5), 525-534.

Ma, W.Y., Yang, C.Y., Shih, S.R., Hsieh, H.J., Hung, C.S., Chiu, F.C., et al. (2013): Measurement of Waist Circumference: midabdominal or iliac crest? *Diabetes Care*, 36(6), 1660-66.

Mondal, S., Bardhan, S., Chatterjee, S., Chatterjee, S., Banerjee, N., Mukherjee, S. (2024): Relationship between Body Balance and Nutritional Status in Indian Elderly. *Indian Journal of Gerontology*, 38(3), 384-394.

Moreira, G.C., Cipullo, J.P., Ciorlia, L.A., Cesarino, C.B., Vilela-Martin, J.F. (2014): Prevalence of metabolic syndrome:

association with risk factors and cardiovascular complications in an urban population. *PLoS One*, 9(9), e105056.

Mukherjee, S., Banerjee, N., Chatterjee, S., Chatterjee, S., Chatterjee, A., Santra, T. et al. (2014): Effect of Bharatnatyam dancing on body composition of Bengalee female children. *Am J Sports Sci Med*, 2(1), 56-59.

Mukherjee, S., Banerjee, N., Chatterjee, S., Chakrabarti, B. (2013): Impact of Bharatnattyam dancing exercise in reducing central obesity in Bengalee adult females. *Sci Cult*, 79(11-12), 503-506.

Ng, A.C., Wai, D.C., Tai, E.S., Ng, K.M., Chan, L.L. (2012): Visceral adipose tissue, but not waist circumference is a better measure of metabolic risk in Singaporean Chinese and Indian men. *Nutrition & Diabetes*, 2(8), e38-e38.

Ratjen, I., Morze, J., Enderle, J., Both, M., Borggrefe, J., Muller, H.P., et al. (2020): Adherence to a plant-based diet in relation to adipose tissue volumes and liver fat content. *The American Journal of Clinical Nutrition*, 112(2), 354-363.

Santra, T., Banerjee, N., Chatterjee, S., Chatterjee, A., Ghosh, K., Mukherjee, S. (2021): Linkage Between Select Anthropometric Measures and Pulmonary Function Indicator: A Study on Bengalee Male Automobile Workers. In: Ergonomics for Improved Productivity, pp 847-855, Springer Nature, Singapore,

Saravana-Bawan, M., Alghamdi, M., Khadaroo, R.G. (2021): The Relationship Between Visceral Obesity and Post-operative Complications: A Meta-Analysis. *Journal of Surgical Research*, 267, 71-81.

Shuster, A., Patlas, M., Pinthus, J.H., Mourtzakis, M. (2012): The clinical importance of visceral adiposity: a critical review of methods for visceral adipose tissue analysis. *Br J Radiol*, 85(1009), 1-10.

Silveira Rossi, J.L., Barbalho, S.M., Reverete de Araujo, R., Bechara, M.D., Sloan, K.P., Sloan, L.A. (2021): Metabolic syndrome and cardiovascular diseases: Going beyond traditional risk factors. *Diabetes/metabolism Research and Reviews*, 38(3), e3502-e3502.

Spinelli, R., Parrillo, L., Longo, M., Florese, P., Desiderio, A., Zatterale, F., et al. (2020): Molecular basis of ageing in chronic metabolic diseases. *Journal of Endocrinological Investigation*, 43, 1373-1389.

Staynor, J.M., Smith, M.K., Donnelly, C.J., Sallam, A.E., Ackland, T.R. (2020): DXAreference values and anthropometric screening for visceral obesity in Western Australian adults. *Scientific Reports*, 10(1), 18731.

Stefan, N. (2020): Causes, consequences, and treatment of metabolically unhealthy fat distribution. *Lancet Diabetes Endocrinol*, 8(7), 616-627.

Verma, M., Rajput, M., Sahoo, S.S., Kaur, N., Rohilla, R. (2016): Correlation between the percentage of body fat and surrogate indices of obesity among adult population in rural block of Haryana. *Journal of Family Medicine and Primary Care*, 5(1), 154-159.

Warrier, V., Krishan, K., Shedge, R., Kanchan, T. (2023): Height Assessment. [Updated 2023 Jul 25]. In: *StatPearls* [Internet], StatPearls Publishing, Florida. Available from: https://www.ncbi.nlm.nih.gov/books/NBK551524/.

World Health Organization Homepage. (2024): https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

World Health Organization Homepage. (2021): https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).

World Health Organization. (2008): *Waist Circumference and Waist–Hip Ratio: Report of a WHO Expert Consultation*. https://www.who.int/publications/i/item/9789241501491.

World Health Organization. (2024) : Global levels of physical inactivity in adults: off track for 2030. https://iris.who.int/handle/10665/378026.

Xu, Z., Liu, Y., Yan, C., Yang, R., Xu, L., Guo, Z., *et al*. (2021): Measurement of visceral fat and abdominal obesity by single-frequency bioelectrical impedance and CT: a cross-sectional study. *BMJ Open*, 11(10), e048221.

Zamanillo-Campos, R., Chaplin, A., Romaguera, D., Abete, I., Salas-Salvado, J., Martin, V., *et al*. (2022): Longitudinal association of dietary carbohydrate quality with visceral fat deposition and other adiposity indicators. *Clinical Nutrition*, 41(10), 2264-2274.

Zhang, F.L., Ren, J.X., Zhang, P., Jin, H., Qu, Y., Yu, Y., *et al*. (2021): Strong association of waist circumference (WC), body mass index (BMI), waist to height ratio (WHtR), and waist to hip ratio (WHR) with diabetes: a population based cross sectional study in Jilin Province, China. *Journal of Diabetes Research*, 2021(1), 8812431.

Zwick, R.K., Guerrero-Juarez, C.F., Horsley, V., Plikus, M.V. (2018): Anatomical, Physiological, and Functional Diversity of Adipose Tissue. *Cell Metabolism*, 27(1), 68-83.

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 407-420
ISSN : 0971-4189, UGC No. – List B, Science –121

Prevalence and Predictors of Cardiovascular Diseases among Older Adults in Kerala

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ABSTRACT

This research investigates the occurrence of cardiovascular diseases (CVD) and the connected risk factors among the elderly population in Kerala, utilizing data from the Longitudinal Aging Study in India (LASI). The research reveals a significant increase in self-reported CVD prevalence with age, emphasizing the cumulative impact of risk factors throughout the lifespan. Gender disparities indicate a higher likelihood of CVD among older men, challenging common misconceptions about cardiovascular risk. Urban residents exhibit a higher prevalence than rural counterparts, aligning with global trends in urbanization and CVD burden. High cholesterol and diabetes emerge as prominent risk factors, corroborating existing evidence of their substantial contribution to CVD morbidity and mortality. Physical inactivity is identified as a noteworthy risk factor, emphasizing the importance of promoting regular physical activity among older adults. The study also underscores the significant role of family history in CVD, urging attention to genetic predispositions in preventive

strategies. Logistic regression analyses provide nuanced insights into the multivariate relationships between various demographic and health-related factors. In summary, this study contributes to a thorough comprehension of the prevalence of cardiovascular diseases (CVD) and related risk factors in the older adult population of Kerala. The study underscores the pressing necessity for focused health interventions and awareness initiatives to address the increasing challenge of cardiovascular diseases in this specific demographic.

Keywords: Cardiovascular diseases (CVD), Gender disparities, Older adult population of Kerala, Focused health interventions,

In the past few decades, India has experienced a rapid transformation in its epidemiological landscape. As life expectancy has risen, non-communicable diseases (NCDs) have emerged as a growing public health issue in the country. Low- and middle-income countries, including India, bear the brunt of NCD-related deaths. Rapid urbanization and lifestyle changes have triggered an epidemiological health transition, leading to economic growth. However, this transition has also brought certain associated risk factors. The increasing burden of NCDs and high case fatality rate in low- and middle-income countries prompted the United Nations to recognize 2012 that the escalating NCD burden is a significant challenge to sustainable development in the 21st century (Joshi R, *et al.,* 2006). According to the World Health Organization's country-wise statistics on non-communicable diseases (NCDs), non-communicable diseases account for approximately 53 percent of all deaths in India. Among these, cardiovascular diseases (CVDs) have the largest share, accounting for 24 percent of the total deaths (WHO, 2010). According to the Global Status on NCDs Report (2010), India witnessed over 2.5 million deaths from CVD in 2008, with two-thirds of the deaths attributed to coronary heart disease (CHD) and the remaining one-third to stroke (Sapru, 1991 & WHO, 2011). Research indicates that CVD affects Indians at least a decade earlier

than people of European ancestry, striking them during their most productive midlife years (Joshi R *et al.,* 2006 & Xavier *et al.,* 2008). The prevalence of CVD appears to be most closely linked to a country's epidemiological transition stage, particularly when high disease rates in middle age persist into later life. Based on a few population-based surveys, the estimated prevalence of CVD in rural India was 3-4 percent in 2003, while it was 8-10 percent in urban areas (Omran, 1971 & Ghaffer *et al.,* 2004, & Gupta R, 2005). According to the Global Burden of Disease Study, 2010, the age-standardized CVD death rate in India of 272 per 100,000 is higher than the global average of 235 per 100,000 (GBD, 2021). CVD mortality rates vary significantly by age and gender. According to the WHO's India report, age-adjusted CVD mortality rates are higher among men than women, with rates of 349 per 100,000 for men and 265 per 100,000 for women (Kumar & Sinha, 2020). These rates are two to three times higher than those in the United States, where the mortality rate for men is 170 per 100,000 and 108 per 100,000 for women. In India, over 10.5 million deaths occur annually, with CVD accounting for 20.3 percent of all deaths in men and 16.9 percent of all deaths in women, as reported. There is a rapidly evolving global epidemic of cardiovascular disease (CVD), where the burden of the disease is shifting. In developing countries, CVD currently claims the lives of twice as many people compared to developed countries. The primary causes of CVD are attributed to conventional risk factors, which account for the majority of CVD cases (Gaziano, 2005). Numerous epidemiological studies conducted during the mid and late twentieth century revealed that cardiovascular risk factors were more prevalent among individuals of higher socioeconomic status (SES) compared to those of lower SES (Sapru, 2006). However, certain studies have indicated that in economically disadvantaged areas, particularly those with high illiteracy rates, the burden of risk factors might be more significant among the poor. Epidemiological findings additionally indicate a connection between cardiovascular disease (CVD) and behavioral risk elements like

smoking, alcohol use, insufficient physical activity, and inadequate consumption of fruits and vegetables. Additionally, in elderly individuals, hypertension has been identified as an autonomous risk factor for acute myocardial infarction and stroke (Sapru, 1991). Extensive epidemiological evidence supports the familial clustering of cardiovascular disease (CVD). Results derived from the Framingham Study reveal that individuals with at least one parent affected by cardiovascular disease (CVD) face a twofold increase in the risk of developing CVD over an 8-year duration compared to those lacking such familial history, mainly observed among men. Among women, the presence of CVD in at least one parent increases their risk by 70 percent (Lloyd *et al.,* 2004).

To craft and execute a successful plan for preventing and managing cardiovascular disease (CVD) in older adults, it is imperative to possess a thorough comprehension of diverse CVD risk elements and factors pertinent to this demographic. However, few studies have focused on older adults (Li CY *et al.,* 2011). Therefore, the present study aims to assess the prevalence of CVD and its attributable risk factors among older adults in Kerala.

Data and Methods

For the current study, data was obtained from the Longitudinal Aging Study in India (LASI Wave 1), which is a national survey aimed at scientifically investigating the health, economic, and social determinants and consequences of population ageing in India. LASI is the world's most extensive and India's first longitudinal ageing study, designed to generate data, raise awareness of older people's health issues, and inform public policies in India and its states. The LASI presents a significant opportunity to investigate how various healthcare policies and institutions impact healthcare utilization and health outcomes using innovative and comparable measures of health, including the direct assessment of biological measures. As per the conventional practice for other population-based surveys, the LASI sampling frame included only the household population. The LASI (Wave 1) 2017–18 dataset comprised 72,250 individuals aged 18

years. For the present study, we selected the state of Kerala only; however, a total of 2497 data points from participants aged ≥ 45 years were included in the analysis of this study.

Variable

Dependent variable : The dependent variable used for the study was cardiovascular disease for multivariate analysis. Cardiovascular diseases (CVDs) comprise a spectrum of conditions impacting the heart and blood vessels, encompassing hypertension, stroke, persistent heart ailments like rheumatic heart disease, and congenital and structural disorders. The prevalence of self-reported cardiovascular diseases (CVDs) outlined in this section was computed by taking into account any self-reported diagnosis of conditions such as hypertension, stroke, and chronic heart diseases.

Independent variable : The following variables are used as underlying factors.

Socio-demographic factors: Age of the respondents (45–59, 60-69, 70-79 and 80+years), Sex (male and female), residential place (Rural and Urban), Education (No schooling, up to primary, up to secondary, higher secondary & above), marital status (currently married, widowed), religion (Hindu, Muslim, Christian, and others), Caste (SC, ST, OBC, General), Living arrangement (Alone, With Spouse, With Spouse & Children, With Children, With Others), and MPCE Quintile (Poorest, Poorer, Middle, Richer, Richest)

Genetic factors: Family history of CVD.

Behavioural factors: Physical activity (categorized as every day, at least once a month, and never worked).

Other risk factors: Diabetes and high cholesterol.

Methods

Statistical analyses conducted using SPSS include bivariate analysis and multivariate analysis. The prevalence of self-reported diagnosed CVD is presented by Age, sex, place of residence, Education, Marital Status, social group, religion, monthly per capita expenditure, Physical activity, and family history of CVD in India for

2017–18 about the Longitudinal aging study in India (LASI), Wave 1. Logistic regression was carried out between CVD and its associated risk factors. The dependent variable, CVD, was dichotomous (yes/no), and the independent variables were the associated risk factors of CVD like Sex, place of residence, age, physical activity, family history of CVD, etc., to check the independent effect on CVD. The logistic regression model is as follows:

$$\text{Logit}(Y) = \ln(p / 1 - p) = \alpha + \beta 1 \times 1 + \beta 2 \times 2 +$$

Where p is the probability of the event, α is the intercept, $\beta 1$ is regression coefficients, xi is a set of predictors, and å is an error term.

Findings

Table 1

Prevalence of Cardiovascular disease of the older adult population in Kerala by its background characteristics.

		CVD		Chi-square
Characteristics	Categories	Yes	No	P value
Age	45-59	28.8	71.2	0.000
	60-69	52.1	47.9	
	70-79	62.9	37.1	
	80+	56.5	43.5	
Sex	Male	43	57	0.404
	Female	41.3	58.7	
Place of Residence	Urban	41.5	58.5	0.628
	Rural	42.4	57.6	
Education Completed	No schooling	47.9	52.1	0.000
	Upto Primary	46.2	53.8	
	Upto Secondary	39.1	60.9	
	Higher Secondary & above	35.5	64.5	
Marital Status	Currently Married	38.4	61.6	0.000
	Widowed	57.7	42.3	
	Others	32.6	67.4	

Religion	Hindu	39.5	60.5	0.003
	Muslim	42.7	57.3	
	Christian	48.5	51.5	
	Others	0	100	
Caste	General	44.3	55.7	0.123
	SC	35.4	64.6	
	ST	37.5	62.5	
	OBC	41.4	58.6	
Living Arrangement	Alone	46.9	53.1	0.000
	With Spouse	50.2	49.8	
	With Spouse & Children	34.5	65.5	
	With Children	56.8	43.2	
	With Others	41.5	58.5	
MPCE	Poorest	43.1	56.9	0.889
	Poorer	40.3	59.7	
	Middle	41.6	58.4	
	Richer	41.6	58.4	
	Richest	43.1	56.9	
Ever diagnosed Diabetes	Yes	64.4	35.6	0.000
	No	33.7	66.3	
Ever diagnosed High Cholesterol	Yes	67	33	0.000
	No	35	65	
Physical Activity	Daily	44.6	55.4	0.118
	Atleast once a month	35.7	64.3	
	Never	42.8	57.2	
Family history of CVD	Yes	45.5	54.5	0.000
	No	37.1	62.9	
Total		1048 (42.0)	1449 (58.0)	2497 (100)

The prevalence of diagnosed cardiovascular diseases (CVDs) among older adults in Kerala, categorized by background characteristics, is presented in Table 1 based on self-reported data.

In older adults aged 45 and above, the self-reported prevalence of diagnosed cardiovascular diseases (CVDs) was 42 per cent overall. The prevalence rate of diagnosed cardiovascular diseases (CVDs) increased with age, ranging from 28.8 per cent in the 45-59 age group to 56.5 per cent among individuals aged 80 and above. Among older adults, the self-reported prevalence of diagnosed cardiovascular diseases (CVDs) was higher among males (43%) compared to females (41%). Additionally, the prevalence was notably higher among those residing in rural areas (42.4%) compared to individuals in urban areas (41.5%).The self-reported prevalence of diagnosed cardiovascular diseases (CVDs) exhibited a decrease as the level of education declined. It was 47.9 per cent among individuals with no schooling and decreased to 35.5 per cent among those with higher secondary and above education. The prevalence of cardiovascular disease (CVD) was found to be higher among individuals belonging to the "Other Caste" category, with a rate of 44.3 per cent , as compared to those from Scheduled Castes, Scheduled Tribes, and Other Backward Castes (OBC). Interestingly, in contrast to the results presented in Table 1, the self-reported prevalence of diagnosed CVD was higher among Christians, accounting for 48.5%, as compared to Hindus, Muslims, and individuals belonging to other religious backgrounds. The analysis covered that older adults with diabetes exhibited an elevated incidence of cardiovascular disease (CVD), with a rate of 64.4 percent. Similarly, individuals with high cholesterol exhibited a higher prevalence of CVD, with a rate of 67 percent. Conversely, a graded inverse correlation exists between the levels of physical activity and the prevalence of cardiovascular disease. Among individuals who engage in daily activity, the prevalence of cardiovascular disease (CVD) was relatively high, at 44.6 per cent . Conversely, the analysis indicated that older adults with a family history of CVD had a higher prevalence of diagnosed CVD, with a rate of 45.5 per cent .

Table 2

Results of Binary Logistic regression of risk factors of cardiovascular disease of older adult population in Kerala.

	Sig.	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper
Age				
45-49(ref)				
60-69	0.000	1.84	1.762	1.921
70-79	0.000	2.374	2.244	2.512
80+	0.000	2.349	2.159	2.556
Sex				
Male (ref)				
Female	0.000	1.29	1.24	1.342
Place of residence				
Rural (ref)				
Urban	0.000	1.355	1.303	1.409
Living Arrangement				
Alone ((ref)				
With Spouse	0.152	1.145	0.951	1.378
With Spouse & Children	0.162	1.138	0.949	1.365
With Children	0.001	1.201	1.083	1.331
With Others	0.061	1.134	0.994	1.292
MPCE Quintile				
Poorest (ref)				
Poorer	0.000	1.156	1.091	1.226
Middle	0.000	1.317	1.243	1.396
Richer	0.000	1.461	1.378	1.548
Richest	0.000	1.626	1.531	1.727
Education				
No Schooling (ref)				
Upto primary	0.000	1.101	1.052	1.153

Upto Secondary	0.545	1.017	0.964	1.073
Higher Secondary & above	0.244	0.959	0.895	1.029
Religion				
Hindu (ref)				
Muslim	0.000	1.29	1.222	1.362
Christian	0.027	1.084	1.009	1.164
Others	0.000	1.394	1.286	1.511
Caste				
General (ref)				
SC	0.000	0.689	0.643	0.739
ST	0.004	0.925	0.877	0.975
OBC	0.05	1.058	1	1.119
Marital Status				
Currently Married (ref)				
Widowed	0.006	1.264	1.07	1.491
Others	0.488	0.935	0.772	1.131
Family History of CVD				
No (ref)				
Yes	0.000	1.85	1.779	1.923
Diabetes				
Yes (ref)				
No	0.000	0.254	0.242	0.268
Cholesterol				
Yes (ref)				
No	0.000	0.269	0.244	0.297
Physical Activities				
Daily (ref)				
Atleast once a month	0.474	0.962	0.865	1.07
Never	0.028	0.897	0.814	0.989
Constant	0.001	1.515		

Table 2 presents the odds ratios for the likelihood of cardiovascular disease (CVD) associated with various risk factors. Analysis reveals that respondents of 60-69 age groups were 1.8 times (OR 1.84, 95% CI 1.762–1.921), and respondents of 70-79 and 80+ age groups are 2.37 (OR 2.37, 95% CI 2.244–2.512) and 2.34 times (OR 2.349, 95% CI 2.159–2.556) more likely to suffer from CVD than 45–59 age groups. Sex is another intrinsic risk factor among older adults. Given that older females are reported to be 1.2 times (OR 1.29, 95% CI 1.24-1.34) more likely to suffer from CVD than age-matched men. The analysis also shows a significant association between residing in urban areas and a higher risk factor for cardiovascular disease (CVD). Older adults residing in urban areas were 1.3 times more likely to experience CVD compared to those in other areas (OR 1.35, 95% CI 1.303-1.409). A notable contributing factor in the onset of cardiovascular disease (CVD) is the rise of physical inactivity. Furthermore, the study indicated that individuals without a family history of cardiovascular disease (CVD) had a 1.85 times higher risk of developing CVD (OR 1.85, 95% CI 1.779-1.923).

Discussion

This study's primary objective was to investigate cardiovascular disease (CVD) and the correlated risk factors among the elderly population in Kerala. The findings reveal that the prevalence of CVD tends to rise as individuals age. Moreover, with the process of ageing, individuals accumulate various risk factors for CVD throughout their lifespan. Despite CVD being the primary cause of death for both men and women in India, there are significant gender disparities in the prevalence of these diseases. The study revealed that men exhibited a higher likelihood of experiencing CVD compared to women. These findings align with past research indicating that males have a higher mortality rate from cardiovascular disease than females. Additional support for this observation comes from the researcher, who explains that women surpass men in terms of both living with and succumbing to CVD and stroke. Moreover, there is a higher number of hospital

discharges for heart failure and stroke among women. These disparities in CVD prevalence between sexes primarily arise from demographic variations in India. As women generally have a longer life expectancy compared to men, they constitute a more significant proportion of the elderly population, wherein the prevalence of CVD is highest. Furthermore, there is a tendency to underestimate the risk of cardiovascular disease in men, possibly stemming from the misconception that they are inherently more protected against CVD compared to women. Unfortunately, this underestimation of CVD risk among men often results in less proactive and aggressive treatment approaches.

The results of the current study demonstrate a significant association between the prevalence of CVD and the place of residence. Specifically, the study reveals that older adults residing in rural areas exhibit a lower likelihood of having CVD compared to their urban counterparts. This observation is reinforced by researchers who indicate that the urban population generally experiences a higher prevalence of CVDs in comparison to the rural population. Moreover, the prevalence of risk factors in slum/ peri-urban areas falls somewhere between the trends observed in urban and rural areas but leans more towards the patterns observed in urban areas. Additionally, the study uncovered that high cholesterol and diabetes were identified as the significant risk factors for CVD. This reinforces earlier discoveries indicating that individuals with diabetes encounter roughly twice the risk of mortality from stroke or heart disease in comparison to those without diabetes. Subsequent studies have further confirmed that individuals with type 2 diabetes (T2D) have a twofold higher percentage of cardiovascular disease compared to those without T2D. Additionally, cardiovascular disease stands as the primary cause of mortality among patients with T2D.

The study findings revealed a notable correlation between physical inactivity in older adults and a higher prevalence of cardiovascular disease (CVD). The noted distinction was statistically

noteworthy, demonstrating a p-value below 0.001. Consistently participating in moderate to vigorous physical activity markedly reduces the risk of cardiovascular disease development. The study revealed that individuals with a significant family history of heart disease, stroke, or hypertension had a higher likelihood of developing cardiovascular disease (CVD) themselves.

Conclusion

In summary, the study provided a thorough evaluation of the prevalence of cardiovascular disease (CVD) and the related risk factors within the elderly population in Kerala. The findings highlighted a significant prevalence of CVD risk factors among this demographic, raising serious public health concerns and indicating a potential future surge in healthcare demands. It is imperative to implement targeted strategies aimed at reducing CVD risk among the elderly, with a specific focus on promoting physical activities and early detection of CVD based on family history. Failure to design well-structured health promotion and awareness programs poses a significant threat to effectively addressing these issues.

References

Gaziano TA.(2005). Cardiovascular disease in the developing world and its cost-effective management. *Circulation.* 112(23):3547–3553.

Ghaffar A, Reddy KS, Singhi M.(2004). Burden of non-communicable diseases in South Asia. *BMJ.* 328(7443):807–810.

Global Burden Of Diseases (2021). GBD profile: India. From Healthdata.orgwebsite: http:// www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_count ry_report_india.pdf;

Gupta R.(2004). Burden of Coronary Heart Disease in India. *Indian Heart Journal* 57(6):632-8

Joshi R, Cardona M, Iyengar S, A Sukumar, C Ravi Raju, K Rama Raju, Krishnam Raju, K Srinath Reddy, Alan Lopez, Bruce

Neal,(2006). Chronic diseases now a leading cause of death in rural India—mortality data from the Andhra Pradesh Rural Health Initiative. *Int J Epidemiol*. 35(6):1522–1529.

Kumar AS, and Sinha N. (2020). Cardiovascular disease in India: A 360 degree overview, *Med J Armed Forces India*. 76(1):1.

Li CY, Han HR, Kim J, Kim MT. (2011). Factors related to risk of cardiovascular disease among older Korean Chinese with hypertension. *Asian Nurs Res*. 5(3):164–169

Lloyd-Jones DM, Nam BH, D'AgostinoSr RB, Ralph B D'Agostino Sr, Daniel Levy, Joanne M Murabito, Thomas J Wang, Peter W F Wilson, Christopher J O'Donnell, (2004). Parental cardiovascular disease as a risk factor for cardiovascular disease in middle-aged adults: a prospective study of parents and offspring. *JAMA*. 291(18):2204–2211.

Omran AR., (2005). The Epidemiologic Transition: A Theory of the Epidemiology of Population Change. *Milbank Q.* 83(4): 731–757

Sapru RP. (1991). An overview of cardiovascular diseases in India. *Preventive cardiology: an introduction;* 69–86

WHO (2010). *Non-Communicable Diseases Country Profiles*: India

WHO (2011). *Global Status Report of NCD, 2010.* Geneva: World Health Organization

WHO (2014). *Global Status Report on Alcohol and Health*, Geneva, Switzerland

Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, K.Srinath Reddy, Rajeev Gupta , Prashant Joshi , Prafulla Kerkar, SThanikachalam, KK Haridas, TM Jaison, Sudhir Naik, AK Maity, Salim Yusuf (2008). Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. *Lancet.* 371(9622):1435–1442.

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 421-432
ISSN : 0971-4189, UGC No. – List B, Science –121

The Impact of Basic Yogic Exercises on Pulmonary Function and Cognitive Performance in Geriatric Population : An Experimental Study

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ABSTRACT

The research, which holds significant implications for geriatric health and wellness, examined the impact of basic yogic exercises on the pulmonary and cognitive functions of 30 elderly persons (15 males and 15 females) aged 60 to 80 years who stayed with their families and in old-age homes. The parameters of Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV1), Peak Expiratory Flow Rate (PEFR), and Montreal Cognitive Assessment (MoCA) Test were used to measure accessing the Lung Functions and for accessing Cognitive functions before and after 12 weeks of Yoga instruction. The findings, which are of profound importance, suggest a noticeable enhancement in pulmonary and cognitive functions after attaining a 12-week yogic training programme. Statistically significant rises in forced vital capacity (FVC), Forced Expiratory Volume (FEV 1), Peak Expiratory Flow Rate (PEFR),

and cognitive functions in terms of Attention and Memory were noticed. The findings indicate that regular and simple yoga enhanced lung and memory functions.

Keywords: Yoga, Pranayam, Meditation, Geriatric, Pulmonary, Cognitive

While traditional workouts like walking, jogging, running, swimming, and cycling are known for their cardiovascular and pulmonary benefits, there is a growing global recognition and appreciation for the efficacy of traditional yogic activities in promoting holistic well-being. This research, supported by reputable studies (Jeter *et al.,* 2015), further strengthens the case for incorporating yogic exercises into geriatric health and wellness programmes, offering a potentially cost-effective and accessible way to improve pulmonary function and cognitive performance in the elderly.

Yoga is a unique practice that combines controlled breathing techniques and specific body postures to promote a state of tranquillity. Yoga is a comprehensive system encompassing religious, moral, physical, and physiological aspects. Yoga, a practice of spiritual nature, is often considered to possess transformative qualities that can enhance the overall well-being of individuals. The genre in question is an interdisciplinary field encompassing philosophical, scientific, and aesthetic elements within the cultural context of India. It may be understood as a whole lifestyle. The primary objective of Yogic practices was to attain a broader goal, such as integrating individual and collective awareness. The field of yoga science centers its attention on exploring and applying spiritual methodologies and exercises, as elucidated by Maharshi Patanjali in the Sutras and Hatha Yoga lineages. The practice encompasses various elements such as self-regulation, interpersonal conduct, Kriya cleansing techniques, physical postures, breath control exercises, and meditation, all of which contribute to the holistic well-being of individuals (Malhotra, 2017)

Yoga has been found to contribute to overall personality development, serving as a preventive measure against a range of

ailments and facilitating spiritual upliftment. Scientific research has demonstrated yoga's benefits in managing hypertension, cardiovascular disease, and heart rate variability (Mooventhan & Nivethitha, 2020). Yoga has been found to have positive effects on metabolic illnesses, including the reduction of blood cholesterol levels, weight loss, and the lowering of blood sugar levels (Kumar *et al.,* 2016)

Yoga is purported to enhance longevity and have therapeutic and rehabilitative properties. The loss in effectiveness of the respiratory system and ventilation is observed with advancing age, which can be attributed to many reasons. Pranayama, a widely recognized yogic practice, has favourable benefits for the respiratory system. These exercises facilitate the more effective and thorough emptying and filling of the respiratory apparatus, resulting in enhanced development of the respiratory musculature.

A study conducted on a cohort of individuals in the older age range (41-50 years) revealed that engaging in a brief yoga practice, specifically focusing on postures and pranayama techniques, enhanced respiratory muscles' functionality. This intervention showed a preventive effect against the onset of primary respiratory disorders (Nayar *et al.,* 1975; Culver & Butler, 1985; Joshi *et al.,* 1992; Ahmed *et al.,* 2010). Reports indicate that yoga can significantly enhance pulmonary functioning due to its incorporation of physical activity and breathing techniques (Pherwani *et al.,* 1989; Prakash *et al.,* 2007).

The aged population frequently experiences cognitive decline, which leads to significant impairment and a diminished standard of living. According to research published in the Journal Pre-proof, an additional investigation conducted on elderly individuals residing in rural areas of China revealed that around 23.3 percent of this population exhibits cognitive impairment in the absence of dementia (Zhang *et al.,* 2018). Based on a comprehensive analysis, it has been determined that the yearly progression of mental health conditions into dementia falls within the range of 5 percent to 10 percent (Mitchell

& Shiri Feshki, 2009). As mentioned earlier, the data indicate a burgeoning concern over cognitive deterioration.

Yoga has positively affected mental health, cognitive abilities, feelings of melancholy, anxiety, and mood (da Silva *et al.,* 2009; Varambally & Gangadhar, 2016). Yoga benefits older individuals by reducing chronic health conditions and improving overall quality of life (Mooventhan & Nivethitha, 2017; Tulloch *et al.,* 2018).

Previous research has demonstrated that yoga is a viable, secure, and beneficial mind-body intervention (Varambally *et al.,* 2013; Cramer *et al.,* 2015). Yogic practices encompass several aspects, including physical, cognitive, and emotional components (Tang *et al.,* 2017).

The objective of the current study was to evaluate the positive impacts of Basic yoga exercises and compare the enhancements in pulmonary and cognitive functions among the Elderly Population.

Methods

Sample

A total of 30 older participants, comprising both males (N= 15) and females (N= 15) aged between 60 and 80 years, were carefully chosen for this study. Among 30 participants 22 (11 male and 11 female) were in the age group (60-70) and 8 (4 male and 4 female) in the age group (71-80). These individuals were free from respiratory, cardiovascular, or other medical conditions. Subjects with a history of major respiratory illness like Tuberculosis, pleural effusion, COPD, asthma, Smokers, and cognitive illnesses like Alzheimer's, dementia, and other mental issues were excluded from the study.

Procedure

Prior to the commencement of the study, explicit agreement was obtained from each participant, ensuring that they were fully informed about the nature and purpose of the research.

The participants' baseline characteristics and health status were assessed before the intervention. The yoga training programme,

consisting of daily sessions lasting at least 30 minutes for 12 weeks, was then administered to the participants. Following the completion of the intervention, the same group of senior individuals was re-evaluated using the same assessment measures employed at baseline.

Tools Used

A. Spirometer– to measure Pulmonary Function

A spirometry test requires you to breathe into a tube attached to a machine called a spirometer. Spirometry is the term given to the primary lung function tests that measure the air that is expired and inspired. There are three basic related measurements: volume, time, and flow. The main spirometry measurements include forced vital capacity (FVC), the most significant amount of air you can forcefully breathe out after breathing in as deeply as possible. Average values in healthy patients aged 20-60 range from 5.5 to 4.75 litres in males and 3.75 to 3.25 litres in females.

The forced expiratory volume in 1 second (FEV_1) is the volume of air (in litres) exhaled in the first second during forced exhalation after maximal inspiration. Usually, at least 80 percent of the forced vital capacity (FVC) is exhaled in the first second.

Peak expiratory flow rate (PEFR) is the volume of air forcefully expelled from the lungs in one quick exhalation and is a reliable indicator of ventilation adequacy and airflow obstruction. The standard peak flow value can range from person to person and depends on sex, age, and height. The average peak flow is 450-550L/min in adult males and 320-470L/min in adult females. PEFR reflects the functioning of the larger airways, and any amount of stress, infection, or inflammation in these airways causes adverse reactions.

Spirometry parameters like Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV 1), and peak expiratory flow rate (PEFR) were recorded in the sitting position using an RMS Helios 401 Spirometer.

B. Montreal Cognitive Assessment Test– to measure cognitive performance

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuo-constructional skills, conceptual thinking, calculations, and orientation. The MoCA may be administered by anyone who understands and follows the instructions; however, only a health professional with expertise in the cognitive field may interpret the results. The time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

Similarly, other characteristics such as bowel, appetite, and sleep quality were alsorecorded for all participants: Excellent, very good, Good, Average, and poor.

The spirometry technique was conducted according to the established standards and guidelines, using normal protocol and safeguards. Three recordings were captured, and the most exemplary attempt was incorporated into the findings.

The recordings were conducted between 8:30 a.m. and 10:30 a.m. to mitigate the potential influence of diurnal fluctuations.

A paired t-test was utilised for testing purposes.

Intervention used : The Yogic exercises allotted to the participants were for a minimum duration of 30 minutes:

1. Pranayam 1 (Bhastika) – duration 3minutes
2. Pranayam 2 (KapalBhati) – duration 5 mins
3. Pranayam 3 (Anulom Vilom) – duration at least 8 mins.
4. Pranayama 4 (Sheetali Pranayama) – 4 mins
5. Meditation 1 (OM meditation) – duration of at least 5 min
6. Meditation 2 (Love-Kindness meditation) – duration of at least 5 min

Results

After statistical analysis of the data, the following noteworthy augmentation was observed.

Table 1 shows significant improvement in daily activities such as Bowel, Appetite, and Sleep

Table 1

pre-yogic intervention Other Characteristics (Bowel, Appetite and Sleep)

Other Characteristics	Excellent	Very Good	Good	Average	Poor
BOWEL	0	1	9	15	5
APPETITE	0	6	14	6	4
SLEEP	0	6	14	6	4

post-yogic intervention Other Characteristics (Bowel, Appetite, and Sleep)

Other Characteristics	Excellent	Very Good	Good	Average	Poor
BOWEL	13	9	2	4	2
APPETITE	11	7	8	4	0
SLEEP	13	9	2	4	2

Table 2

pre-yogic intervention Other Characteristics (Bowel, Appetite, and Sleep) detailed analysis - Age and gender-wise

Other Characteristics	Excellent				Very Good				Good				Average				Poor			
Age	(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)	
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
BOWEL	0	0	0	0	1	0	0	0	3	4	1	1	5	6	2	2	2	1	1	1
APPETITE	0	0	0	0	2	2	1	1	6	7	1	0	2	2	0	2	1	0	2	1
SLEEP	0	0	0	0	2	2	1	1	6	7	1	0	2	2	0	2	1	0	2	1

post-yogic intervention Other Characteristics (Bowel, Appetite and Sleep) detailed analysis-Age and gender-wise

Other Characteristics	*Excellent*				*Very Good*				*Good*				*Average*				*Poor*			
Age	(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)		(60-70)		(71-80)	
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
BOWEL	4	6	2	1	2	4	2	1	1	1	0	0	3	0	0	1	1	0	0	1
APPETITE	5	5	1	0	3	2	1	1	2	3	1	2	1	1	1	1	0	0	0	0
SLEEP	4	6	2	1	2	4	2	1	1	1	0	0	3	0	0	1	1	0	0	1

Table 3 shows significant improvement in the Peak Expiratory Flow Rate, Forced Expiratory Volume,and Forced Vital Capacity

Table 3

Comparison of Value of Pulmonary Function (pre-yogic intervention & post-yogic intervention)

Pulmonary Parameters	pre-yogic intervention values Mean ± SD	post-yogic intervention values Mean ± SD	'p' value
PEFR	190.61 ± 59.23	268.13 ± 88.76	< .001
FEV 1	1.35 ± .45	1.99 ±.53	< .001
FVC	1.80 ± .50	2.45 ± .54	< .001

Table 4 shows significant improvement in Cognitive functions such as Memory and Attention

Table 4

Comparison of Value of Cognitive Function, i.e., Memory and Attention (pre-yogic intervention & post-yogic intervention)

Cognitive Parameters	pre-yogic intervention values Mean ± SD	post-yogic intervention values Mean ± SD	'p' value
Memory	2.50 ± 1.22	3.30 ± 1.47	< .001
Attention	3.57 ±1.19	5.00 ± 1.31	< .001

Discussion

Tables 1 and 2 depict that there has been significant improvement in Bowel, appetite, and sleep quality post-yogic intervention among the elderly participants. Whereas pre-yogic intervention, the number of the elderly population reported Excellent [Bowel (N=0), Appetite (N=0) and Sleep Quality (N=0)], post-yogic intervention, there has been a significant increase with Excellent [Bowel (N=13), Appetite (N=11) and Sleep Quality (N=13)]. Further, was observed that yoga practices significantly impact participants in the age group 60-70 years compared to those in the age group 71-80 years. Also, female participants in the age group 60-70 showed comparatively notable improvement

compared to male participants in the same age group The improvements in the other characteristics can be attributed to overall enhancement in all bodily functions such as the digestive system, excretory system, etc., and reduction in stress and anxiety.

The analysis of results for the pulmonary function revealed that a significant rise in the PEFR, FEV 1,and FVC(see *Table 3)*was noticed after the yogic intervention in the subjects.The statistical measures for the components were seen to be as follows:

- There was a significant rise in the Peak Expiratory flow rate with a p-value ($p < 0.001$) that shows improvement in the PEFR of the elderly participants post-yogic intervention
- There was a significant rise in the Forced expiratory volume in one-secondp-value ($p < 0.001$) that shows improvement in the FEV1 of the elderly participants post-yogic intervention
- There was a significant rise in the Forced Vital Capacity with a p-value ($p < 0.001$) that shows improvement in the FVC of the elderly participants post-yogic intervention

This phenomenon might be attributed to the consistent practice of slow and forceful inhalation and exhalation during yoga asanas, which may result in the strengthening of respiratory muscles and an augmented release of surfactant.

The analysisof results for the Cognitivefunction revealed a significant rise in attention and memory (Table 4) in the subjects after attending yogic sessions. The statistical measures for the components were seen to be as follows:

- There was a significant rise in Memory with a p-value ($p < 0.001$) that shows improvement in the memory of the elderly participants'post-yogic intervention.
- There was a significant rise in Attention with a p-value ($p < 0.01$) that shows improvement in the attention of the elderly participants'post-yogic intervention.

The improvement might be attributed to the fact that Yoga, in addition to its capacity to induce mental relaxation, has the potential to mitigate and alleviate emotional stress, therefore attenuating the Broncho-constrictive. Further, this may also be due to an augmentation in the amount of grey matter inside the temporal and frontal lobes.

The study's findings revealed that elderly participants who practiced Yoga for a minimum of 30 minutes daily showed a significant enhancement in their respiratory and cognitive abilities and other characteristics such as Bowel, appetite, and sleep quality.

Limitations in the Study—the current study is subject to a significant restriction as it does not include a comparative analysis of the impacts of various exercise modalities on additional physiological processes. Another constraint is the limited sample size. Further investigation is required to comprehensively examine the impact of Yoga on the respiratory and mental systems as a whole, including a thorough analysis of other lung function and cognitive measures.

References

Jeter, P. E., Slutsky, J., Singh, N., & Khalsa, S. B. S. (2015, October). Yoga as a Therapeutic Intervention: A Bibliometric Analysis of Published Research Studies from 1967 to 2013. *The Journal of Alternative and Complementary Medicine,* 21(10), 586–592. https://doi.org/10.1089/acm.2015.0057

Malhotra AK.(2017). *An Introduction to Yoga Philosophy: an annotated translation of the Yoga Sutras*. London: Routledge; 30-39.

Mooventhan, A., & Nivethitha, L. (2020, July). Role of yoga in the prevention and management of various cardiovascular diseases and their risk factors: A comprehensive scientific evidence-based review. *Explore*, 16(4), 257–263. https://doi.org/10.1016/j.explore.2020.02.007

Kumar, V., Jagannathan, A., Philip, M., Thulasi, A., Angadi, P., & Raghuram, N. (2016). Role of yoga for patients with type II

diabetes mellitus: A systematic review and meta-analysis. *Complementary Therapies in Medicine*, 25, 104–112. https://doi.org/10.1016/j.ctim.2016.02.001

Prakash S, Meshram S, Ramtekkar U.(2007). Atheletes, Yogics and individuals with sedentary lifestyle; Do their long functions differ. *Indian J PhysiolPharmacol*, 51:76- 80.

Pherwani AV, Desai AG, and Solepure AB., (1989). A study of pulmonary function of competitive swimmers. *Indian J Physiol Pharmacol*. 33(4):228-232.

Ahmed QR, Sau SK, and Kar SK.(2010). An evaluation of pulmonary parameters in two groups of subjects during Yoga practice. *Nepal Med Coll J.* 12(3):180-182.

Joshi LN, Joshi VD, and Gokhale LV, (1992). Effect of Short Term "Pranayam" practice on breathing rate and ventilator functions of lung. *Indian J PhysiolPharmacol*, 36:105-108.

Culver, B. H. and Butler, J. (1985). Alterations in pulmonary function. In: *Principles of Geriatric Medicine* Ed. Andes, R., Bierman, E.L. and Hazzard, W.R. McGraw Hill Book Co. Ltd. (London); Chapter 26, 280-287

Nayar HS, Mathur RM, and Kumar RS,(1975). Effects of yogic exercises on human physical efficiency. *Indian J Med Res*. 63:1369-1376.

Zhang, Y., Guan, Y., Shi, Z., Yue, W., Liu, S., Liu, S., Lu, H., Zhao, L., Zhang, Y., Su, W., & Ji, Y. (2018). Sex Differences in the Prevalence of and Risk Factors for Cognitive Impairment No Dementia among the Elderly in a Rural Area of Northern China: A Population-Based Cross-Sectional Study. *Neuroepidemiology,* 52(1–2), 25–31. https://doi.org/10.1159/000493141

Mitchell, A. J., & Shiri Feshki, M. (2009). Rate of progression of mild cognitive impairment to dementia – meta analysis of 41 robust inception cohort studies. *Acta Psychiatrica Scandinavica,* 119(4), 252–265. https://doi.org/10.1111/j.1600-0447.2008.01326.x

Da Silva, T. L., Ravindran, L. N., & Ravindran, A. V. (2009). Yoga in the treatment of mood and anxiety disorders: A review. *Asian Journal of Psychiatry*, 2(1), 6–16. https://doi.org/10.1016/j.ajp.2008.12.002

Varambally, S., & Gangadhar, B. N. (2016). Current status of yoga in mental health services. *International Review of Psychiatry,* 28(3), 233–235. https://doi.org/10.3109/09540261.2016.1159950

Mooventhan, A., & Nivethitha, L. (2017). Evidence based effects of yoga practice on various health related problems of elderly people: *A review. Journal of Bodywork and Movement Therapies*, 21(4), 1028–1032. https://doi.org/10.1016/j.jbmt.2017.01.004

Tulloch, A., Bombell, H., Dean, C., & Tiedemann, A. (2018). Yoga-based exercise improves health-related quality of life and mental well-being in older people: a systematic review of randomised controlled trials. *Age And Ageing*, 47(4), 537–544. https://doi.org/10.1093/ageing/afy044

Varambally, S., Hariprasad, V., Varambally, P., Thirthalli, J., Basavaraddi, I., & Gangadhar, B. (2013). Designing, validation and feasibility of a yoga-based intervention for elderly. *Indian Journal of Psychiatry,* 55(7), 344. https://doi.org/10.4103/0019-5545.116302

Cramer, H., Ward, L., Saper, R., Fishbein, D., Dobos, G., & Lauche, R. (2015). The Safety of Yoga: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *American Journal of Epidemiology,* 182(4), 281–293. https://doi.org/10.1093/aje/kwv071

Tang, Y. Y., Jiang, C., & Tang, R. (2017, May 26). How Mind-Body Practice Works—Integration or Separation? *Frontiers in Psychology*, 8. https://doi.org/10.3389/fpsyg.2017.00866

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 433-440
ISSN : 0971-4189, UGC No. – List B, Science –121

Effects on Closed Kinematic Chain Exercises in Elderly with Sarcopenia

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ABSTRACT

The study aimed to assess the effects of closed kinematic chain exercises in the elderly with sarcopenia, an age-related, involuntary loss of skeleton muscle mass and strength, and to demonstrate the effectiveness of exercises in improving muscle mass and function. The study included 20 subjects (11 males and nine females) with sarcopenia, ages varying 60 years and above. SARC-F Questionnaire and Short Physical Performance Battery Test (SPPBT) were used in the data collection. The subjects were treated with closed kinematic chain exercises, including bridging, wall pushups, lunges, chair squats, calf raises, and stair step-ups. Pre-test and post-test with SARC-F and SPPBT were conducted with an interventional study duration of 4 weeks. The findings revealed a statistically significant difference in SARC-F score between pre-test and post-test at $p \leq 0.001$. There was a statistically significant difference in SPPBT score between pre-test at $p \leq 0.001$. These conclusions underscore the potential of Closed Kinematic Chain exercise in significantly

improving the treatment of sarcopenia in the elderly, sparking further interest and discussion in this field.

Keywords : Sarcopenia, Closed kinematic chain exercises, SARC-F, SPPBT.

Sarcopenia is an age-related, involuntary loss of skeletal muscle mass and strength (Dufour AB *et al.,* 2012). This process typically initiates as early as the fourth decade of an individual's life, and research indicates a consistent decline in both muscle mass and strength, reaching a potential loss of about 50 percent by the eighth decade of life. Given that approximately 60percent of the total body mass is attributed to muscle mass, any pathological changes affecting these vital and metabolic tissues can have substantial consequences for older adults.

Sarcopenia is recognized as an inevitable part of ageing. However, its severity and the age at which it begins cannot be predicted by age alone. The condition can be categorized into primary or age-related sarcopenia and secondary sarcopenia. Secondary sarcopenia is linked to acute and chronic diseases, heightened insulin resistance, fatigue, an increased risk of falls, and higher mortality rates. Among chronic diseases, there is a notable association between sarcopenia and rheumatologic conditions, with a particular emphasis on women with rheumatoid arthritis (RA).

The impact of sarcopenia can be particularly severe for older adults, as the decline in strength and functionality associated with it can lead to various adverse health outcomes. These consequences may include a loss of overall function, increased disability, and developing frailty.

The physiological and morphological change occurring in skeletal muscle as an individual ages is marked by overall reductions in the number and size of muscle fibers, particularly affecting type 2 or fast-twitch muscle fibers (Lexell J., 1995).Additionally, there is a noticeable infiltration of fibrous and adipose tissue into the skeletal muscle. Moreover, satellite cells, precursor cells for skeletal muscle, typically remain quiescent along myofibrils and undergo significant age-related

changes. These cells play a critical role in the repair and regeneration of the skeletal muscle, responding to stress from activities like weight-bearing or traumatic injury events.

In the skeletal muscle of older adults, there is a reduction in the content of satellite cells, particularly type-2 muscle fibers (Lexell J., 1995). While it is evident that age-related biological changes contribute significantly to sarcopenia, a growing understanding of obesity and the infiltration of fat into muscle also have a vital role in this process.

The phenomenon known as sarcopenic obesity is often grouped with sarcopenia, and it plays a crucial role as a subset of sarcopenia in older adults (Prado CM, *et al.,*2012). A recent analysis at Framingham Study highlighted mobility and functional limitations associated with sarcopenic obesity. The Aging, Health & Body Composition Study, a longitudinal investigation into age-related changes in skeletal muscle and body composition, revealed that increased fat mass was linked to an accelerated lean body mass loss and decreased muscle quality by around eight years.

The sarcopenic causes are generally considered multifactorial, involving environmental factors, activated inflammatory pathways, disease triggers, mitochondrial abnormalities, neuromuscular junction loss, reduced number of satellite cells, and hormonal changes. Recent progress in comprehending the molecular pathways in maintaining skeletal muscle has offered additional insights (Bijlsma AY *et al.,*2012).

Environmental causes include declines in nutritional intake and activity. The elderly are often less active due to burdened chronic diseases that lead to fatigue and pain. Declines in protein and calorie intake, as well as overnutrition resulting in sarcopenic obesity and accelerated muscle mass loss, are significant contributors to sarcopenia in older adults.

These environmental factors are superimposed on a multifaceted, age-related biological shift resulting in declines in skeletal muscle mass and strength. Reducing the number of neuromuscular junctions, leading

to the dropout of fast-twitch or type-II muscle fibers, is a pivotal factor in the age-related decline of muscle.

The hallmark symptom of sarcopenia is the loss of muscle mass and strength without an accompanying loss of overall body weight. Individuals with sarcopenia are likely to experience worse clinical outcomes and higher mortality compared to healthy individuals. Sarcopenia is increasingly recognized as a correlate of aging and is associated with an elevated risk of adverse outcomes, including falls, fractures, frailty, and mortality (Cruz-Jentoft AJ *et al.,* 2010).

Various tools, such as the Red Flag Method, the SARC-F questionnaire, the SMI method, and different prediction equations, have been recommended to assessindividuals' sarcopenic risk, particularly in primary care. While several tools have proven accurate and reliable in investigational settings, not all are easily applicable in daily practice.

Managing sarcopenia should be patient-centered and involve a combination of resistance and endurance-based activity programs, with or without dietary interventions (Su-ZiYoo*et al.,*2018).

Aerobic exercise ameliorates mitochondria-derived problems and provides at least a partial solution to sarcopenia, while resistance exercise strengthens muscle mass and function. Furthermore, combinations of these exercise types benefit the two (Yanjiao Shen *et al.,*2023).

Resistance exercise is currently recommended as a first-line treatment for sarcopenia. The research–practice gap represents a challenge for clinicians and exercise practitioners delivering exercise. Resistance exercise programmes should consist of two full-body exercise sessions per week performed with a relatively high degree, for 1–3 sets of 6–12 repetitions is appropriate (Christopher Hurst *et al.*, (2022).

Closed kinematic chain (CKC) exercises are given to the patients to increase joint stability and compressive forces and decrease shear and acceleration forces. These CKC exercises are full-body exercises

(a type of Resisted Exercise). Therefore, a study is needed to find the effect and create evidence for Closed Kinetic Chain Exercise for Sarcopenia in the Elderly.

The objective of the Study

The study aimed to find the effects of closed kinematic chain exercises on the elderly with Sarcopenia.

Method

The study was conducted in the Outpatient Physiotherapy Department of ACS Medical College and Hospital, Velappanchavadi, Chennai. In this pre- and post-test-type experimental study, the 20 randomly selected subjects (11 males and 9 females), aged 60 years and above, were given closed kinematic chain exercises for four weeks.

Patients of age after 60 years with slow walking speed, difficulty with rising from the chair, Muscle wasting, or weight loss (with Positive SARC-F scoring of > 3) wereincluded. The patients with a physical disability and who had previous falls and frailty were excluded (based on negative scores in SARC-F Questionnaire < 3) from the study. The pre-test and post-test outcome measures were the SARC-F questionnaire and the Short Physical Performance Battery Test. The materialsused werea stop-watch, a Chair with arms, a Tape measure, and two cones to mark.

After the pre-test, an intervention was performed for the closed kinematic chain exercises. The closed kinematic chain exercises—bridging Exercises, Wall Pushups, Lunges, Chair Squats, and Calf Raises—were given for four weeks. Then, a post-test was conducted to determine the differences. Data were collected using the SARC-F Questionnaire scoring and SPPBT scores.

Analysis of Data

The collected data were organized and analyzed through descriptive and inferential statistical methods. Statistical Package for the Social Sciences (SPSS) version 22.0 was employed to assess all parameters. A paired t-test was utilized within the experimental group to identify any statistically significant differences.

Results and Discussion

Table : 1

Comparison of Sarc-F Questionnaire Scre Between Pre-Test & Post-Test

	Pre Test		Post Test		t-Test	Significance
	Mean	SD	Mean	SD		
SARC-F	6.75	1.74	2.15	0.87	17.321	.000*

(*- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value, and p-value for the SARC-F Questionnaire's pre-test and post-test scores.

There is a high statistically significant difference e between the pre-test & post-test values of SARC-F Questionnaire scores (*- P ≤ 0.001).

Table : 2

Comparison of Sppbtscore Between Pre-Test and Post-Test

	Pre Test		Post Test		t-Test	Significance
	Mean	SD	Mean	SD		
SPPBT	4.70	1.94	8.40	1.56	15.308	.000*

(*- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value, and p-value between SPPBT's pre-test and post-test scores.A high statistically significant difference exists between the pre-test and post-test values of SPPBT scores (*- P ≤ 0.001).

Upon comparing the mean values of pretest (6.75) and posttest (2.45) within the group using SARC-F, which indicates reduced values, a high statistical significant difference in mean values was observed at P ≤ 0.001.

Similarly, when comparing the mean values of the pretest (4.7) and posttest (8.4) within the group using the SPPBT, which demonstrates increased values, there was a high statistically significant difference in mean values at P ≤ 0.001.

Christopher Hurst *et al.,* 2022,found that Resistance exercises are effective in managing sarcopenia. While considerable evidence demonstrates that Resistance Exercise is an effective intervention for

improving muscle strength and function in healthy elderly people, much less is known about its benefits for elderly people with sarcopenia.

Su-Zi Yoo *et al.,* (2018), in a systematic review, summarizes potential mechanisms of age-related sarcopenia and emphasizes the use of exercises as a therapeutic strategy, suggesting that combined exercise provides the most beneficial means of combating it.

As a whole, it was found that closed kinematic Exercises involve multiple joints for one motion. This exercise combines body weight as resistance and motion in the aerobic part, positively treating Sarcopenia.

Conclusion

Closed Kinematic Chain Exercises show significant effective changes in both the SARC-F Questionnaire and the Short Physical Performance Battery Test.Hence, we conclude that closed kinematic chain exercises were effective in treating Sarcopenia among elderly people

Limitations of the study

The sample size was too small and the duration of the exercises was also short. Along with SARC-F Questionnaire and SPPBT, other grip strength & various scales should have been used. It is suggested that these limitations should be taken care in future studies.

References

Bijlsma AY, Meskers CG, and Ling CH, M Narici, S E Kurrle, I D Cameron, R G J Westendorp, A B Maier(2013): Defining sarcopenia: the impact of different diagnostic criteria on the prevalence of sarcopenia in a large middle-aged cohort. *Age (Dordr).*35(3):871-81

Bellan van KG, Houles M, Vellas B. (2012): Identifying sarcopenia. *CurrOpinClinNutrMetab Care,*15(5):436-41.

Cruz-Jentoft AJ, Baeyens JP, Bauer JM, *et al.* (2010): Sarcopenia: European consensus on definition and diagnosis: report of the European Working Group on Sarcopenia in Older People. *Age Ageing*, 39,412–423.

Christopher Hurst et al , (2022): Resistance exercise as a treatment for sarcopenia: prescription and delivery, *Age and Ageing* , 51, 1–10.

Dufour AB, Hannan MT, Murabito JM, *et al.* (2012): Sarcopenia definitions considering body size and fat mass are associated

with mobility limitations: The Framingham Study. J Gerontol A BiolSci Med Sci..

Drey M, Sieber CC, Bauer JM, *et al.* (2012): C-terminal agrin fragment as a potential marker for sarcopenia caused by degeneration of the neuromuscular junction.ExpGerontol.

Ferrucci L, de Cabo FR, Knuth ND, Studenski S. (2012): Of Greek heroes, wiggling worms, mighty mice, and old body builders : A review study highlights important current insights into the epidemiology, causes, and diagnostic dilemmas that accompany sarcopenia research . J Gerontol A BiolSciMed Sci.,67,13–16.

Landi F, Liperoti R, Russo A, *et al.* (2012): Sarcopenia as a risk factor for falls in elderly individuals, ClinNutr.

Lexell J. (1995): Human aging, muscle mass, and fiber type composition.JGerontolABiolSci Med Sci., 50, 11–16.

Marcus RL, Brixner DI, Ghate S, Lastayo P. (2012): Fat modulates the relationship between sarcopenia and physical function in nonobese older adults.CurrGerontolGeriatr Res., 21, 61-85.

Morley JE, Abbatecola AM, Argiles JM, *et al.* (2011): Sarcopenia with limited mobility: an international consensus.J Am Med Dir Assoc.,12, 403–409.

Newman AB, Kupelian V, Visser M, *et al.*, (2006): Strength, but not muscle mass, is associated with mortality in the health, aging and body composition study cohort.JGerontol A BiolSci Med Sci., 61, 72–77.

Prado CM, Wells JC, Smith SR, *et al.* (2012): Sarcopenic obesity: a critical appraisal of the current evidence.ClinNutr.

Snijders T, Verdijk LB, van Loon LJ. (2009) : The impact of sarcopenia and exercise training on skeletal muscle satellite cells. Ageing Res Rev, 8, 328–338.

Su-ZiYooEtal., (2018): Role of exercise in age-related sarcopenia. Journal of Exercise Rehabilitation , 14(4), 551-558.

Yanjiao Shen *et al.* (2023):Exercise for sarcopenia in older people : A systematic review and network meta-analysis, *Journal of Cachexia, Sarcopenia and Muscle,* 14, 1199–1211.

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 441-467
ISSN : 0971-4189, UGC No. – List B, Science –121

Abysmal Afflictions and Everyday Life Challenges of Transgender Older Adults in Kerala

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ABSTRACT

Through a descriptive research design employing a snowball sampling method, 100 transgender elders in the Kollam and Alappuzha districts were interviewed, shedding light on their unique challenges. The interview guide facilitated data collection on TG individuals. The methodology involved extensive fieldwork and participant observation. The researcher immersed herself within the TG community, actively participating in their daily routines to comprehensively understand their lives. The findings reveal a landscape marked by victimization, violence, limited access to healthcare, social isolation, mental health struggles, and structural barriers. Despite strides towards inclusivity, many elders grapple with concealing their true identities due to societal discrimination and lack of support systems. The intersectionality of gender, sexuality, and age plays a

crucial role in understanding transgender ageing. Community-level organizing and resistance emerge as pathways to wellness for transgender older adults. This study underscores the urgent need for tailored interventions and recommendations for healthcare professionals and researchers to engage with the transgender older adult population. By creating trans-positive spaces within theological and applied ethics, we can support transgender elders in navigating the challenges of ageing with dignity and respect.

Keywords: Afflictions, Ageing, Intersectionality, Transgender, Cisgender, Discrimination

In our society, there is a gender binary system shaped by cultural norms (Bhattacharya, 2022). Non-binary transgender individuals, unable to conform to this binary framework, face hardships and oppression throughout their lives (Eisend, 2022; Bermúdez Figueroa, 2023). Unlike their cisgender counterparts, transgender elders often confront systemic barriers that exclude them from receiving appropriate, respectful, and competent care (MAP, 2017). Transgender adults are distinct in terms of their gender identities, gender expressions, sexual orientations, attractions, and socio-demographic characteristics (Fredriksen-Goldsen, *et al.,* 2014). The general society treats them with contempt and ridicule due to the adverse environment of their times. Most transgender people belong to a deficient socio-economic status, particularly ageing transgender individuals, who are victims of lifelong disdain, persistent discrimination, and external and internal stigma (White Hughto JM, 2015). Hence, the condition of transgender persons who have reached old age is highly deplorable.

The predicament of ageing transgender adults is considerably aggravated by a lack of societal acceptance, which permeates many aspects of their lives, including access to healthcare (Fredriksen-

Goldsen, 2014). These disparities are not mere inconveniences; they are matters of life and death, which can significantly shorten life expectancy and deteriorate the quality of life in any individual's later years (Bockting, W., 2016). Discriminatory practices within health services, coupled with widespread stigma and ignorance, often deter these individuals from seeking necessary medical and psychological help, which is crucial as one ages. Age-related stress is a common issue faced by all ageing individuals. Living in a society that does not accept diverse gender identities can lead to constant experiences of gender-related stressors and harm their mental health (Borson, *et al.,* 2001; White *et al.,* 2018).

Older transgender individuals experience more age-related health problems and stressors than other older adults. Chronic health problems, severe financial hardships, unexpected declines in social relationships, criticism, and disapproval from family members make life miserable for destitute and disadvantaged transgender individuals (Adams, *et al.,* 2004). Anxiety hurts emotional and physical functioning and quality of life (Brenes, 2007). The fear of ageing increases anxiety. Transgender individuals are haunted by thoughts of ill health and the inability to meet their own needs. Experiences of violence, family problems, lack of care, lack of access to infrastructure, and lack of mobility add to the stress. Stability in relationships results in happiness. A person who gets social, psychological, emotional, and financial support lives a contented life. Transgender adults have minimal social support and relationships.

Moreover, the urgent need to integrate and prioritize transgender older adults within healthcare services, policies, and research initiatives is critical. Historically, this group has been underrepresented in research, leading to a gap in understanding and addressing their needs (MAP, 2017). By acknowledging their historically underserved status and implementing targeted healthcare strategies, society can begin to amend the disparities they face. This involves training healthcare providers in gender inclusivity, developing policies that explicitly

protect and affirm the rights of transgender individuals, and promoting research that explores the intersection of aging, gender identity, and socio-economic challenges. As these efforts expand, they not only improve the healthcare outcomes for transgender elders but also affirm their dignity and right to a respectful and supportive old age (Foglia MB, 2014).

Addressing these challenges head-on is not merely a healthcare issue but a broader call for social justice, aiming to rectify longstanding inequalities that have left transgender older adults on the margins of society, particularly in regions like Kerala, where traditional norms strongly influence public attitudes and behaviors. This comprehensive approach will help ensure that ageing, while a universal experience, is dignified and equitable for all, regardless of gender identity.

The intersectionality of gender, sexuality, and age is central to understanding the complexities of transgender ageing (Calasanti, 2019; Wesp LM, 2019). This intersectionality informs their day-to-day experiences and the specific challenges they face, which are distinct from those encountered by their cisgender peers; it is within this context that community-level organizing and resistance emerge as vital pathways to wellness and improved quality of life for transgender older adults (Fabbre, 2019). Such efforts are crucial in fostering environments that are accepting, supportive, and affirming of their identities. Amidst these challenges, the study also underscores the urgent need for tailored interventions. Recommendations are directed towards healthcare professionals and researchers to engage more deeply with the transgender older adult population, ensuring that the services and support systems are both accessible and appropriate. By creating trans-positive spaces within both theological and applied ethics (Alphonsa George, 2015), there is an opportunity to support transgender elders in navigating the challenges of ageing with the dignity and respect they deserve.

Kerala is known for its high Human Development Index, and transgender individuals have historically been invisible, often hiding their gender due to fear of stigma and ostracism, forcing them to

remain within the binary gender category against their wishes (PK, V., 2023). According to the Statewide Transgender Survey 2014-15 by the Social Justice Department of Kerala, approximately 25,000 transgender individuals reside in Kerala, with 95.98 percent under 45 years old, 3.43 percent between 45 and 55, and 56 percent over 55. In Kerala, despite periodic reforms aimed at inclusivity, older transgender individuals continue to navigate a treacherous landscape characterized by victimization, violence, social isolation, limited healthcare access, and persistent mental health struggles (Raj P., 2024). These challenges are exacerbated by structural barriers that limit their ability to live openly and authentically, compelling many to conceal their true identities to avoid discrimination and social exclusion. The ageing process for transgender individuals, while parallel in many ways to that of gender-typical individuals, necessitates a culturally competent, inclusive, and affirmative healthcare approach to address and mitigate these disparities effectively (Allison *et al.,* 2012).

The research seeks to contribute to the broader discourse on ageing, gender, and health equity. It aims to shed light on the lived experiences of transgender elders in Kerala, advocating for systemic changes that would not only address their immediate health and social needs but also foster long-term support structures. A deeper understanding of the layered adversities faced by the transgender elder community plays a crucial role in informing stakeholders, ranging from policymakers to healthcare providers, about the specific challenges and needs of this demographic. The knowledge thus gained is essential in crafting and implementing policies and practices beyond mere inclusivity toward celebrating diversity in all its forms. Particularly within the ageing population, embracing such diversity is critical to fostering an environment where everyone is respected and valued.

This research lays the foundation for a comprehensive examination of the numerous challenges faced by older transgender individuals in Kerala. It highlights the urgent need for culturally sensitive research methodologies that are not only inclusive but also

specifically designed to address the unique experiences of transgender elders. At its core, this paper aims to provide valuable insights into the struggles and remarkable resilience of older transgender individuals. It advocates for a significant shift in societal attitudes and restructuring existing frameworks to better support and empower these individuals. The goal is to ensure that transgender elders can enjoy their later years with dignity and respect. Therefore, this introduction goes beyond an academic discussion; it is a passionate call to action. It calls on stakeholders from diverse sectors to acknowledge and tackle a marginalized group's specific and essential requirements worldwide.

The objectives of the Study

To understand the miserable life experiences of elderly transgender individuals by exploring their personal histories, daily struggles, and social interactions to capture a comprehensive picture of their lived experiences, highlighting the specific adversities and forms of discrimination that result in significant psychological and emotional distress.

To identify the challenges faced by the elderly transgender community. This involves pinpointing obstacles that hinder their well-being and quality of life, such as health issues exacerbated by age, inadequate medical care,

Methodology

Due to the challenge of finding older transgender individuals, 50 participants were reached through Outreach Workers and community members active in community-based organizations from the Kollam and Alappuzha districts. Using a descriptive research design and the snowball sampling method, the study ensured the inclusion of this marginalized group.

Data collection involved an interview schedule, allowing for in-depth qualitative insights. The gathered data were meticulously organized, classified, and tabulated using appropriate statistical methods to ensure robust analysis.

For detailed information regarding the sample, see Table 1.

Table 1

The socio demographic detail of the respondents

Socio-demographic profiles	**Category**	**Frequency**	**Percentage**
Age	45 to 50	24	48
	50 to 55	12	32
	55 to 60	9	18
	Above 60	5	10
Religion	Hindu	42	84
	Christian	6	12
	Muslim	2	4
Education	Literate only	35	70
	Primary	8	16
	High School	2	4
	SSLC	4	8
	Diploma	1	2
Type of Family	Joint Family	8	16
	Nuclear Family	42	84
Marital Status	Married	44	88
	Unmarried	6	12
	Divorced	2	4
	Widow/Widower	7	14
If married, children	Yes	42	84
	No	8	16
Living Arrangements	Living Alone	3	6
	Living with Family	40	80
	Living with Relatives	7	14
Family Acceptance	Yes	4	8
	No	46	92
Home-ownership	Yes	2	4
	No	48	96
TG ID Card	Yes	1	2
	No	49	98
Savings	Yes	4	8
	No	46	92

These transgender individuals were interviewed individually.

Results and Discussion

In modern complex societies, transgender individuals confront numerous challenges. They face prejudice, intolerance, hatred, stigma, discrimination, disrespect, inequality, injustice, unfairness, rejection, and unwanted attention, all of which significantly impact their lives. These pervasive issues lead to restricted access to education, employment opportunities, healthcare services, and public spaces. Geriatric transgender persons, in particular, are often excluded from political, religious, and recreational activities, further marginalizing them within the broader community. Despite the Indian constitution providing for the fundamental right to equality and prohibiting discrimination on the grounds of sex, caste, creed, or religion, transgender individuals continue to experience systemic oppression. The Constitution guarantees political rights and other benefits to every citizen, yet the transgender community remains marginalized and underserved. An analysis of the current conditions of elderly transgender individuals in Kerala reveals a stark reality: they endure significant social and institutional barriers that hinder their ability to lead dignified and fulfilling lives. This analysis highlights the urgent need for more inclusive and supportive policies to ensure that the rights guaranteed by the constitution are fully realized for all members of society, including geriatric transgender persons.

Older transgender individuals in Kerala often live without openly revealing their gender identity to others, primarily due to societal pressures and the nature of their environment. Most are recognized in society by their assigned gender at birth. While contemporary Kerala offers a more accepting atmosphere for the younger generation to express their gender identities, the older transgender population largely continues to present themselves according to traditional gender norms and often has not undergone sex reassignment surgery. These individuals face significant social ostracism, as Kerala society largely refuses to accept them, subjecting them to ridicule and mockery. Consequently, many older transgender individuals do not openly

discuss their gender identity, although they are discreetly recognized as such within their hometowns. This concealment and societal rejection lead to numerous daily life challenges. The study has analyzed crucial personal information about older transgender individuals in Kerala, shedding light on the difficulties and distress they face in their lives. The socio-demographic details of the respondents are given in Table 1.

Table 1 reveals that 50 respondents belong to different age categories, from 45 to 60. Everyone has faith in religion, with the majority (84%) belonging to the Hindu religion. Thirty-six percent have become literate through the Government's Literacy Mission programme, yet they do not even have primary education. Highly educated individuals are scarce—only 16 percent live in joint families, all belonging to Hinduism. Eighty-eight percent are married, with many being forced into marriage by their families. After marriage, some wives leave them when they do not like their characteristics. Eighty-four percent of married individuals have children. Eighty percent live in their own houses with their children and grandchildren. Those who are unmarried mainly live with distant relatives or in siblings' houses. Only 4 percent of respondents own their own houses. One person has applied for and received a Transgender Identity Card from the Central and State governments. Ninety-six percent have no savings, relying on the mercy and help of others. Savings are a great asset to every individual, and the quantity of assets varies based on social and family background. When considering the situation of elderly transgender people, only 8 percent of individuals have access to their assets. Out of fifty individuals, a staggering ninety-two percent revealed they lack personal savings, representing forty-eight people facing financial insecurity. Conversely, a minority of eight percent reported having personal savings, equating to just four individuals who have managed to set aside funds for future needs or emergencies.

Miserable Life Experiences of Elderly Transgender Individuals

Men's and women's experiences of old age differ not only by gender but also by ethnicity, class, sexual orientation, and race

(Calasanti & Slevin, 2001). These intersecting aspects of identity shape the conditions and experiences related to physical health, mental well-being, emotional state, and social interaction in old age. Transgender older adults, in particular, face unique challenges in achieving happy and healthy ageing due to their marginalization as sexual and gender minorities (Van Wagenen *et al.,* 2013). Despite these challenges, a supportive family network can significantly enhance a transgender person's emotional and social health and psychological well-being, providing a buffer against the negative impacts of societal prejudice.

In a culture imbued with transphobia and traditional ideas about gender norms, society often reacts to transgender individuals with hostility rather than compassion. This pervasive hostility leads to increased anxiety and stress for transgender individuals, who find themselves living in environments that are not only unsupportive but actively hostile. The research study analyzed the experiences of elderly transgender individuals, focusing on their interactions with family and the general public. The study delves into the living situations, social environments, and the discrimination these individuals face, highlighting the inequalities within their families and the broader society. The personal feelings and challenges of elderly transgender persons in Kerala are discussed in detail below, offering a comprehensive view of their struggles and resilience. The life conditions and experiences of the elderly adult transgender are given in Table 2.

Table 2

The life conditions and experience of the older adult transgender

Experiences	Category	Number of respondents	Percentage
Attitude of family	Favorable	-	-
	Unfavorable	50	100
Avoidances from society	Always	47	94
	Sometimes	3	6
	Never	-	-

Interest of interaction	Yes	34	68
	No	16	32
Experience from society	Good experience	2	4
	Bad experience	28	56
	Bitter experience	20	40
Self-respect	Yes	10	20
	No	40	80
Self-esteem	Yes	6	12
	No	44	88
Self- confidence	Yes	11	22
	No	39	78
Self-acceptance	Yes	8	16
	No	42	84
Satisfaction of present condition	Satisfied	3	6
	Dissatisfied	47	94
Lack of family support	Yes	42	84
	No	8	16
Stigma	Yes	48	96
	No	2	4
Discrimination	Yes	45	90
	No	5	10
Social exclusion	Yes	42	84
	No	8	16
Financial instability	Yes	48	96
	No	2	4
Health issues	Yes	49	98
	No	1	2
Psychological problems	Yes	43	86
	No	7	14

Table 2 indicates that nobody is happy with society's attitude towards them. All of them opined that the familial attitude is not favorable to transgender individuals. This means that family members never give them any consideration. They have a very

negative attitude towards transgender persons, which creates adjustment problems in the lives of elderly transgender individuals. In Kerala, transgender individuals face extreme avoidance from their fellow beings. This is mainly due to the conventional culture of gender binaries. The table reveals that the majority (94%) of them feel that society is always avoiding transgender individuals, and 6 percent of them sometimes feel this avoidance. This avoidance and negligence indicate that they have no access to public spaces.

This study shows that 68 percent are interested in interacting with others in society. However, 32 percent are very different; they are not interested in interacting and mingling with others. Transgender individuals are generally talkative, enthusiastic, and friendly by nature. However, people are not ready to communicate with them. This exclusion from social interactions leads elderly transgender people into distress, tribulation, and deprivation, further limiting their opportunities. It also denies their visibility in all major domains of society.

This table reveals that 4 percent of the respondents have had good experiences with society. Fifty-six percent of the respondents have had negative experiences, and 40 percent have had bitter experiences. Society considers transgender individuals to be social deviants with some psychological issues. There is no acceptance from their families or their community. At present, our society is not prosperous in providing the facilities that transgender individuals need to meet their livelihood requirements. They are not only not provided with opportunities but also blamed for their mistakes.

Equality is a fundamental human right guaranteed by our constitution. The right to equality before the law and equal protection under the law is ensured under Articles 14 and 21 of the Constitution. The right to choose one's gender identity is an essential part of leading a life with dignity, which also falls under the ambit of Article 21. The Court has granted the people of India

the right to gender identity. Furthermore, they cannot be discriminated against on the grounds of gender, as this violates Articles 14, 15, 16, and 21. However, transgender people face discrimination in all walks of life. They are often offended and insulted in public places like bus stands, railway stations, theaters, temples, educational institutions, offices, malls, beaches, playgrounds, and public toilets. Society considers transgender individuals to be abnormal compared to other members of the community. This perception makes them feel inferior. This complex causes them to lose their self-respect, self-esteem, self-confidence, and self-acceptance, essential for a happy life. The lack of these personal qualities leads them to hate themselves and the whole society.

The above table shows their different feelings. Self-respect helps to fulfill our potential and develop healthy relationships. The present study shows they have low self-respect, self-confidence, and self-esteem. Healthy self-esteem originates in the environment found in the family, school, peer group, workplace, and community. For healthy self-esteem, individuals need to receive nurturing from the people in their environment. The ability to control ourselves helps to boost our feelings of self-esteem. Here, transgender persons have very low self-respect, self-esteem, self-confidence, self-acceptance, and self-control. Our society plays a vital role in shaping these personality traits. They feel that society undervalues and underestimates them. This attitude towards transgender individuals itself acts as a barrier to uplifting their lives.

The table shows that out of the total respondents, 94 percent are unsatisfied with their situation, and only 6 percent are satisfied with the present conditions. Many social stigmas are attached to the third gender. Our data show that a high percentage of transgender people are dissatisfied with their lives. This result is consistent with Anderssen *et al.,* (2020), who found that transgender people have significantly lower life satisfaction compared

to cisgender people. Elderly transgender individuals face avoidance in all spheres of life. People living together in a community make up a society, and anything connected to that group can be described as societal. Societal pressures are expectations that affect the entire community, and existing social stigmas negatively impact transgender individuals. Consequently, they are not gratified by their present conditions.

Arduous Challenges of Elderly Transgender Individuals

Ageing is one of the most challenging phases of human life. However, with proper support, individuals can embrace aging with a sense of identity, self-esteem, and dignity. Elderly individuals often face numerous health issues, including hypertension, hearing loss, cataracts, body pain, diabetes, high cholesterol, rheumatism, arthritis, constipation, high blood pressure, depression, dementia, and osteoporosis. Beyond these health problems, many seniors also struggle with financial difficulties, family issues, social isolation, loneliness, a sense of lost accomplishments, boredom, and dissatisfaction. Social support for depressed elders experiencing interpersonal struggles and hostility in relationships is typically weak, leading to a higher incidence of suicide attempts due to overwhelming personal difficulties (Harrison *et al.,* 2010).

Life is particularly harsh for those who must rely on the kindness of others to meet their daily needs. Those who dwell on bitter memories often lead a gloomy existence. Unfortunately, transgender seniors are often denied the opportunity to live according to their interests. They experience more tremendous stress from adverse circumstances than from health problems. When their aspirations are not respected, their mental health deteriorates, and they are burdened by isolation and a low quality of life. They suffer profoundly when regarded as useless, leading to deep sorrow and despair. The major challenge faced by older transgender respondents is given in Table 3.

Table 3 Major challenges faced by older transgender respondents

Challenges faced by elders	Number of respondents	
	Yes	No
Lack of family support	42 (84%)	8 (16%)
Stigma	48 (96%)	2 (4%)
Discrimination	45 (90%)	5 (10%)
Social exclusion	42 (84%)	8 (16%)
Financial instability	48 (96%)	2 (98%)
Health issues	49 (98%)	1 (2%)
Psychological problems	43 (86%)	7 (14%)

A person can overcome adverse situations and crises more swiftly if they have support from others. Loneliness, isolation, and despair often arise when no one can lean on them during difficult times. Data highlight the severity of ill-treatment, widespread discrimination, and violence against transgender individuals, leading to social exclusion that limits or completely denies their participation in society. They also face economic hardship and age-related illnesses. The discrepancy between assigned gender and gender identity increases the visibility of transgender individuals, marking them with stigma (Miller & Crollman, 2015). Stigma is a significant challenge for the transgender community. Due to society's negative attitude towards stigmatized individuals, transgender people often become victims of discrimination and psychological distress (Quinn & Chaudoir, 2009; Stutterheim *et al.,* 2011). Elderly transgender individuals face neglect and rejection by family and society due to prejudice. Avoidant behaviour, exclusion, bullying, and violence are manifestations of social stigma.

Older transgender individuals who have not used hormones or other medical treatments for transition and are dissatisfied with their assigned sex at birth often experience psychological problems such as alienation, suicidal tendencies, hopelessness, and depression (Dhejne *et al.,* 2016; Testa *et al.,* 2017). Transgender individuals

who have undergone transition tend to experience decreased distress and increased self-esteem, satisfaction, and psychological well-being (Barr *et al.,* 2016). Living in a stressful environment with unpleasant emotions such as sadness, depression, anxiety, and restlessness causes tremendous mental stress for transgender individuals. Age discrimination, gender discrimination, negative experiences, and lack of social support predispose transgender adults to depression (White Hughto & Reisner, 2018). Emotional distress from life's adversities and bitter experiences has a devastating effect on transgender individuals. Insomnia, fatigue, loneliness, isolation, and worry contribute to emotional and psychological distress in senior transgender individuals.

In Kerala, older transgender persons often lack the courage to express their true gender identity. Despite recognizing their characteristics, family members and society do not provide adequate support and recognition. As a result, their self-esteem and life satisfaction diminish, leaving them disillusioned and unable to self-assess positively, thus feeling far from living a happy and healthy old age. The challenges faced by older transgender individuals reveal the multifaceted difficulties in living with dignity.

In support of the above objective data, three case studies are given below:

"The respondent A, aged 68 years, a Hindu devotee, was the oldest transgender individual among the participants. Born as the youngest son, he has two married brothers who live separately with their families. Case "A" lives with his elder sister, caring for her as she remains unmarried. He is a cross-dresser who was forced into marriage by his family, a union that ended within two months. Subsequently, he lived in neighboring states and was disconnected from his relatives. Upon returning to his native place in middle age, he had no home and began residing with his sister. Throughout his life, he worked as a tile worker and also engaged in sex work to survive. Since school, he has been the target of mockery due to his feminine mannerisms, which led him to drop out and eventually

face harassment in the workplace. The societal rejection he faced forced him to migrate, where he earned a living through begging and sex work. Health issues like diabetes and rheumatism eventually made life difficult, prompting his return home. By then, his parents had died, and his brothers denied him a share of the family property. Only his elder sister showed him compassion and welcomed him back.

Case A was sexually abused by a neighbor at a young age, which instilled a fear of men in him. His femininity and preference for playing with girls drew sharp criticism from his family and community. After his marriage failed, his family ostracized him further, leading him to live with the hinjras (transgenders) he met by chance. However, illness forced him back home, where his sister cared for him. Although he found some respite, he could no longer work due to his age and health. Despite the persistent discrimination and isolation, he continues to identify and live as a transgender person, participating in community events and working in a community-based organization for a modest salary. His pension is his only source of sustenance. Case A's life story is one of resilience amid numerous hardships".

"The 53-year-old respondent B has not disclosed his transgender identity to his family or community. The youngest boy in a family of four children, his father abandoned them when he was a child. Raised lovingly by his mother and three sisters, he enjoyed dressing up and wearing jewelry like girls. His closest friends were the neighborhood girls and his sisters. Dropping out of school to avoid harassment, he excelled in dance; his mother encouraged him to pursue his talents. He pursued a career as a dance master and makeup artist, although he faced ridicule from locals who gave him comical nicknames. Case B identifies as transgender, a fact known only to close friends. Fearing societal backlash, he has not applied for a TG ID Card and remains single to avoid potential marital failure. He regularly participates in transgender arts festivals but only wears male clothes in his home and community. Secretly, he dresses as a woman when attending transgender events in other states. The fear

of revealing his identity in Kerala society forces him to hide his true self".

"The respondent **C,** now 51 years old, faced ostracism from his family at age 38 when his transgender identity became known. He first encountered transgender people while working abroad as a driver and began living as a transgender person there. Upon returning home on leave, he got married but was dissatisfied with his marital life. After his wife became pregnant, he returned abroad, resuming his life as a transgender individual. This led to a complete disconnect from his relatives, culminating in a legal separation initiated by his wife's family. Five years later, he returned to his native land and started a workshop with his savings. However, living openly as a transgender person in Kerala proved challenging. His family's increasing resentment and societal neglect drove him to attempt suicide. Post-recovery, he sold his assets and moved to a new place, living with members of the transgender community in a rented house, cut off from his family. Unable to secure a job, he earns a living through sex work, finding a sense of freedom despite ongoing anxiety about his future. His journey underscores the profound impact of familial rejection and societal discrimination on his mental health and stability".

Gender disparities in physical and mental health vary widely across the globe. Living conditions in culturally diverse countries like India are particularly critical for gender minorities, such as the transgender community. Despite the importance of transgender individuals as a significant sub-segment of the population, research on their issues in India is scant (Raj and Dubey, 2024). During colonial times, transgender individuals were singled out as criminal minorities and denied civil rights based on a binary view of gender (Joshi *et al.,* 2022). These detrimental conditions adversely affect the socioeconomic status and well-being of the transgender community. They face constant stigmatization and marginalization and are exposed to brutal violence and animosity.

The National Legal Services Authority's decision to grant them citizenship sparked a nationwide debate on their rights. The Transgender Persons' Rights Act of 2019 ensures equal rights and protection for the transgender population in India (Bhattacharya & Ghose, 2020). However, the respondents' socio-economic status indicates that this community is not fully realizing the progress represented by the legal process. Transgender individuals are denied their rights, and their suffering is compounded by the disavowal of social acceptance and equality (Srivastava *et al.,* 2021). It is imperative to prioritize the psychological well-being of transgender individuals, eliminate negative societal attitudes, and provide essential support for gender reassignment surgery (Gomes *et al.,* 2020; Jena, 2022). Low socio-economic status and acute psychological distress make the situation of marginalized aged transgender persons especially dire.

Older transgender individuals who have not used hormones or other medical treatments for transition and are dissatisfied with their assigned sex at birth often experience psychological problems such as alienation, suicidal tendencies, hopelessness, and depression (Dhejne *et al.,* 2016; Testa *et al.,* 2017). Transgender individuals who have undergone transition tend to experience decreased distress and increased self-esteem, satisfaction, and psychological well-being (Barr *et al.,* 2016). Living in a stressful environment with unpleasant emotions such as sadness, depression, anxiety, and restlessness causes tremendous mental stress for transgender individuals. Age discrimination, gender discrimination, negative experiences, and lack of social support predispose transgender adults to depression (White Hughto & Reisner, 2018). Emotional distress from life's adversities and bitter experiences has a devastating effect on transgender individuals. Insomnia, fatigue, loneliness, isolation, and worry contribute to emotional and psychological distress in senior transgender citizens.

In Kerala, older transgender persons often lack the courage to express their true gender identity. Despite recognizing their

characteristics, family members and society do not provide adequate support and recognition. As a result, their self-esteem and life satisfaction diminish, leaving them disillusioned and unable to self-assess positively, thus feeling far from living a happy and healthy old age. The challenges faced by older transgender individuals reveal the multifaceted difficulties in living with dignity. An environment that fosters social inclusion and service access without gender bias or stigma should be cultivated. To achieve this, social change must be encouraged in a way that respects the cultural nuances of the region. Significant changes are still needed in societal outlook, values, the social system, and jurisprudence.

Implications of the Study

Aged individuals are marginalized as a vulnerable group due to the decline in physical and mental abilities and the negative impact of ageism. Transgender individuals are also considered a high-risk population due to significant social, economic, and health disparities (Emlet, 2016). Older transgender individuals face profound challenges related to healthcare access and significant disparities in opportunity, acceptance, and social inclusion. To address these issues, it is crucial to combat prejudice, discrimination, hostility, and institutional barriers that threaten their well-being.

Urgent attention from the government is needed to tackle social and health disparities and financial instability. From a policy perspective, it is essential to identify the needs of transgender adults, enforce anti-discrimination laws, promote equality, and eliminate violence. Key issues that require immediate focus in welfare policy formulation include social and physical isolation, internalized stigma, concealment of gender identity, family rejection, lack of social support, and poor mental health. Providing inclusive healthcare services and promoting social acceptance are practical strategies for addressing the needs of transgender seniors.

Conclusion

The ageing process is inherently uncertain and uncomfortable, and for transgender adults, old age can be particularly daunting. Transgender individuals often face a lifetime of isolation, rejection, and insecurity, making the struggle for survival even more challenging. As they age, they encounter numerous barriers that severely impact their ability to lead happy and fulfilling lives. These barriers include adverse living conditions, abuse, neglect, and lack of access to basic amenities. Health issues are also common, often worsened by a lack of transgender-inclusive healthcare services and the cumulative effects of lifelong discrimination and neglect. Financial instability is another critical concern, with many elderly transgender individuals lacking stable income due to systemic employment discrimination and inadequate social security measures. Emotional distress is widespread, fueled by social isolation, stigma, and the absence of familial support. These interconnected challenges highlight the urgent need for targeted interventions and comprehensive support systems to improve the quality of life and well-being of elderly transgender individuals in Kerala. In a society that adheres to religious dogma based on a binary gender structure, the transgender community is often rejected. Theological ethics and morality typically do not accommodate the social mobility of transgender individuals. To address these issues, it is essential to create trans-positive spaces through a broad application of inclusive ethics, enabling transgender older persons to age with dignity and pride.

Strategies for the Welfare of Transgender Elders

- Develop comprehensive health strategies to address the multiple disadvantages faced by socially and culturally disadvantaged transgender elderly.
- Create an inclusive social environment not based on a binary gender system.

- Organize awareness classes to foster a positive attitude and willingness to support transgender seniors.
- Plan and implement programs to address the various issues faced by transgender elders.
- Involve family members in the programmes of community organizations that support transgender individuals.
- Improve the healthcare sector by ensuring health insurance coverage for elderly transgender persons.
- Select and appoint competent youth representatives to report the unique needs of elderly transgender individuals to the government and assist them in obtaining necessary support.
- Policymakers should ensure an enabling environment to legally address all forms of institutional discrimination against the transgender community.
- Establish mechanisms to provide free access to legal services for elderly transgender individuals in need.
- Conduct timely assessments of mobility issues, care options, and free health programs available to elderly transgender persons provided by the government.
- The government should implement appropriate and necessary services to help transgender individuals overcome the unique challenges of old age.
- Plan and implement measures to prevent loneliness, social isolation, and other difficulties faced by transgender elders by involving local youth, voluntary organizations, and social workers.
- Obtaining accurate demographic data on the aging transgender population is essential for ensuring their well-being. Therefore, it is a significant social responsibility to conduct a separate survey for transgender individuals to collect detailed information.

References

Adams, K. B., Sanders, S., & Auth, E. A. (2004). Loneliness and depression in independent living retirement communities: risk and resilience factors. *Aging & mental health*, *8*(6), 475–485. https://doi.org/10.1080/13607860410001725054.

Allison, A.,Sen, K.,Emily, A.,Harper J. Tobin (2012). *Improving the lives of transgender older adults: Recommendations for Policy and Practice*. National Center for Transgender, WashintonDC https://transequality.org/sites/default/files/docs/resources/TransAgingPolicyReportFull.pdf

Alphonsa George, Janardhana N., Muralidhar D. 2015. Quality Of Life of Transgender Older Adults International Journal of Humanities and Social Science Invention ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714 www.ijhssi.org Volume 4 Issue 6||June. 2015 || PP.07-11

Anderssen, N., Sivertsen, B., Lønning, K. J., & Malterud, K. (2020). Life satisfaction and mental health among transgender students in Norway. *BMC public health*, *20*, 1-11.

Barr, S. M., Budge, S. L., & Adelson, J. L. (2016). Transgender community belongingness as a mediator between strength of transgender identity and well-being. *Journal of counseling psychology*, *63*(1), 87.

Bermúdez Figueroa, E., Dabetiæ, V., Yuste, R.P., Saeidzadeh, Z. (2023). Gender and Structural Inequalities from a Socio-Legal Perspective. In: Vujadinoviæ, D., Fröhlich, M., Giegerich, T. (eds) *Gender-Competent Legal Education*. Springer Textbooks in Law. Springer, Cham. https://doi.org/10.1007/978-3-031-14360-1_4

Bhattacharya, S., & Ghosh, D. (2020). Studying physical and mental health status among hijra, kothi and transgender community in Kolkata, India. *Social Science & Medicine*, *265*, 113412.

Borson, S., Bartels, S. J., Colenda, C. C., Gottlieb, G. L., & Meyers, B. (2001). Geriatric mental health services research: Strategic Plan for an Aging Population: Report of the Health Services Work Group of the American Association for Geriatric Psychiatry. *The American journal of geriatric psychiatry: official journal of the American Association for Geriatric Psychiatry*, *9*(3), 191–204.

Brenes G. A. (2007). Anxiety, depression, and quality of life in primary care patients. *Primary care companion to the Journal of clinical psychiatry*, *9*(6), 437–443. https://doi.org/10.4088/pcc.v09n0606.

Bhattacharya S, Ghosh D, Purkayastha B.(2022). 'Transgender Persons (Protection of Rights) Act' of India: An Analysis of Substantive Access to Rights of a Transgender Community. *J Hum Rights Pract*. 14(2):676-697.

Bockting W, Coleman E, Deutsch MB, Guillamon A, Meyer I, Meyer W 3rd, Reisner S, Sevelius J, Ettner R. (2016).Adult development and quality of life of transgender and gender nonconforming people. *Curr Opin Endocrinol Diabetes Obes*. 23(2):188-97.

Calasanti, Toni, (2019).'On the intersections of age, gender and sexualities in research on ageing', in Andrew King, Kathryn Almack, and Rebecca L. Jones (eds), *Intersections of Ageing, Gender and Sexualities: Multidisciplinary International Perspectives* (Bristol, online edn, Policy Press Scholarship Online, 19 Sept. https://doi.org/10.1332/policypress/9781447333029.003.0002

Calasanti, T. M., & Slevin, K. F. (2001). *Gender, social inequalities, and aging*. Rowman Altamira.

Dhejne, C., Van Vlerken, R., Heylens, G., & Arcelus, J. (2016). Mental health and gender dysphoria: A review of the literature. *International Review of Psychiatry*, *28*(1), 44–57.

Eisend, M., & Rößner, A. (2022). Breaking Gender Binaries. *Journal of Advertising*, 51(5), 557–573. https://doi.org/10.1080/00913367.2022.2109780

Emlet, C. A. (2016). Social, economic, and health disparities among LGBT older adults. *Journal of American Society on Aging. 40*, 16–22.

Fabbre, Vanessa, and Anna Siverskog, 'Transgender ageing: community resistance and well-being in the life course', in Andrew King, Kathryn Almack, and Rebecca L. Jones (eds), Intersections of Ageing, Gender and Sexualities: Multidisciplinary International Perspectives (Bristol, 2019; online edn, Policy Press Scholarship Online, 19 Sept. 2019), https://doi.org/10.1332/policypress/9781447333029.003.0004.

Fredriksen-Goldsen , K., Cook-Daniels,L., Hyun-Jun Kim, Elena A Erosheva, Charles A Emlet, Charles P Hoy-Ellis, Jayn Goldsen, Anna Muraco (2014). Physical and mental health of transgender older adults: an at-risk and underserved population. *Gerontologist*. 54(3):488-500

Foglia MB, Fredriksen-Goldsen KI.(2014). Health Disparities among LGBT Older Adults and the Role of Nonconscious Bias. *Hastings Cent Rep*. 44 Suppl 4(0 4)

Gomes de Jesus, J., Belden, C. M., Huynh, H. V., Malta, M., LeGrand, S., Kaza, V. G. K., & Whetten, K. (2020). Mental health and challenges of transgender women: A qualitative study in Brazil and India. *International Journal of Transgender Health*, *21*(4), 418-430.

Harrison, K. E., Dombrovski, A. Y., Morse, J. Q., Houck, P., Schlernitzauer, M., Reynolds, C. F., & Szanto, K. (2010). Alone? Percieved social support and chronic interpersonal difficulties in suicidal elders. *International Psychogeriatrics*, *22*(3), 445-454. https://ruralindiaonline.org/en/library/resource/transgender-survey-kerala-2014-15/

Jena, S. (2022). Understanding the panorama of sexuality and gender identity with an emphasis on transgender persons and the impact of intervention through the rights based counseling approach: A case study. *Journal of Public Affairs*, *22*(4), e2640.

Joshi, N., Vinu, V., Jois, S. N., Begum, F., & Salagame, K. K. (2022). The need, feasibility and willingness to explore "meditation on twin hearts" as a self-administered tool for mental health management among transgender women: An exploratory survey. *Community mental health journal*, *58*(4), 666-672.

MAP, (Movement Advancement Project),(2017). Understanding Issues Facing LGBT Older Adults. https://www.lgbtmap.org/file/understanding-issues-facing-lgbt-older-adults.pdf

Miller, L. R., & Grollman, E. A. (2015, September). The social costs of gender nonconformity for transgender adults: Implications for discrimination and health. In *Sociological Forum* (Vol. 30, No. 3, pp. 809-831).

PK, V. (2023). The Political Participation of Transgender Community in Kerala: Rights, Accessibility, and Activism. *Bulletin of Applied Transgender Studies*, *2*(1-2), 95-106.

Quinn, D. M., & Chaudoir, S. R. (2009). Living with a concealable stigmatized identity: the impact of anticipated stigma, centrality, salience, and cultural stigma on psychological distress and health. *J.pers Soc psychol,* 97(4) 634-651.

Raj, P., & Dubey, A. (2024). Comprehending Health of the Transgender Population in India Through Bibliometric Analysis. *International Journal of Public Health*, *69*, 1606598. https://doi.org/10.3389/ijph.2024.1606598

Srivastava, A., Sivasubramanian, M., & Goldbach, J. T. (2021). Mental health and gender transitioning among hijra individuals: A qualitative approach using the minority stress model. *Culture, Health & Sexuality*, *23*(6), 757-771.

Stutterheim, S. E., Bos, A. E., Pryor, J. B., Brands, R., Liebregts, M., & Schaalma, H. P. (2011). Psychological and social

correlates of HIV status disclosure: The significance of stigma visibility. *AIDS Education and prevention*, *23*(4), 382-392.

Testa, R. J., Michaels, M. S., Bliss, W., Rogers, M. L., Balsam, K. F., & Joiner, T. (2017). Suicidal ideation in transgender people: Gender minority stress and interpersonal theory factors. *Journal of Abnormal Psychology*, *126*(1), 125–136.

Van Wagenen, A., Driskell, J., & Bradford, J. (2013). "I'm still raring to go": Successful aging among lesbian, gay, bisexual, and transgender older adults. *Journal of aging studies*, *27*(1), 1-14.

White Hughto, J. M., & Reisner, S. L. (2018). Social Context of Depressive Distress in Aging Transgender Adults. *Journal of applied gerontology: the official journal of the Southern Gerontological Society*, *37*(12), 1517–1539. https://doi.org/10.1177/0733464816675819.

White Hughto JM, Reisner SL, Pachankis JE.(2015). Transgender stigma and health: A critical review of stigma determinants, mechanisms, and interventions. *Soc Sci Med*. 147:222-31.

Wesp LM, Malcoe LH, Elliott A, Poteat T. Intersectionality Research for Transgender Health Justice: A Theory-Driven Conceptual Framework for Structural Analysis of Transgender Health Inequities. Transgender Health. 2019 Oct 29;4(1):287-296. doi: 10.1089/trgh.2019.0039.

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 468-483
ISSN : 0971-4189, UGC No. – List B, Science –121

Investigating the Patterns of Lexical Semantic Activation in Neuro-typical Younger, Middle, and Older Adults

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ABSTRACT

Activating and retrieving lexical entries from the mental lexicon, known as lexical access, is a complex process. The present study, which rigorously investigated the patterns of Lexical Semantic Activation as a function of age in neurotypical native Kannada-speaking younger (N=15), middle-aged (N=15), and older adult (N=15) age groups, employed a non-cyclic-block naming paradigm. This paradigm was carefully designed to include taxonomic, thematic-related, and unrelated blocks containing frequent and infrequent items. Reaction time and accuracy scores were not just measured but also meticulously measured. The results, which revealed that Group 1 and Group 2 out performed Group 3 for all the parameters, both in terms of reaction times and accuracy measures, are a testament to the thoroughness of our methodology.

Participants from all three groups performed significantly better for related and unrelated frequent than infrequent conditions. Participants from all three groups performed better for related than unrelated conditions, but no significant effect was observed. This trend was observed for both taxonomic and thematic blocks. Therefore, based on a comprehensive and meticulous methodology, our study's findings suggest that a mixed block containing frequent and infrequent related and unrelated items provides neutral grounds for naming activation patterns.

Keywords : Lexical access, Patterns of lexical activation, age groups

The lexicon of a language is a collection of all words existing in that particular language. In psycholinguistics, the mental lexicon is a systematically organized mental dictionary. It contains information regarding a word's form and meaning. This is in terms of its pronunciationand syntactic and semantic features. Hence, the mental lexicon of an individual is their internalized knowledge of the properties of words.

Each word known to an individual is represented in the mental lexicon as a lexical entry. Appropriate selection of lexical entries is necessary for successful language production. The activation and retrieval of these lexical entries is termed lexical access. The present study aimed to investigate the pattern of Lexical Semantic Activation as a function of age in neurotypical native Kannada-speaking younger, middle-aged, and older adult age groups.

In order to investigate the patterns of lexical access, naming paradigms have been predominantly employed. Of these paradigms, picture naming tasks are most commonly used. Many variables could influence the responses obtained. These variables can be classified as patient and stimulus variables. Patient variables include age, attention, motivation, and education, to name a few. The stimulus variables include factors such as relatedness or frequency of

occurrence of the target items. These parameters determine the thresholds of activation for the target items. Items with lower activation thresholds are accessed faster than those with higher ones. Hence, the patterns of lexical semantic activation could follow two trends: facilitation or inhibition.

If an item (prime) preceding the target item increases the ease of retrieval of the target item, facilitation is said to have occurred. This prime could be semantically related or unrelated to the target item. Brown (2014) reported a boost in naming latencies when the two consecutive items were semantically related. On the other hand, no such facilitatory effect was seen for consecutively unrelated items. For example, subjects respond faster to the word "doctor" when it is preceded by "nurse" than when it is preceded by an unrelated word like "carrot." This is supported by authors who postulate a degree of independence between the nodes. Here,a particular node's activation level determines the time required for retrieval.

Inhibition occurs when the presence of a semantically related item before the target item delays the naming latencies for that item. This occurs due to an interference effect. Monsell and Hirsh (1998) observed that latencies were delayed in semantically related contexts compared to semantically unrelated contexts. Here, it was postulated that the levels of activation of the adjoining related nodes delayed the selection of the source node. Hence resulting in longer naming latencies.

Navarrete *et al.,* (2010, 2012) conducted a cyclic block naming paradigm study. Upon analysis of the results, the authors emphasized that the first cycle of a cyclic naming task displays a facilitation effect even though an interference effect is observed in the subsequent cycles. Here, the highest activated word is selected, and the time for this selection is not affected by the activation levels of the non-target words. They argued that this semantic interference in the subsequent blocks only emerges due to repetitions within the block. They attributed it to a lower

priming effect in related blocks than in unrelated ones. The authors hypothesized that this resultant pattern was observed due to weaker repetition priming in homogenous sets than in heterogenous sets and was not a result of increased lexical competition. They further demonstrated that when homogenous sets were presented in alternate combinations with unrelated sets and not immediately repeated, semantic relatedness induced a facilitation rather than an inhibition effect.

Hence, extensive research must be conducted using various methods to understand the spreading activation patterns for lexical access. This finding is to be substantiated with studies supporting either view. However, there is no overall consensus in the literature evidencing any one type of activation pattern for lexical access. Also, there is limited research using non-cyclic block naming paradigms, and these activation patterns have not been studied as a function of age, necessitating the present study.

Method

The present study attempted to investigate the pattern of lexical semantic activation in native Kannada-speaking neurotypical individuals as a function of age.

Participants

Lexical semantic activation was studied across three age groups: Group 1: younger adults (aged between 18 and 25), Group 2: middle-aged adults (aged between 45 and 59), and Group 3: older adults (aged between 60 and 79) (Forman *et al.,* 1992); as specified by the United Nations guidelines, 2010). Each group comprised 15 individuals, so the study involved 45 participants.

Stimulus

One hundred items were shortlisted from the 260-picture naming test given by Wasim Ahmed *et el.*, (2022), developed based on Snodgrass and Vanderwart's standardized 260-picture list (1980). These items were black-and-white line-drawing picture stimuli. To label pictures as 'frequent' and 'infrequent,' these items were

subjected to a familiarity check. Three judges were asked to label each item as 'frequent' or 'infrequent', and the inter-agreement between the judges was considered.

The shortlisted 100 items were further classified into taxonomic and thematic domains, with 40 items in each section. The taxonomically related block included items belonging to the categories of 'animals' and 'objects.' The thematic block included items about the theme 'size' - 'big' and 'small'. On the other hand, the taxonomically and thematically unrelated blocks included items about various categories and themes, respectively. Each of the two mixed blocks included a total of 10 items. These were taxonomically (related and unrelated) and thematically (related and unrelated) items.

Each related block consisted of two categories/themes with 10 items each. These items were divided into frequent (5) and infrequent (5) picture stimuli. The two unrelated blocks comprised the first 10 items as 'frequent' and the following 10 as 'infrequent' picture stimuli. Each participant was instructed in either Kannada or English, depending on their language of preference.

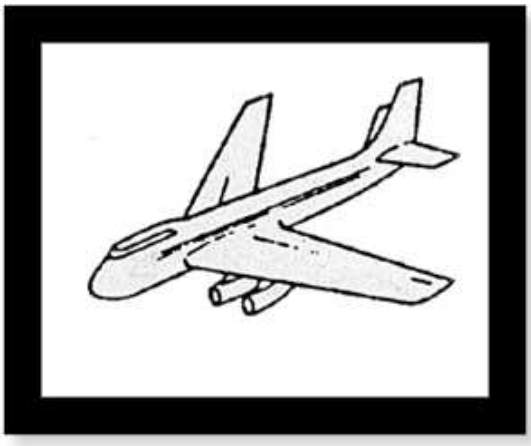

Figure 1 : An example of a stimulus item

Table 1

Stimulus list (100 items)

	BLOCKS		FREQUENT (F)	INFREQUENT (IF)
Block 1	Taxonomically Related (20 Items)	Animals Objects	Dog, Cat, Elephant, Cow, Fish Book, Clock, Cup, Apple, Doll	Squirrel, Rhino, Leopard, Camel, Fox Needle, Saw, Hammer, Axe, Button
Block 2	Taxonomically Unrelated (20 Items)		Dog, Book, House, Comb, Sun, Shirt, Apple, Ear, Hen, Potato	Raddish, Lobster, Truck, Spider, Bell, Table, Flag, Watermelon, Star, Cannon
Block 3	Thematically Related (20 Items) (*Size)*	Big Small	Airplane, Elephant, House, Table, Mountain Ant, Ear, Flower, Key, Ring	Crocodile, Fridge, Window, Well, Pumpkin Fly, Clip, Ring, Caterpillar, Knob
Block 4	Thematically Unrelated (20 Items) *(Shape)*		Banana, Table, Pencil, Hill, Book, Apple, Kite, Wheel, Doll, Cup	Pear, Eagle, Swan, Heart, Trumpet, Bear, Finger, Capsicum, Flag, Ironbox
Block 5	Mixed Block (10 Items)	Taxo-nomic	Dog, Ear, Flower, Key, Ring	Well, Hammer, Button, Turtle, Window
Block 6	Mixed Block (10 Items)	Thematic	Apple, Clock, Cow, Fish, Doll	Saw, Ring, Top, Squirrel, Watermelon

Instrumentation

The testing was carried out in a well-lit, relatively silent environment. The stimuli were displayed on a Dell Inspiron laptop with a 15-inch screenabout two feet from the participant. The 'DMDX' software was employed to programme and present the picture stimuli for the study. The participants' verbal responses and voice reaction times were recorded and analysed using check vocal, an allied software to DMDX (5.0).

Procedure

The participant was instructed to press the spacebar to commence the task. A vigilant stimulus "XXX" was presented at the

beginning of each block for a duration of 500 milliseconds before the presentation of the first target item (picture) to be named in that block.

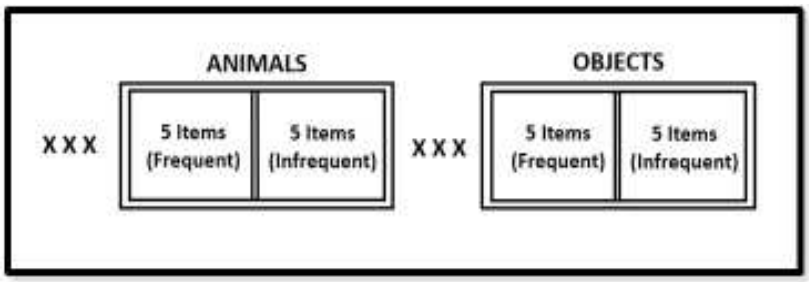

Figure 2 : Schematic representation of Block 1

Each target item was presented for 1600 milliseconds (Campanella & Shallice, 2011), after which the participant was given another maximum duration of 3000 milliseconds to name the target item presented. The next target item was presented automatically once the participant successfully attempted to name or failed to name the current target item. This was after 3000 milliseconds following the offset of the target item.

The participants' verbal responses were recorded for accuracy measures. The time between the stimulus and correct response onset was recorded as the reaction time for each item. Incorrect responses were discarded for reaction time measures.

Results and Discussion

The independent variables considered were the participant's age, the classification of the block as taxonomic or thematic, the frequency of occurrence, and the relatedness of the stimuli. The dependent variables considered were reaction time, measured in milliseconds, and the accuracy of the responses, measured in percentage. The data was analysed using the Statistical Package for Social Sciences (SPSS) software version 21.0.

Table 2

Reaction time and accuracy results obtained for Taxonomic Blocks

BLOCKS		GROUP 1		GROUP 2		GROUP 3	
		RT (ms)	AS (%)	RT (ms)	AS (%)	RT (ms)	AS (%)
TARF	Mean	920.20	100	958.74	98.66	1007.80	93.33
	SD	86.20	0.0	117.67	5.16	99.60	10.46
TARIF	Mean	1449.41	93.33	1643.91	91.33	1798.51	73.33
	SD	238.65	11.62	164.04	12.20	213.90	19.88
TAURF	Mean	939.19	100	997.48	98.66	1040.01	86.66
	SD	102.60	0.0	159.14	3.51	134.28	9.75
TAURIF	Mean	1478.44	87.33	1561.25	89.33	1773.77	71.33
	SD	221.67	8.16	267.92	8.33	294.13	15.52

Note : TARF: Taxonomically related frequent

TAURF: Taxonomically unrelated frequent

TARIF: Taxonomically related infrequent

TAURIF: Taxonomically unrelated infrequent

Table 3

Reaction time and accuracy results obtained for Thematic Blocks

BLOCKS		GROUP 1		GROUP 2		GROUP 3	
		RT (ms)	AS (%)	RT (ms)	AS (%)	RT (ms)	AS (%)
THRF	Mean	979.65	100	1004.32	99.33	1089.58	90.66
	SD	45.96	0.0	120.34	2.58	135.52	9.61
THRIF	Mean	1649.28	93.33	1719.80	84.66	1903.86	67.33
	SD	174.94	10.0	160.85	9.15	382.37	12.45
THURF	Mean	1014.02	96.66	1052.57	98.66	1097.41	87.33
	SD	125.21	4.80	102.63	3.51	151.91	10.32
THURIF	Mean	1586.29	88.00	1649.50	84.00	1855.70	64.66
	SD	153.61	10.14	178.31	11.83	259.84	15.33

Note :THRF : Thematically related frequent

THURF : Thematically unrelated frequent

THRIF : Thematically related infrequent

THURIF : Thematically unrelated infrequent

As shown by Table 2 and Table 3, Group 1 (younger individuals) obtained better reaction times and accuracy scores, followed by Group 2 (middle-aged individuals) and, hence, Group 3 (older individuals). This trend was seen for all the parameters except one (accuracy scores for taxonomic unrelated infrequent stimulus were better for Group 2 than Group 1). Hence, Group 1 exhibited an overall better performance for all the tasks.

Also, better reaction times and accuracy scores were observed for the frequent (920.20-1097.41ms) than infrequent (1449.41-1855.70ms) and for related (920.20-1903.86ms) than unrelated (939.19-1855.70ms) parameters for all three groups. Participants across all three groups performed better for taxonomic (920.20-1798.51ms) than thematic (979.65-1903.86ms) blocks. Hence, the trend for lexical semantic activation was observed to be similar in each of the three groups included in the study.

The study's first objective was to compare the performance (regarding reaction time and accuracy scores) of the younger adults with that of the middle-aged and older adults. The overall means and standard deviations were calculated. This was done to measure the performance of all the parameters under study. The data was initially subjected to the normality test by employing Shapiro-Wilk's test. The results showed that the data for reaction times was parametric, while the data for accuracy scores showed a non-parametric distribution. Hence, parametric tests were used for the former, and non-parametric tests were used for the latter. The data for reaction time was subjected to a Mixed ANOVA to find the main effect and interaction effect between the parameters. Results revealed that the main effects of the stimulus were age and frequency. An interaction effect was observed for group, frequency, and frequency and condition (taxonomic and thematic) parameters. The data for reaction time measures was then subjected to a ANOVA. The results revealed a significant difference ($p < 0.05$) between the performance of Group 1 and Group 3, Group 2 and Group 3 but not Group 1 and Group 2. The data for accuracy scores did not follow a normal distribution. Hence, it was subjected

to a non-parametric Kruskal Wallis Test, which revealed a significant difference ($p < 0.05$). Therefore, a Man Whitney U test was carried out for pairwise comparisons. This revealed the same results as the reaction time data. Hence, it can be concluded that Groups 1 and 2 performed significantly better than Group 3 for all the parameters considered.

Table 4

Pairwise comparisons of the Reaction times and Accuracy scores for the condition and frequency parametersfor the taxonomic blocks

Groups	**Comparison**	**t**	**df**	**P**	**|z|**	**P**
		Reaction Time			**Accuracy Scores**	
Group 1	TRF & TRIF	-10.08	14	0.00*	-2.83	0.005*
	TURF & TURIF	-14.17	14	0.00*	-2.82	0.005*
	TRF & TURF	-0.562	14	0.583	0.00	1.000
	TRIF & TURIF	-0.413	14	0.686	-1.55	1.200
Group 2	TRF & TRIF	-18.58	14	0.00*	-2.81	0.004*
	TURF & TURIF	-12.67	14	0.00*	-2.88	0.003*
	TRF & TURF	-1.146	14	0.271	0.00	1.000
	TRIF & TURIF	1.197	14	0.251	-0.60	0.546
Group 3	TRF & TRIF	-16.45	14	0.00*	-2.74	0.004*
	TURF & TURIF	-13.93	14	0.00*	-3.44	0.003*
	TRF & TURF	-1.092	14	0.293	-1.97	0.048
	TRIF & TURIF	0.374	14	0.714	-0.55	0.581

*Significant difference

The study's second objective was to compare the reaction times and accuracy scores for the activation pattern for taxonomically related and unrelated frequent and infrequent blocks. The overall means and standard deviations were calculated. The participants' performance from all three groups was better for frequent than infrequent stimuli and related than unrelated conditions in the taxonomic blocks. This was observed in terms of both reaction times and accuracy scores.The results for reaction time (tested through

Paired sample t-test) and accuracy scores (tested through Wilcoxon Signed Ranks Test) showed a significant difference ($p<0.05$) only for the frequency parameter and not for relatedness (Refer Table 4).

The third objective of the study was to compare the reaction time and accuracy scores for the activation pattern for thematically related and unrelated frequent and infrequent blocks. The overall means and standard deviations were calculated. Based on the normal distribution, the data for reaction time was subjected to a paired sample t-test, whereas the data for accuracy scores was subjected to the Wilcoxon Signed Ranks Test. The results revealed that the participants performed better for frequent than infrequent and related than unrelated conditions. However, a significant difference was observed only for the thematic blocks' frequency and not the relatedness parameter (Refer to Table 5). This pattern was similar to the taxonomic blocks.

Table 5

Pairwise comparisons of the Reaction times and Accuracy scores for the condition and frequency parametersfor the thematic blocks

Groups	Comparison	t	df	P	|z|	P
		Reaction Time			Accuracy Scores	
Group 1	TRF & TRIF	-15.48	14	0.00*	-2.91	0.004*
	TURF & TURIF	-20.68	14	0.00*	-2.91	0.004*
	TRF & TURF	-1.04	14	0.313	-2.23	0.025
	TRIF & TURIF	0.94	14	0.363	-0.55	0.580
Group 2	TRF & TRIF	-24.47	14	0.00*	-3.11	0.004*
	TURF & TURIF	-20.67	14	0.00*	-2.96	0.003*
	TRF & TURF	-2.82	14	0.013	-0.57	0.564
	TRIF & TURIF	1.72	14	0.106	-0.12	0.903
Group 3	TRF & TRIF	-09.74	14	0.00*	-3.32	0.001*
	TURF & TURIF	-18.87	14	0.00*	-3.40	0.001*
	TRF & TURF	-0.319	14	0.754	-1.50	0.048
	TRIF & TURIF	0.407	14	0.690	-6.80	0.581

As discussed above, the facilitation effect was seen for the frequent items as compared to the infrequent items. This effect was observed equally for thematic and taxonomic conditions and related and unrelated conditions. It was also observed across all the three age groups included in the study. This finding showed that the stimulus frequency will have a more critical role in predicting the activation pattern in neurotypical individuals, irrespective of age. This finding is supported by some studies in literature, employing both priming (Alario *et al.,* 2004) and cyclic block naming paradigms (Navarrete *et al.,* 2010, 2012).

Statistically, no significant difference was observed between the related and unrelated conditions. This holds good for both taxonomic and thematic blocks. Therefore, the activation pattern for neurotypical individuals did not show a significant facilitation or inhibition effect as a function of relatedness. This observation was consistent across all three age groups. There is strong evidence indicated by priming studies for the relatedness of the stimuli inducing a facilitatory effect (Swinney, 1979; Caramazza *et al.,* 2007). However, this facilitation effect was eliminated in the block naming paradigm. Considering relatedness, the block naming paradigm would give a neutral pattern of lexical semantic activation, unlike the priming studies that indicate facilitation.

Considering relatedness, the cyclic block naming paradigms indicate a change in the trend from a facilitation effect in the first cycle to an inhibition effect in the subsequent consecutive cycles (Belke, 2008). This change in trend is also eliminated using the block naming paradigm.

The above findings could be attributed to two factors. The first factor could be the inclusion of the frequency parameter. Then, relatedness and the frequency of occurrence of the stimuli played a dominant role in influencing the pattern of lexical semantic activation. The second factor could be the method of presentation of the stimulus. The pairwise prime-target presentation of the priming paradigm and the repetitions of the cyclic block naming paradigm were eliminated

in the block naming paradigm. Parallelly, the relatedness effect was also observed to disappear. This was observed for all neurotypical adults, irrespective of age.

Considering the relatedness parameter alone or employing the same paradigm on the disordered population might reveal different results. Therefore, in the present study, frequency played a more critical role in predicting the pattern of lexical access than relatedness for all neurotypical adults.

As discussed, the parameters were analysed individually for the thematic and taxonomic blocks. These parameters were also compared with the taxonomic and thematic mixed blocks' reaction times and accuracy scores.

The performance of the individuals on taxonomic blocks was also compared with that of the thematic blocks and, hence, mixed blocks. This trend revealed a better performance for taxonomic than thematic blocks, both in terms of reaction times and accuracy scores. This was observed for all three age groups included in the study. Therefore, better overall reaction times were observed for the taxonomic compared to the thematic conditions.

Furthermore, these parameters were compared with the taxonomic and thematic items' reaction times and accuracy scores in the two mixed blocks, respectively. This was done to observe any differential patterns of lexical activation across the blocks mentioned above. It was observed that the related blocks elicited shorter reaction times than the mixed blocks, and the mixed blocks received shorter reaction times than the unrelated blocks. The data for reaction time and accuracy scores were subjected to a Paired sample t-test and a Wilcoxon Signed Ranks Test. Results revealed a significantly better performance for the mixed blocks than the unrelated infrequent blocks only. This was observed for both taxonomic and thematic conditions. The same trend was followed by all the three groups included in the study.

In addition, the reaction times for the stimuli across each block were tracked to predict the presence of any incremental learning

effect. This would explain the patterns of activation observed across each block included in the study. No particular statistical analysis was carried out for the same. Upon observation, the reaction times successively reduced across items within a block. Thus, an incremental learning effect was observed only for the related frequent and infrequent blocks. However, this decrease in reaction time was more evident for frequent than infrequent blocks. The same trend was observed for both taxonomic and thematic blocks and was followed by all three groups included in the study. However, for group 3 (older adults), an increasing reaction time pattern was observed for the thematically unrelated infrequent block. Hence, an incremental learning effect was observed for related and frequent stimuli in taxonomic and thematic blocks.

As shown by past research, the overall performance in naming decreases with age. Older adults exhibit longer naming latencies and have a lesser accuracy of responses for naming. Literature also suggests an increase in the ease of retrieval for frequent rather than infrequent items. Lower thresholds of activations for more frequently accessed items can account for this observation (Balota&Chumbley, 1984). The facilitatory effect of relatedness seen in priming paradigms (Mahon *et al.,* 2007) and the overall inhibitory effect of relatedness observed in cyclic block naming paradigms can be nullified by employing a non-cyclic block naming paradigm. Taxonomic conditions provide a better environment for naming than thematic conditions. Therefore, mixed blocks (comprising related, unrelated, frequent, and infrequent items) may neutralize the learning effect.

Conclusion

To summarise the overall results obtained, group 1 and group 2 outperformed group 3 for all the parameters consideredregarding reaction times and accuracy measures. However, no significant difference was observed between group 1 and group 2. A significantly better performance was seen for frequent than infrequent stimuli. This was observed for both taxonomic and thematic blocks. Similarly, a

better performance was observed for related than unrelated blocks; however, a significant difference was not observed. For group 3, better reaction times were obtained for unrelated infrequent blocks than related infrequent ones. Participants performed better on related blocks than on mixed blocks. However, a better performance was seen on mixed blocks than on unrelated blocks. Reaction time measures were observed to be better for taxonomic than thematic blocks. Considering the learning effect, it was notable only for related frequent items more than related infrequent items. This was not observed for unrelated items. As mentioned above, these trends were shown by all three groups included in the study.

References

Alario, F., Segui, J., & Ferrand, L. (2000). Semantic and associative priming in picture naming. *The Quarterly Journal of Experimental Psychology A,53*(3), 741-764. doi:10.1080/027249800410535

Balota, D. A., &Chumbley, J. I. (1984). Are lexical decisions a good measure of lexical access? The role of word frequency in the neglected decision stage. *Journal of Experimental Psychology: Human Perception and Performance*, 10(3), 340-357. doi:10.1037/0096-1523.10.3.340

Belke, E. (2008). Effects of working memory load on lexical–semantic encoding in language production. *Psychonomic Bulletin & Review*, 15, 357–363.

Campanella, F., & Shallice, T. (2011). Refractoriness and the healthy brain: A behavioural study on semantic access. *Cognition, 18*(3), 417-431. doi:10.1016/j.cognition.2010.08.005

Caramazza, A. (1997). How many levels of processing are there in lexical access?.*Cognitive neuropsychology*, *14*(1), 177-208.

Forman, D. E., Berman, A. D., McCabe, C. H., Baim, D. S., & Wei, J. Y. (1992). PTCA in the elderly: the "young-old" versus the "old-

old". Journal of the American Geriatrics Society, 40(1), 19–22.

Mahon, B. Z., Costa, A., Peterson, R., Vargas, K. A., & Caramazza, A. (2007). Lexical selection is not by competition: A reinterpretation of semantic interference and facilitation effects in the picture-word interference paradigm. Journal of Experimental Psychology: Learning, Memory, and Cognition, 33(3), 503–535.

Monsell, S., & Hirsh, K. W. (1998). Competitor priming in spoken word recognition. Journal of Experimental Psychology: Learning, Memory, and Cognition, 24(6), 1495–1520.

Morton, J. (1969). Interaction of information in word recognition. *Psychological Review,* 76(2), 165-178.

Navarrete, E., Mahon, B. Z., &Caramazza, A. (2010). The cumulative semantic cost does not reflect lexical selection by competition. *ActaPsychologica*, 134, 279–289.

Navarrete, E., Del Prato, P., & Mahon, B. Z. (2012). Factors determining semantic facilitation and interference in the cyclic naming paradigm. *Frontiers in Psychology*, 3, 38.

Scott W Brown,S.W.(2014). Involvement of shared resources in time judgment and sequence reasoning tasks, Acta Psychol (Amst), 147:92-6.

Swinney, D. (1979). Lexical access during sentence comprehension: (Re)-consideration of Context Effects'. *Journal of Verbal Learning and Verbal Behaviour*, 18: 21-39.

Wasim Ahmed , P. P. Giridhar, and Gopee Krishnan (2022). Development and validation of a novel corpus of 269 verb pictures in Kannada based on an argument structure taxonomy, Behav Res Methods. 54(3): 1358–1373

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 484-508
ISSN : 0971-4189, UGC No. – List B, Science –121

Encouraging Successful Ageing and Positive Affect in Older Adults : A Review Study

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ABSTRACT

This review study, based on 84 papers published in various journals, aims to synthesize recent literature suggesting that the mental health of the elderly can be improved. It significantly underscores the crucial role of four types of interventions: psychotherapy, yoga, expressive art-based therapy, and religious and spiritual interventions in fostering successful Ageing and positive affect. Significantly, these findings not only contribute to our understanding of successful ageing but also have practical implications, providing a roadmap for future research and interventions in gerontology, psychology, and mental health. This practical aspect of our study should inspire hope and motivate further action in our audience.

Keywords: Ageing, Successful Ageing, Positive Affect

Ageing is a natural and irreversible process that involves physical, psychological, and social changes. As individuals transition into old age, they experience various physical and psychosocial alterations. However, successful ageing is not a solitary endeavor. It is a collaborative journey, requiring active participation from the individual, their environment, and society. Independence during old age, life satisfaction, longevity, freedom from disabilities, active engagement in life, mastery, and growth are all indicators of successful ageing (Moody, 2005; Bülow & Söderqvist, 2014). 'Vital aging', 'productive aging', or 'active aging' are the synonyms of the term, which implies that older people can maintain health and vitality, contributing to society rather than being dependent (Achenbaum, 2001; Butler & Gleason, 1985; Bülow & Söderqvist, 2014) and maintaining a positive functioning as long as possible (Phelan & Larson, 2002; Cosco *et al.,* 2017). The World Health Organization's contribution to healthy aging defines it as developing and maintaining the functional ability that enhances and fosters well-being during old age. These abilities include the ability to meet their basic needs, learn, grow and make decisions, be mobile, build and maintain relationships, and contribute to society. The WHO suggests that these functional abilities are an outcome of efficient interaction between the intrinsic capacity of the individual and environmental characteristics (World Health Organization, 2020).

Although there are different models of successful ageing from different populations defining their perspectives on the concept of ageing, there are researches reflecting upon the fact that it is an individualistic concept that might have different meanings to different people (Araújo *et al.,* 2016; Stewart *et al.,* 2019; Badache *et al.,* 2023). This indicates that even if a person is not physically independent and cannot meet his basic needs, given poor external circumstances, they still can perceive themselves positively, adapt adequately to their ageing process, and age successfully. Shifting the lenses toward the Indian population, it can be observed that research

in the area of successful ageing needs further development, which can be taken up in further studies.

There have been numerous intervention programmes established for the betterment of the elderly population dealing with psychological illnesses, out of which anxiety, depression, and dementia in old adults have enticed most researchers, psychologists, and psychiatrists worldwide. Interventions, including positive psychotherapy, mindfulness-based therapies, yoga, cognitive interventions, technology-based interventions, humor or laughter therapy, and many more, have been attempted to reduce the effects of age-related psychological illnesses. (Choudhary*et al.,* 2019; Asghari*et al.,* 2020; Tavakoli*et al.,* 2021; Sanchez-Lara *et al.,* 2022). Music therapy and cognitive behavior therapy have been shown to reduce the prevalence of depression and reduction in the severity of the symptoms, respectively. (Pimple, 2012; Kirubakaran&Kokilavani, 2014). However, the focus is not merely on treating psychological illnesses but on enhancing the well-being of the elderly. For this reason, the present study has included the description of four main types of interventions, namely, positive psychotherapy, yoga,mindfulness, expressive art therapy, and religion and spirituality interventions, supported by research evidence. Interventions such as CBT and other psychotherapies involve the individual attention of each elderly,mainly undertaken when there are any mental illnesses amongst them.

Method

This review article aimed to deduce whether psychological interventions, such as Positive Psychotherapy, Yoga,Expressive-based Therapy, and Religion and Spirituality, can revamp the well-being of the elderly population. Moreover, the review also aimed to explore the effectiveness of intervention programmes, especially those designed to be used among the elderly to encourage them to age successfully and enhance their Positive Effects. For this purpose, initally125 papers published on the abovementioned themes were selected from various journals. Several online databases, including Google Scholar, PubMed, Psych INFO, Web of Science, Scopus,

and Science Direct, were used to select these articles. Finally, 84 articles belonging to the chosen categories, Positive Psychotherapy(16 articles), Yoga(25 articles), Expressive-based Therapy(13 articles), and Religion and Spirituality interventions (30 articles) were reviewed.

Each author independently reviewed the titles and abstracts of research papers that suggested using intervention programmes conducted amongst the elderly to enhance their overall well-being. All the documents identified as potential articles were further reviewed during the initial screening. Studies that included variables unrelated to mental health and psychological well-being were excluded. Interventions conducted for patients with psychiatric illnesses admitted to hospitals were also excluded, and only those who resided in communities and old age homes were included. The focus had been on including Indian mediation and emerging and creative methods of interventions to be used amongst the elderly rather than the same old therapeutic techniques. The methodological validity of the relevant interventional studies was assessed based on the following parameters: 1) training of the researcher in the relevant field of therapy/ intervention, 2) conduction of interventions under supervision, 3) random assignment of participants into the treatment group, if experimental, 4) blinded post-test analysis and 5) treatment follow-ups.

Result

Table 1. Represents an overall view of the types of studies conducted among the Elderly and the effectiveness of these interventions in promoting their well-being.

Interventions	**Conclusions**
Positive Psychotherapy as Intervention *Type of studies* **:** Experimental studies, group interventions, individual interventions and therapy, quantitative analysis	Enhanced quality of life, subjective happiness, life satisfaction, meaningfulness, sense of control over situations, personal growth, positive relationships with others, purpose in life, and self-acceptance encourage strength, hope, inner resources, and values among the elderly. They also decrease the symptoms of anxiety and depression.

Yoga as Intervention *Type of studies* : Experimental studies with Yogic Interventions, Group as well as Individual studies, Quantitative analysis	*Direct Impact* : It suggests Improved bodily functions, including respiratory and cardiovascular efficiency, and balancing biochemical functioning such as blood sugar, lipids, and serum triglycerides. It enhances gait balance and flexibility, improves cardio-metabolic health, restores overall autonomic mechanisms, lowers cortisol levels, maintains breathing and heart rate, decreases blood pressure and pain reduction, and increases blood flow and overall physical health. *Indirect Impact*: Enhanced sleep quality, mood, cognitive functions, memory, attention, quality of life, stress reduction and decreases in symptoms of depression, improvements in psychological health and social relationships.
Expressive Art-based Therapy as Intervention *Type of studies* : Experimental intervention studies, group studies, quantitative analysis	Improvements in symptoms of depression and anxiety reverse symptoms of dementia and enhance quality of life. Management of emotional states, dealing with life and death issues, reducing feelings of loneliness, and increasing subjective happiness. It helps recollect memories, organize life experiences, express emotions, and facilitate positive experiences. Impact brain function by activating the orbitofrontal cortex, integrating sensory inputs, and enhancing internal decision-making and emotional processing.
Intervening Religion and Spirituality *Type of studies* : Group Interventions, experimental studies, quantitative and qualitative analysis	*Direct impact*: Introduces a sense of peacefulness and calmness, life satisfaction, optimistic attitude and enhances overall mental health and well-being. *Indirect Impact* : Promotes healthy behaviours such as restraining from consumption of alcohol and nicotine, healthy eating and diet through fasting and enhanced social network of religious practitioners.

Positive Psychotherapy as Intervention

Numerous studies have been conducted reflecting the effectiveness of positive psychotherapy amongst the entire population. Recent evidence suggests the importance and usefulness of positive psychotherapy amongst the elderly. This therapy originated from the initial research of Martin Seligman in the field of positive psychology, which suggests the enhancement of positive emotions and well-being rather than just inclining toward lowering the psychological symptoms amongpeople (Seligman *et al.,* 2006). While encouraging and enhancing positive affect, the focus on inducing '*Sukha*' within an individual can be a practical component in the overall satisfaction and well-being of the elderly. Researchers working in this area have found that positive psychotherapy has been proven to be effective in increasing the vitality of the elderly, which insinuates the enhancement of their sense of life and spirit, inducing an energy-filled inner experience (Sharifi *et al.,* 2015; Tavakoli *et al.,* 2021). An experimental study focused on enhancing the quality of life amongst the elderly by creating an intervention group and training them on autobiographical memories, forgiveness, and gratitude resulted in their enhanced sense of subjective happiness, life satisfaction and a significant decline in their state of anxiety and depression (Ramírez *et al.,* 2014; Rad *et al.,* 2020). Positive psychotherapy encourages strength, hope, inner resources, and values instead of focusing on deficits and weaknesses (Seligman *et al.,* 2006; Rad *et al.,* 2020). Therefore, it enhances various components of well-being and life satisfaction and brings meaningfulness to the lives of the elderly (Kashaniyan & Khodabakhshi, 2015). Another intervention programme covering several themes of positive psychology in their group sessions with the elderly included gratitude, optimism, savoring, curiosity, happiness, courage, altruism, and meaning of life, revealed a positive impact on their level of happiness, gratitude, and life satisfaction (Ho *et al.,* 2014).

There are three major positive psychology theories or techniques for the mental health of the elderly: positive-psychological capital,

quality-of-life treatment, and well-being therapy. The positive-psychological capital (Luthans, 2002) inclines toward the level of an individual's happiness, potential, and strengths and suggests that resilience helps in facing life's challenges. The quality-of-life treatment, following a positive psychology orientation developed by Frisch (Frisch, 1998; Frisch, 2013), suggests understanding and applying positive aspects of people to improve their happiness and strength. This treatment has been proven to be effective in enhancing the overall quality of life and emotional stability along with enhanced intimacy with others among depressed elderly (Rodrigue *et al.,* 2005). However, another therapy developed by Fava, known as well-being therapy, is based on Ryff's psychological well-being model (Fava, 2003). This therapy aims to enhance control over situations, personal growth, build positive relationships with others, purpose in life, and self-acceptance. Recent research using these models has proven to be an effective intervention amongst the elderly (Lam *et al.,* 2020; Dehnavi *et al.,* 2020; Taghvaienia & Alamdari, 2020) even in the Indian population (Adhikari, 2013; Ganesh & Harisingh, 2019).

Yoga as Intervention

Deriving its roots from the Ancient Indian Philosophy, in the scientific literature, yoga is considered to be a trendy lifestyle integrating mind, body, and soul (Sathyanarayanan *et al.,* 2019), having a direct and indirect impact on the well-being and mental health of elderly (Cramer *et al.,* 2014; Choudhary *et al.,* 2019). Research also proves the feasibility of yoga as an intervention for the elderly (Gour *et al.,* 2020). Techniques used in Yoga have improved bodily functions, including respiratory and cardiovascular efficiency (Santaella *et al.,* 2011), balances biochemical functioning, including blood sugar levels, lipid levels, and serum triglycerides (Permana *et al.,* 2020) as well as cognition; executive functions, memory, language and attention (Chobe *et al.*, 2020). Yogic interventions amongst the elderly have proven to be efficient and effective, enhancing their gait and balance, flexibility, and mood (Chen *et al.*, 2009; Donesky-Cuenco *et al.,* 2010), where Chen *et al.* suggested

the effectiveness of yoga on residents of the community or old age homes. It can improve and elevate age-related declines in executive cognitive functions and health-related quality of life. Pranayama has been found to have a significant impact on decreasing the symptoms of depression in the elderly and enhancing their quality of life (Gupta *et al.,* 2010; Umadevi *et al.,* 2013).

There have been researches concerning older people which provide us with evidence of the benefits of yoga in improving symptoms of depression and anxiety (Wang *et al.,* 2014; Ramanathan, *et al.,* 2017; Sivaramakrishnan *et al.,* 2019), sleep quality (Freedman *et al.,* 2017), reduction in stress and elevated mood (Kumar & Singh, 2021), pain reduction (Mirzaei *et al.,* 2022), cognition (Chobe *et al.,* 2020; Bhattacharyya *et al.,* 2021) and cardiometabolic health (Alam *et al.,* 2022). With the elderly, yoga also helps restore overall autonomic mechanisms associated with stress by lowering cortisol levels, maintaining breathing and heart rate, decreasing blood pressure, and increasing blood flow (Kimoto *et al.,* 2021). Research evidence has also indicated benefits in the quality of life and sleep patterns among the elderly (Manjunath *et al.,* 2005; Chobe *et al.,* 2020; Ganesh *et al.,* 2021). Improvements in mental health issues such as stress, depression, mood and anxiety, overall physical and psychological health, and social relationships are reflected through yoga-based interventions (Mooventhan & Nivethitha, 2017; Chobe *et al.,* 2020; Ganesh *et al.,* 2022). Therefore, well-being and successful ageing can be encouraged directly or indirectly through yogic interventions.

Expressive Art-based Therapy as Intervention

Recent psychological literature attempts to understand the importance and effectiveness of Art-based interventions for old adults. Arts are considered a fundamental phenomenon of human existence and are closely related to imagination, emotions, cognition, body experience, and spirituality. It helps overcomethe limitations of standard communication, and people can precisely, at a deeper level, illuminate inner and outer conflicts and possible solutions to the

problem (Martinec, R. 2018). McNiff (1992) suggested that "paintings have stories to tell, feelings to express, complaints to make and endless communication."Creative action facilitates a sense of equilibrium between the self and psyche, which older people must achieve. It is not very recent that art and creative expression are being studied to understand the impact on mental health. Arieti (1976) states that creativity enlists a total gestalt. The creative process moves from an unstable or unsatisfactory situation to a situation that offers a solution.

A growing body of literature suggests that art therapy facilitates self-expression, communication, and growth in a safe and trusting environment. It addresses acute stress by expressing mind-body connectivity (Kim, 2013). Wald (2003) states four main goals of Art therapy: a) releasing repressed emotions and revealing psychosis; b) gaining a sense of connection and control between internal and external reality; c) experiencing feelings of mastery by giving form to and integrating conflicting feelings; d) satisfying creative and expressive urges by utilising various art materials. Rawtaer *et al.* (2018) found improvements in subsyndromal anxiety and depression among community-living elderly who participated in psychosocial interventions, including mindful awareness practice, art therapy,and music reminiscence activity. A study by Mahendran *et al.* (2018) suggests the impact of art on brain functioning, with activation in the orbitofrontal cortex that leads to the integration of sensory inputs, enhancing internal decision-making and emotional processing. Researchers also suggest that group art therapy interventions help prevent or reverse dementia, preventing depression and improving quality of life (Choi & Jeon, 2013; Ciasca *et al.,* 2018; Jardim *et al.,* 2020).

A recent and significant study by Mishra, K., Misra, N., & Chaube, N. (2021) on five institutionalized elderly women investigated the impact of Expressive Arts Therapy on their subjective happiness and feelings of loneliness. This quantitative research implicates the importance of EAT in helping older adults cope with

various emotional states concerning thoughts related to life and death issues. This supports other studies reflecting the significance of Expressive Art Therapy (Newland & Bettencourt, 2020; Partridge, 2022). Another qualitative research on expressive art-based life-death education programmes for the elderly suggests that art-making helps to recollect memories and organize life experiences, facilitating the thinking process, reexamination and reorganization of significant life experiences, enhancing emotional expression by evoking repressed emotions and helping in the expression and release of emotions which is a positive experience (Nan *et al.,* 2020; Aydýn & Kutlu, 2021; Partridge, 2022).

Intervening Religion and Spirituality

India is a diverse culture with a high inclination towards religiosity and spirituality, where research suggests that people turn towards religiosity and have an enhanced sense of spirituality as they age (Moberg, 2005; Mukherjee, 2016). A belief in spirituality and spiritual practices helps the elderly to navigate and cope with their daily life struggles of old age (Lawrence *et al.,* 2007; Naz *et al.,* 2021). *Disengagement theory*, a fascinating theory explaining the aging process, suggests that marginalization, denunciation, and diminished status of senior citizens in society have led the elderly to turn to their inner selves (Dezutter *et al.,* 2008), leading to their spiritual development. This development enables older people to cope with their losses and defend themselves against age-related psychological decline (Janhsen, *et al.,* 2021). Several interventions conducted amongst elderly people with religious practice and spirituality as the main intervener suggested positive results (Papadopoulos, 2020; Janhsen *et al.,* 2021; Coelho-Júnior *et al.,* 2022). Dimensions of spirituality, such as forgiveness, repentance, locating meaning in life, and gratitude, are predictors of well-being in older adults (Mukherjee, 2016). On the other hand, religiosity is said to indirectly affect the individual's well-beingthrough the pathways of spirituality, gratitude, and forgiveness (Sharma & Singh, 2019).

Differences have been found between people who involve themselves in *Satsang*, *Bhajan,* and other religious activities and those who do not. Following the intervention, physical health, balance, and self-care changes have been observed (Singh *et al.,* 2020). Other studies describing the findings have been supported outside India as well. Religion has been found to play a role in boosting self-esteem (Krause & Hayward, 2014; Karimi *et al.,* 2021), life satisfaction (Munawar & Tariq, 2018; Abdi *et al.,* 2019), and optimistic attitude (dos Santos Mendes Mónico, &Alferes, 2019) amongst the elderly. A research study on mindfulness and religious coping in the elderly reflects that some dimensions of mindfulness, such as observation, description, and action with awareness, are positively related to enhancing the mental health of the elderly along with positive religious coping in Indonesia (Mahwati, 2017). Discussing the mechanism by which religious practices impact mental health suggests that it has both direct and indirect impacts on promoting positive emotions and enhancing well-being among individuals (Nguyen, 2020). Indulging in prayer directly impacts well-being by inducing a sense of peacefulness and calmness in individuals (Shukla, 2015; Mukherjee, 2016). The indirect impact includes the promotion of healthy behaviors, such as restraining oneself from indulging in alcohol and nicotine consumption (Chatters, 2000; Linardakis *et al.,* 2015; Spanaki *et al.,* 2021), which ultimately prevents the elderly from physical ailments during old age. The belief and practice of fasting during religious days promotes healthy eating and diet, which also helps enhance the physical health of individuals (Morton *et al.,* 2017). Involving in religious practices also promotes social well-being while providing a vast network of religious practitioners participating in prayers and worship together (McFarland, 2009; Schieman *et al.,* 2013; Gallardo-Peralta, 2017).

One very intriguing phenomenon known as the *resource mobilization framework* (Wheaton, 1985) also explains how individuals facing personal distress associated with psychological harm involve themselves in prayer and religious practices more

frequently to delineate this distress. Spiritually modified CBT has also proven to be an effective intervention with elderly people diagnosed with depression. As CBT works on altering irrational cognitions into rational ones, spiritual modification replaces unhealthy beliefs and actions with participants' spiritual narratives (Hodge & Bonifas, 2010; Subica & Yamada, 2018).

Discussion

Seldom are there any efforts to understand and enhance the Positive effect of the elderly, rather than just reducing the symptoms of psychological illnesses? As suggested by Westerhof and Keyes (2010), *if older people are not mentally ill, they are also not mentally healthy*, suggesting a difference between mental illness and mental health. Therefore, the focus needs to be more on enhancing their positive affect and helping people who might not have any significant psychological illness to age positively and successfully. To establish a framework for successful aging, a theoretical research study suggested the importance of biopsychosocial models and meaning-centered interventions that include gratitude, altruism, and forgiveness to address the issues related to age-related declines (Hill & Smith, 2015). This supports combined interventions of positive psychotherapy and dimensions of spirituality, yoga, and expressive art therapy, as discussed in the present paper. With the increasing aging population, where the focus is on improving their mental illnesses as much attention, there is also a need to reflect upon enhancing the mental health of the elderly to bring more meaningfulness in their lives, induce 'Sukha' within themselves, and help them age successfully.

Successful ageing and positive affect both encourage mental wellness amongst the elderly. Ageing positively and successfully is not just limited to physical well-being. However, a focus on overall psycho-social well-being is required. It is an individualistic and subjective concept that might depend on how people perceive their situations and the internal and external spaces around them. The idea of '*Sukha*' derived from positive affect indulges in shifting one's focus

on the internal space despite poor external spaces. This suggests that even during old age, while normal physiological and social processes of ageing might impact their external spaces, their psychological processes can still be altered by remodeling their internal space. This review paper has suggested several interventions that have proven effective with the elderly to enhance their overall well-being and mental health. One significant gap lies with the lack of research in India focusing on encouraging successful aging and their internal space (to elevate Sukha) to reinforce healthy ageing and break the negative stereotype of ageing; it suggests implications for further studies concerning the Indian population.

Excellent internal space can lead to a change in the external space of the individual. This is supported by previous research advocating through anecdotal and empirical evidence that people who inhibit positive affect and happiness within themselves tend to perceive adverse events in a more positive way as compared to people with negative affect (Lyubomirsky & Tucker, 1998; Segura *et al.,* 2023). Moreover, the internal locus of control related to the internal space of Sukha has been reported to be correlated with experiences of positive emotions and happiness (Pannells & Claxton, 2008; Musich *et al.,* 2022). With the restructuring of families in the changing world, the social isolation of the elderly has increased rapidly, leading to disruptions in their social space. Being away from their own families and exhibiting negative relationships with them have led older people to generate hostile attitudes towards others. This tends to make them experience less internal satisfaction and a decreased sense of happiness while they drift away from other people. This ultimately delineates their mental and physical well-being and acts as a catalyst for their already existing problems. Therefore, not denying the fact that the social environment does play a role in the well-being of people, being devoid of which leads to poor internal space, there is a hope that if their internal space can be altered, they can also work on enhancing their external space, develop positive feelings for other people and involve themselves in social activities.

From the previous literature, understanding the mixed perspective of old age, the capacity of this population to flourish, and the need to implement different types of intervention to enhance their 'wellness' rather than simply working on their 'illness' provides evidence for interventions. It is suggested that the advocated interventions can be taken up in communities and old age homes where the elderly survive, losing a sense of meaningfulness and purpose in life. To ignite the light in their darker space and induce a feeling of 'Sukha' within them while pushing them towards successful ageing, an eclectic approach to intervention is suggested for use amongst old adults. In India, a diverse society, the elderly population is heterogeneous. This raises concerns regarding functional incompetency, loneliness, financial security, and social participation for the young and the oldest (LASI, 2020). There needs to be a comprehensive understanding of these various age units within the elderly population to plan efficient policies, measures, and interventions.

References

Abdi, A., Soufinia, A., Borji, M., &Tarjoman, A. (2019). The effect of religion intervention on life satisfaction and depression in elderly with heart failure. *Journal of religion and health*, *58*, 823-832.

Achenbaum, W. A. (2001). Productive aging in historical perspective. *Productive aging: Concepts and challenges*, 19-36.

Adhikari, H. (2013). Effectiveness of Structured Reminiscence Group Psychotherapy in Elderly Care. *Journal of Gerontology and Geriatric Research*, *2*(124), 2.

Alam, I., Ullah, R., Jan, A., Sehar, B., Khalil, A. A. K., Naqeeb, H., ...& Zeb, F. (2022). Improvement in cardio-metabolic health and immune signatures in old individuals using daily chores (Salat) as an intervention: A randomized crossover study in a little-studied population. *Frontiers in Public Health*, *10*, 1009055.

Araújo, L., Ribeiro, O., Teixeira, L., &Paúl, C. (2016). Successful aging at 100 years: the relevance of subjectivity and psychological resources. *International psychogeriatrics*, *28*(2), 179-188.

Arieti, S. (1976). Psychoanalysis of severe depression: Theory and therapy. *Journal of the American Academy of Psychoanalysis*, *4*(3), 327-345.

Asghari, N., Madahi, M. E., KraskianMojamnari, A., &Sahaf, R. (2020). The Effectiveness of Cognitive-Behavioral Group Therapy (CBT) on Psychological Symptoms (Depression and Psychological Well-Being) in the Elderly. *Journal of Excellence in counseling and psychotherapy*, *8*(32), 15-26.

Aydýn, M., &Kutlu, F. Y. (2021). The effect of group art therapy on loneliness and hopelessness levels of older adults living alone: A randomized controlled study. *Florence Nightingale Journal of Nursing*, 29(3), 271.

Badache, A. C., Hachem, H., & Mäki-Torkko, E. (2023). The perspectives of successful ageing among older adults aged 75+: a systematic review with a narrative synthesis of mixed studies. *Ageing & Society*, 43(5), 1203-1239.

Bhattacharyya, K. K., Andel, R., & Small, B. J. (2021). Effects of yoga-related mind-body therapies on cognitive function in older adults: A systematic review with meta-analysis. *Archives of Gerontology and Geriatrics*, 93, 104319.

Bülow, M. H., & Söderqvist, T. (2014). Successful ageing: A historical overview and critical analysis of a successful concept. *Journal of Aging Studies*, 31, 139-149.

Butler, R. N., & Gleason, H. P. (1985). *Productive aging: Enhancing vitality in later life*. Springer Publishing Company.

Chatters, L. M. (2000). Religion and health: Public health research and practice. *Annual Review of Public Health*, 21, 335–367.

Chen, K. M., Chen, M. H., Chao, H. C., Hung, H. M., Lin, H. S., & Li, C. H. (2009). Sleep quality, depression state, and health

status of older adults after silver yoga exercises: cluster randomized trial. *International journal of nursing studies*, *46*(2), 154-163.

Chobe, S., Chobe, M., Metri, K., Patra, S. K., &Nagaratna, R. (2020). Impact of Yoga on cognition and mental health among elderly: A systematic review. *Complementary therapies in medicine*, *52*, 102421.

Choi, Y. H., & Jeon, E. Y. (2013). Effects of art therapy on cognition, depression, and quality of life in elderly. *Journal of Korean Academy of Community Health Nursing*, *24*(3), 323-331.

Choudhary, A., Pathak, A., Manickam, P., Purohit, M., Rajasekhar, T. D., Dhoble, P., ...&Diwan, V. (2019). Effect of yoga versus light exercise to improve well-being and promote healthy aging among older adults in central India: a study protocol for a randomized controlled trial. *Geriatrics*, *4*(4), 64.

Ciasca, E. C., Ferreira, R. C., Santana, C. L., Forlenza, O. V., Dos Santos, G. D., Brum, P. S., &Nunes, P. V. (2018). Art therapy as an adjuvant treatment for depression in elderly women: a randomized controlled trial. *Brazilian Journal of Psychiatry*, *40*, 256-263.

Coelho-Júnior, H. J., Calvani, R., Panza, F., Allegri, R. F., Picca, A., Marzetti, E., & Alves, V. P. (2022). Religiosity/Spirituality and mental health in older adults: A systematic review and meta-analysis of observational studies. *Frontiers in Medicine*, *9*, 877213.

Cosco, T. D., Howse, K., &Brayne, C. (2017). Healthy ageing, resilience and wellbeing. *Epidemiology and Psychiatric Sciences*, *26*(6), 579-583.

Cramer, H., Lauche, R., &Dobos, G. (2014). Characteristics of randomized controlled trials of yoga: a bibliometric analysis. *BMC complementary and alternative medicine*, *14*, 1-20.

Dehnavi, S. R., Tavakoli, G., & Montajabian, Z. (2020). The Effectiveness of positive psychotherapy on pain perception and death anxiety in the elderly. *Aging Psychology*, *5*, 321-32.

Dezutter, J., Soenens, B., Luyckx, K., Bruyneel, S., Vansteenkiste, M., Duriez, B., &Hutsebaut, D. (2008). The role of religion in death attitudes: Distinguishing between religious belief and style of processing religious contents. *Death studies*, *33*(1), 73-92.

Donesky-Cuenco, D., Nguyen, H. Q., Paul, S., & Carrieri-Kohlman, V. (2010). Yoga therapy decreases dyspnea-related distress and improves functional performance in people with chronic obstructive pulmonary disease: a pilot study. *The Journal of Alternative and Complementary Medicines*, *15*(3), 225-234.

dos Santos Mendes Mónico, L., & Alferes, V. A. R. (2019). The Effect of Religious Identity on Optimism across the lifespan. In *Gerontechnology: First International Workshop, IWoG 2018, Cáceres, Spain, and Évora, Portugal, 14 and 17 December, 2018, Revised Selected Papers 1* (pp. 359-377). Springer International Publishing.

Fava, G. A., & Ruini, C. (2003). Development and characteristics of a well-being enhancing psychotherapeutic strategy: Well-being therapy. *Journal of behavior therapy and experimental psychiatry*, 34(1), 45-63.

Freedman, V.A.; Carr, D.; Cornman, J.C.; Lucas, R.E. (2017). Aging, mobility impairments and subjective wellbeing. *Disability and Health Journal*, 10(4), 525–531.

Frisch, M. B. (1998). Quality of life therapy and assessment in health care. *Clinical psychology: Science and practice*, *5*(1), 19.

Frisch, M. B. (2013). Evidence-based well-being/positive psychology assessment and intervention with quality of life therapy and coaching and the Quality of Life Inventory (QOLI). *Social indicators research*, *114*, 193-227.

Gallardo-Peralta, L. P. (2017). The relationship between religiosity/spirituality, social support, and quality of life among elderly Chilean people. *International Social Work*, 60(6), 1498-1511.

Ganesh, H. S., Subramanya, P., & Udupa, V. (2021). Role of yoga therapy in improving digestive health and quality of sleep in an elderly population: A randomized controlled trial. *Journal of Bodywork and Movement Therapies*, *27*, 692-697.

Ganesh, H. S., Subramanya, P., Rao, M. R., Vadhiraj, H. S., & Udupa, V. (2022). Impact of yoga therapy in improving perceived stress, depression, and quality of life in elderly population: A randomized controlled trial. *Journal of Applied Consciousness Studies*, 10(1), 62-68.

Ganesh, S., & Harisingh, G. (2019). PSYCHOTHERAPY OF ELDERLY PEOPLE. *Personality in Extreme Conditions and Crisis Situations of Life,* (8), 128-148.

Gour, P., Choudhary, A., Sahoo, K. C., Jirwe, M., Hallgren, M., Diwan, V. K., ...&Diwan, V. (2020). Experience of elderly people regarding the effect of yoga/light exercise on sedentary behavior: a longitudinal qualitative study in Madhya Pradesh, India. *Geriatrics*, *5*(4), 103.

Gupta, P. K., Kumar, M., Kumari, R., & Deo, J. M. (2010). Anulom-Viloma pranayama and anxiety and depression among the aged. *Journal of the Indian Academy of Applied Psychology*, *36*(1), 159-164.

Ho, H. C., Yeung, D. Y., & Kwok, S. Y. (2014). Development and evaluation of the positive psychology intervention for older adults. *The Journal of Positive Psychology*, 9(3), 187-197.

Hodge, D. R., & Bonifas, R. P. (2010). Using spiritually modified cognitive behavioral therapy to help clients wrestling with depression: A promising intervention for some older adults. *Journal of Religion & Spirituality in Social Work: Social Thought*, 29(3), 185-206.

Janhsen, A., Golla, H., Mantell, P., &Woopen, C. (2021). Transforming spirituality through aging: coping and distress in the search for meaning in very old age. *Journal of Religion, Spirituality & Aging*, *33*(1), 38-53.

Jardim, V. C. F. D. S., Vasconcelos, E. M. R. D., Vasconcelos, C. M. R. D., Alves, F. A. P., Rocha, K. A. D. A., & Medeiros, E. G. M. S. D. (2020). Contributions of art therapy to promoting the health and quality of life of older adults. *Revista Brasileira de Geriatria e Gerontologia*, *23*.

Karimi, N., Mousavi, S., & Falah-Neudehi, M. (2021). The Prediction of Psychological Well-being Based on the Components of Religious Attitude and Self-esteem among the Elderly in Ahvaz, Iran. *Journal of Pizhûhishdardînvasalâmat*, *6*(4), 88-100.

Kashaniyan, F., & Khodabakhshi, K. A. (2015). Effectiveness of positive psychology group interventions on meaning of life and life satisfaction among older adults. *Elderly Health Journal,* 1(2), 68-74.

Kim, S. K. (2013). A randomized, controlled study of the effects of art therapy on older Korean-Americans' healthy aging. *The Arts in Psychotherapy*, 40(1), 158-164.

Kimoto, R., Kambayashi, I., Akizuki, A., Tsukamoto, M., Fukushi, M., &Shionoya, A. (2021). Effect of yoga on autonomic nervous system function in females. *The Journal of Physical Fitness and Sports Medicine*, 10(1), 25-32.

Krause, N., & Hayward, R. D. (2014). Religion, finding interests in life, and change in self-esteem during late life. *Research on aging*, 36(3), 364-381.

Kumar, N., & Singh, U. (2021). Yoga for improving mood and cognitive functions–A brief review. *Yoga Mimamsa*, 53(1).

Lam, A. H. Y., Leung, S. F., Lin, J. J., &Chien, W. T. (2020). The effectiveness of a mindfulness-based psychoeducation programme for emotional regulation in individuals with schizophrenia spectrum

disorders: a pilot randomised controlled trial. *Neuropsychiatric Disease and Treatment*, 729-747.

Lawrence, R. M., Head, J., Christodoulou, G., Andonovska, B., Karamat, S., Duggal, A., &Eagger, S. (2007). Clinicians' attitudes to spirituality in old age psychiatry. *International Psychogeriatrics*, 19(5), 962-973.

Linardakis, M., Papadaki, A., Smpokos, E., Sarri, K., Vozikaki, M., &Philalithis, A. (2015). Are religiosity and prayer use related with multiple behavioural risk factors for chronic diseases in European adults aged 50+ years?. *Public health*, 129(5), 436-443.

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *23*(6), 695-706.

Mahendran, R., Gandhi, M., Moorakonda, R. B., Wong, J., Kanchi, M. M., Fam, J., ...& Kua, E. H. (2018). Art therapy is associated with sustained improvement in cognitive function in the elderly with mild neurocognitive disorder: findings from a pilot randomized controlled trial for art therapy and music reminiscence activity versus usual care. *Trials*, *19*, 1-10.

Mahwati, Y. (2017). The relationship between spirituality and depression among the elderly in Indonesia. *Makara Journal of Health Research*, *21*(1), 6.

Manjunath, N. K., &Telles, S. (2005). Influence of Yoga & Ayurveda on self-rated sleep in a geriatric population. *Indian Journal of Medical Research*, *121*(5), 683.

Martinec, R. (2018). Complementary and art-therapies as a supportive approach in gerontology and geriatrics. *Gerontology & geriatrics studies*, *3*(1), 1-4.

McFarland, M. J. (2009). Religion and mental health among older adults: Do the effects of religious involvement vary by gender? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *65*(5), 621–630.

McNiff, S. (1992). *Art as medicine: Creating a therapy of the imagination*. Shambhala Publications.

Mirzaei, T., Tavakoli, O., &Ravari, A. (2022). The effect of yoga on musculoskeletal pain in elderly females: A clinical trial. *Iranian Rehabilitation Journal*, *20*, 55-64.

Mishra, K., Misra, N., &Chaube, N. (2021). Expressive arts therapy for subjective happiness and loneliness feelings in institutionalized elderly women: A pilot study. *Asia Pacific Journal of Counselling and Psychotherapy*, *12*(1), 38-57.

Moberg, D. O. (2005). Research in spirituality, religion, and aging. *Journal of gerontological social work*, *45*(1-2), 11-40.

Moody, H. R. (2005). From successful aging to conscious aging. *Successful aging through the life span: Intergenerational issues in health*, 55-68.

Mooventhan, A., &Nivethitha, L. (2017). Evidence based effects of yoga practice on various health related problems of elderly people: A review. *Journal of bodywork and movement therapies*, 21(4), 1028-1032.

Morton, K. R., Lee, J. W., & Martin, L. R. (2017). Pathways from religion to health: Mediation by psychosocial and lifestyle mechanisms. *Psychology of Religion and Spirituality*, 9(1), 106– 117.

Mukherjee, S. B. (2016). Spirituality and Religion: Elderly's Perception and Understanding. *Indian Journal of Gerontology*, 30(3).

Munawar, K., & Tariq, O. (2018). Exploring relationship between spiritual intelligence, religiosity and life satisfaction among elderly Pakistani Muslims. *Journal of religion and health*, 57, 781-795.

Nan, J. K. M., Pang, K. S. Y., Lam, K. K. F., Szeto, M. M. L., Sin, S. F. Y., & So, C. S. C. (2018). An expressive-arts-based life-death education program for the elderly: A qualitative study. *Death Studies*.

Naz, M. A., Shazia, A., & Khalid, A. (2021). Role of mindfulness, religious coping and serenity in institutionalized and non-institutionalized elderly. *Journal of spirituality in mental health*, 23(3), 278-294.

Newland, P., & Bettencourt, B. A. (2020). Effectiveness of mindfulness-based art therapy for symptoms of anxiety, depression, and fatigue : A systematic review and meta-analysis. *Complementary Therapies in Clinical Practice*, 41, 101246.

Nguyen, Q. H., Michal, V., Julia, K., Elena, R., & Tatyana, C. (2020). Religion, culture and Vietnam seen from a cultural-religious point of view. *European Journal of Science and Theology*, 4, 137-49.

OECD/WHO (2020), "Ageing", in *Health at a Glance: Asia/ Pacific 2020: Measuring Progress Towards Universal Health Coverage*, OECD Publishing, Paris, https://doi.org/ 10.1787/1ad1c42a-en.

Papadopoulos, D. (2020). The role of well-being, spirituality, and religiosity for successful aging in late life: A brief review. *Advances in aging research*, *9*(02), 23.

Partridge, E. E. (2022). Art therapy and older adults. In M. Rastogi, R. P. Feldwisch, M. Pate & J. Scarce (Eds.), *Foundations of Art Therapy* (pp. 379-412). Academic Press. https://doi.org/ 10.1016/B978-0-12-824308-4.00012-0

Permana, B., Lindayani, L., Hendra, A., &Juniarni, L. (2020). The Effect of yoga exercise on reducing blood pressure among elderly with hypertension: A systematic review.

Phelan, E. A., & Larson, E. B. (2002). "Successful aging"–where next?. *Journal of the American Geriatrics Society*, *50*(7).

Pimple R. (2012). Effectiveness of music therapy on level of depression among elderly people. *Sinhgad e Journal of Nursing*, *2*(2), 23-6.

Rad, M. N., Ghodsbin, F., &Rambod, M. (2020). Teaching Positive Thinking and Praying on Life Satisfaction in Elderly Women with Depression and Anxiety. *Iranian Journal of Positive Psychology*, *6*(3), 126-135.

Ramanathan, M., Bhavanani, A. B., &Trakroo, M. (2017). Effect of a 12-week yoga therapy program on mental health status in elderly women inmates of a hospice. *International journal of yoga*, *10*(1), 24.

Ramírez, E., Ortega, A. R., Chamorro, A., &Colmenero, J. M. (2014). A program of positive intervention in the elderly: Memories, gratitude and forgiveness. *Aging & mental health*, *18*(4), 463-470.

Rawtaer, I., Mahendran, R., Chan, H. Y., Lei, F., &Kua, E. H. (2018). A nonpharmacological approach to improve sleep quality in older adults. *Asia Pacific Psychiatry*, *10*(2), e12301.

Rodrigue, J. R., Baz, M. A., Widows, M. R., & Ehlers, S. L. (2005). A randomized evaluation of quality of life therapy with patients awaiting lung transplantation. *American Journal of Transplantation*, *5*(10), 2425-2432.

Sanchez-Lara, E., Lozano-Ruiz, A., Perez-Garcia, M., &Caracuel, A. (2022). Efficacy of mindfulness-based interventions in cognitive function in the elderly people: a systematic review and meta-analysis. *Aging & Mental Health*, *26*(9), 1699-1709.

Santaella, D. F., Devesa, C. R., Rojo, M. R., Amato, M. B., Drager, L. F., Casali, K. R., ...&Lorenzi-Filho, G. (2011). Yoga respiratory training improves respiratory function and cardiac sympathovagal balance in elderly subjects: a randomised controlled trial. *BMJ open*, *1*(1).

Sathyanarayanan, G., Vengadavaradan, A., &Bharadwaj, B. (2019). Role of yoga and mindfulness in severe mental illnesses: A narrative review. *International journal of yoga*, *12*(1), 3.

Schieman, S., Bierman, A., & Ellison, C. G. (2013). Religion and mental health. In C. S. Aneshensel, J. C. Phelan, & A. Bierman

(Eds.), *Handbook of the sociology of mental health* (pp. 457– 478). Springer.

Seligman, M. E., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American psychologist*, *61*(8), 774.

Sharifi, J., Shahbazi, M., &Godarzian, M. (2015). Effectiveness of hope therapy on life satisfaction and vitality of elderly women. *Beyhagh*, *20*(1), 11-21.

Sharma, S., & Singh, K. (2019). Religion and well-being: The mediating role of positive virtues. *Journal of religion and health*, *58*, 119-131.

Shukla, P. (2015). Spirituality and positive view of ageing in modern society. *Indian Journal of Positive Psychology*, *6*(1), 122.

Singh, K., Junnarkar, M., Singh, D., Suchday, S., Mitra, S., &Dayal, P. (2020). Associations between religious/spiritual practices and well-being in Indian elderly rural women. *Journal of religion and health*, *59*, 2753-2774.

Sivaramakrishnan, D., Fitzsimons, C., Kelly, P., Ludwig, K., Mutrie, N., Saunders, D. H., & Baker, G. (2019). The effects of yoga compared to active and inactive controls on physical function and health related quality of life in older adults-systematic review and meta-analysis of randomised controlled trials. *International Journal of Behavioral Nutrition and Physical Activity*, *16*(1), 1-22.

Spanaki, C., Rodopaios, N. E., Koulouri, A., Pliakas, T., Papadopoulou, S. K., Vasara, E., ...&Kafatos, A. (2021). The christian orthodox church fasting diet is associated with lower levels of depression and anxiety and a better cognitive performance in middle life. *Nutrients*, *13*(2), 627.

Stewart, J. M., Auais, M., Belanger, E., & Phillips, S. P. (2019). Comparison of self-rated and objective successful ageing in an international cohort. *Ageing &Society*, *39*(7), 1317-1334.

Stewart, T. L., Chipperfield, J. G., Perry, R. P., & Weiner, B. (2012). Attributing illness to 'old age:' consequences of a self-directed

stereotype for health and mortality. *Psychology & health*, *27*(8), 881-897.

Subica, A. M., & Yamada, A. M. (2018). Development of a spirituality-infused cognitive behavioral intervention for individuals with serious mental illnesses. *Psychiatric Rehabilitation Journal*, *41*(1), 8.

Taghvaienia, A., &Alamdari, N. (2020). Effect of positive psychotherapy on psychological well-being, happiness, life expectancy and depression among retired teachers with depression: a randomized controlled trial. *Community mental health journal*, *56*, 229-237.

Tavakoli, G., RezaiDehnavi, S., &Montajabian, Z. (2021). The Effectiveness of positive psychotherapy on the vitality in the elderly. *Aging Psychology*, *6*(4), 308-299.

Umadevi P, Ramachandra, Varambally S, Philip M, Gangadhar BN. (2013). Effect of yoga therapy on anxiety and depressive symptoms and quality-of-life among caregivers of in-patients with neurological disorders at a tertiary care center in India: A randomized controlled trial. *Indian Journal of Psychiatry*, *55*(3), S385–S389.

Wald, J. (2003). Clinical art therapy with older adults. *Handbook of art therapy*, 294-307.

Wang, Y. Y., Chang, H. Y., & Lin, C. Y. (2014). Systematic review of yoga for depression and quality of sleep in the elderly. *Hu Li ZaZhi*, *61*(1), 85.

Wheaton, B. (1985). Models for the stress-buffering functions of coping resources. *Journal of Health and Social Behavior*, *26*(4), 352–364.

Indian Journal of Gerontology
2024, Vol. 38, No. 4, pp. 509-532
ISSN : 0971-4189, UGC No. – List B, Science –121

Emotional Regulation during Old Age-Challenges and Strategies : An Overview

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ABSTRACT

Emotional regulation improves the ability to control emotions internally or externally by changing emotions, situations, or both. Considering the situation and controlling the response changes a person's cognitive state. An older adult experiencing degenerative changes in their physical, psychological, cognitive, emotional, motivational, social, and financial health generally tries to handle emotional episodes. However, psychosocial changes, traumatic events, cultural factors, and unconventional societal perspectives hinder older people's ability to regulate their emotions. This threatens their health and life and makes emotion regulation necessary. Older adults' difficulties in regulating their emotions can be addressed by deploying Indigenous strategies by i) identifying factors influencing emotional well-being and effective regulations in old age, ii)

devising strategies to regulate and empower emotional regulations, and iii) internal composure strategies.

Keywords: Emotional reaction, Emotional control, Emotional regulation, Old age, Cultural context, Dysregulation, Bhav, Rasa, Internal composure.

Regulation refers to the mechanisms by which people control their emotions, including how they perceive and express them. Emotional management is essential for sustaining good mental health and includes a wide range of approaches and skills. Emotional regulation is the development of abilities for efficiently managing the processes that cause emotions and controlling their expressions. Internal efforts or external approaches can accomplish this by adjusting the situation or reactions in a socially acceptable way. It entails altering one's mental state by assessing the situation and responding accordingly. Acquiring and implementing these techniques during the early stages of life may be easier if they are learnt and practiced effectively. The aged will inevitably experience severe degenerative changes in a variety of areas of their lives, including physical, psychological, cognitive, emotional, motivational, social, and economic.

The elderly's wide life experiences, optimistic outlook on life, and exposure to a variety of events enable them to effectively manage emotional reactions to pressures. However, changes in the psychosocial environment, traumatic events, cultural influences, and unusual societal views frequently test them and hurt emotional regulation. The employment of emotional regulation strategies is crucial in addressing the elderly's well-being, lowering negative consequences while boosting well-being and quality of life.

Emotional responses are collaborative and composite results of a person's physiological, psychological, and experiential states. In traditional Indian thought, emotion is viewed as an aesthetic (Shweder 1993; Misra 2004) and conceptualised as Rasa. It can be interpreted as a complete picture of human conditions, with emotional practices

evaluated in relation to the human condition and its challenges (Paranjpe 2009). According to recent studies, emotions are extremely useful in directing our attention to the surroundings, aiding decision-making, promoting quick behavioural reactions, and improving communication and engagement. However, they can also be harmful. Indeed, emotions determine whether one's life is privileged or impoverished, and they play an important part in the formation or breakdown of interpersonal relationships. People who have happy feelings live longer lives (Danner *et al.*, 2001; Mather & Ponzio, 2016). Researchers discovered that pleasant feelings grow with age (Charles *et al.*, 2001; Stone *et al.,* 2010).

Factors influencing emotional well-being and ER in old age: It is widely accepted that each culture has its unique set of life patterns, styles of expression, interaction, and emotion management methods. Despite psychosocial, environmental, technological, and global changes, the majority of Indians still believe in traditional lifestyles, find them meaningful, and actively support them. This is a nice development worth considering. According to Indian culture, everyone has their tasks and responsibilities, which are further defined at each step. The first two stages cover education, marriage, and family obligations. Manu Smriti suggests that in the final two stages (Vanprasth and Sanyas), one should begin to disengage from worldly activities and prepare for the final renunciation of everything in order to lead an ascetic life, ready to give up his physical body (see Ramamurti & Jamuna, 2010; Tiwari & Pandey, 2013). Manu Smriti explains these stages as follows: "When a man notices wrinkles on his body, white hair on his head, and his grandchildren, he should retreat to the forest." One can easily attain ER in this stage by refraining from intervening in their children's lives unless essential. Routine life concerns in retirement can create emotional distress among the elderly (Ramamurti & Jamuna, 2010). It also proposes that the elderly continue to indulge in self-study. *Svadhyaye nityayuktah syad danto maitrah samahitah; Datta nityam anadata sarvabhutanukampakah.* Such modifications may help

regulate emotions and preserve cognitive and emotional ageing. As we age, structural and functional changes in the central nervous system (brain), cardiovascular system, and neuroendocrine system all have an impact on our emotional state. According to research, older adults prefer positive information over negative material across a variety of cognitive functions, including attention, working memory, autobiographical memory, and decision-making (Carstensen 2006; Reed *et al.* 2014; Samanez-Larkin 2015).

According to findings, the amygdala and prefrontal cortex are less activated until early adulthood, while prefrontal region activity increases and medial and temporal area activity declines with age (Davis *et al.,* 2008). Furthermore, as one gets older, decreasing heart rate reactivity generally implies an age-related decrease in heart-related variability (HRV), which can become a risk factor in later life. Imagination or actual risk perception frequently affects the hypothalamic-pituitary-adrenal (HPA) axis, which causes cortisol to be released. Dysregulation of the HPA axis causes the secretion of glucocorticoids (GCs), resulting in chronic stress and unfavourable health outcomes such as an increased risk of mood, anxiety, and stress-related illnesses (Hammen, 2005; Djernes, 2006; Vreeburg, 2010). Age-related reductions in amygdala function result in more positive emotional experiences and manifestations (Cacioppo *et al.,* 2011). Researchers hypothesise that age-related brain aberrations cause variation in emotional information processing. Examining diverse emotional expressions reveals lower amygdala activity (Gunning-Dixon *et al.,* 2003; Mather, 2004; Tessitore *et al.,* 2005). However, valence data show that cognitive decline and neuronal atrophy do not account for many age-related changes in activation. Instead, as we age, brain activation reduces in reaction to negative emotional input but not in response to good information (Mather *et al.,* 2004; Samanez-Larkin *et al.,* 2007; Gutchess, Kensinger, & Schacter, 2010; Samanez-Larkin & Carstensen, 2011).

Other changes produced by physiological and anatomical degeneration, sensory deterioration, and perceptual and motor ability

impairment may all have an effect on emotions, their expression, and control. However, research on older persons has been limited in this field. Despite their extensive knowledge and motivated efforts, a recent symposium explored how cognitive and physical weaknesses may impair emotion regulation in older persons (English, 2023). According to a review, older persons utilise more adaptive emotion regulation methods and have less regulatory issues than younger adults, although maladaptive strategies can cause psychiatric distress (Sardella *et al.,* 2022).

Emotional issues in old age : Despite difficulties, many elderly persons maintain their emotional well-being (Grühn *et al.,* 2007). Thus, normal ageing has no negative impact on emotional well-being; but, anatomical changes in the frontal lobe might sometimes make it difficult to regulate negative emotions (Mather and Ponzio, 2016). Certain degenerative anatomical changes occur, as do contextual differences that affect emotional functioning. As a result, emotional regulation is required to identify, feel, moderate, and adaptively express emotions. The necessary strategies must address and appropriately adjust the physiological, cognitive, and behavioural domains. Various problems frequently develop, leaving the elderly unable to manage their emotions.

In Indian culture, older persons are valued and cared for by their families. However, the transition to nuclear families and urbanisation has changed these patterns. Many elderly persons suffer from neglect or a lack of familial support as they age, which can lead to undesirable sentiments such as loneliness and isolation. They also cease sharing their emotions, which might emerge as angry outbursts, bad moods, or a lack of interest.

Financial dependency : Over 50% of elderly individuals in India rely on their offspring for financial support due to inadequate savings and pension plans, according to a report (GOI, 2021). This dependency can cause tension, anxiety, and feelings of helplessness, especially if financial support is sporadic.

Quality healthcare facilities become increasingly important as people age. However, the availability, accessibility, and cost of healthcare facilities for the elderly are limited. Limited geriatric care availability and high medical expenses might exacerbate health problems, causing severe emotional discomfort.

Urbanisation and migration of younger family members have resulted in social isolation among elderly persons living in rural or urban areas. This social isolation is exacerbated by transportation limitations, and the absence of community engagement possibilities causes mental anguish.

Chronic conditions including diabetes, hypertension, and arthritis can negatively impact the well-being of older persons.

Bereavement and loss : Losing a spouse or loved one is a typical problem in older age. Such losses frequently distress elderly persons, leaving them unable to cope. This resulted in extended mourning and depression among the elderly.

ER strategies in old age : In the early stages of development, ER strategies seek to foster the ability to control impulses for self-management, self-awareness, and appropriate scenario handling. During the later phases of life, particularly after reaching the age of 60, an individual has already developed the requisite emotional maturity and typically responds constructively to emotional obstacles. However, the aforementioned trauma, combined with physical, psychological, emotional, cognitive, and/or environmental problems, can impair their maturity, demanding intervention. This essay focuses and reflects on issues of emotional regulation (ER) in old age. It outlines: i) the factors that influence emotional well-being and affective regulation in old age; ii) tactics for regulating and empowering emotional and affective regulation; and iii) strategies for preserving internal serenity.

The Indian Worldview : ER approaches vary greatly and are based on human interactions, emotional values, cultural belief systems, and personal mastery. This article will also look at ancient cultural

traditions (especially Indian) that teach self-mastery and have received worldwide acclaim, such as yoga. This is a commonly used technique for emotional regulation. Yoga, whether Ashtanga, Kundalini, Vinyasa, Hath, Iyengar, or any other style of activity, represents one of the most widespread and well-known ER practices for regulating emotions and preserving physical, psychological, and spiritual well-being. Most yogic practices emphasise self-control, commitment, and dedication to executing chores as they arise, without regard for expectations. Many ways are available in Indian culture to help individuals, even the elderly, remain emotionally stable and balanced. Indian living practices can help you maintain your mental and emotional well-being as you get older.

The traditional Indian system clearly defines major actions at different periods of life; it also encourages people to develop a sense of detachment and become more observant. To become an observer, the individual must develop himself and remain engaged throughout his life. Emotional functioning in old age: Interestingly, as one gets older, one gains experience, and thus his or her capacity to manage emotions improves. According to research, the elderly improve their ability to deal with negative emotional situations and typically exhibit a "positivity effect" in attention and memory (Mather & Carstensen, 2005; Charles & Piazza, 2009); they also recall positive information better than negative information (Mather & Carstensen, 2003; Mather & Knight, 2005). Several research shows that melancholy and anger follow different patterns throughout adulthood (Kunzmann *et al.*, 2014). It is worth noting that the elderly are more upset after hearing or seeing terrible news than their younger counterparts (based on the author's own experience). According to research, older persons report less anger but equal or more melancholy than younger adults (Tsai *et al.*, 2000; Labouvie-Vief *et al.*, 2003; Kunzmann and Grühn, 2005; Charles and Carstensen, 2008). According to studies, dread increases with age, while disdain decreases (Kunzmann & Richter, 2009; Teachman & Gordon, 2009). Furthermore, the level of positive emotions in older persons appears to fluctuate due to

degradation in their bio-psycho-social-economic and environmental aspects of life.

People in an emotional state tend to react based on their senses, which can be harmful both individually and in society. The Indian way of life prioritises acquiring control over the senses via practice. In scriptures, the verse is aptly expressed "*Sahsa Viddheet na Kriyam, Avivek Paramapadam Padh. Vrinute hi Vimrishkarinam, Gunlubdha Swaymeva Sampdah*. [Kiratarjuneeyam 2.30] One should not act in haste without assessing the aftereffects. Non-prudence is the seat of the greatest disasters. By choosing the virtue of good judgment (wealth) itself, it comes to those who think and act with prudence. *Dhyaayato vishayaanh pumsah sangasteshhu-pajaayate | Sangaath samjaayate kaamah kaamaath krodho abhijaayate* [Shreemadbhagwatgeeta 2:62] When a person dwells on sense objects, an inclination towards them is generated. This inclination develops into desire, and desire gives rise to anger. Individuals need to regulate their emotions first and to regulate them, one may adopt the following way, as explained in Shrimad Bhagwat Geeta: *Raga-Dvesa-Vimuktais tu, Visayan Indriyais caran || Atma-vashyair Vidheyatma, Prasadam Adhigachchhati* ||2:64|| The verse very nicely elaborates that an individual who can control his senses by practicing the regulatory principles to detach from the material world and become free from feelings of attachment and jealousy may obtain freedom and receive the blessings of the almighty. It is an important aspect, and to maintain happiness, one needs to practice control of the senses.

A state of transcendence can help one become an observer, which is necessary to maintain equanimity and a peaceful mind. Previous verses of the scripture clearly explain that everything in this material world is mortal, only the self (soul) is immortal, and one should not feel sad or happy for transient materials [2:14].

In general, poor emotion regulation practices lead to attachment, frustration, anger, memory loss, and cognitive issues, which eventually lead to :

It is clearly stated that krodhâd bhavati sammohah sammohât smriti-vibhramah smriti-bhranúhâd buddhi-nâúho buddhi-nâúhât pranaœhyati. [2.63] Anger clouds judgement confuses memory, creates illusions, and corrupts the intellect, ultimately leading to ruin.

Sthitapragya is the idea of a perfect person [Shrimad Bhagwat Geeta 2.74]. This state of mind could be attained by practicing yoga. Yoga, in its various forms, is the remedy that suits the intrinsic nature of the person. It's not non-action but wise action. Regulating the mind helps regulate the self. Regulating oneself largely entails ER, and living life wisely is the best way to go. Thus, self-understanding and regulation are the keys. ER is part of self-regulation. The yoga sutra also tells the same story: yoga regulates mental functions. MUDITA (feeling inside happiness), UPEKSHA (feeling of negligence), and MAITRI (feeling of friendliness) are three emotional responses of people in different situations. There is no denial of the physical world. To achieve worldly happiness, one must satisfy their desires in the physical world. However, once one fulfils a desire, another typically arises, which, if left unfulfilled, can lead to distress, symptoms, or even pathology. Self-regulation aids in gaining a better understanding of the situation and develops mental calmness. Whatever one expects from others, they must first cultivate it within themselves. We must train the self to cultivate the peace of mind that accompanies internal happiness. When a person begins to understand who am I, the process of self-perception begins naturally. In the course of self-perception, Veetragita (detached or deconditioned) comes automatically; Veetragita develops the ability to work selflessly and helps regulate the emotion perfectly. In later stages of life, self-perception or self-realization helps in managing the symptoms of stress, anxiety, and depression.

Experience and affective regulations : Early theories of emotion generally focused on children, adolescents, and adults. People assumed that the elderly, with their life experience and knowledge, often maintain positive emotions and thus don't require ER techniques. However, positive and negative affect-related

comparative studies have shown that the number of elderly with subdermal depression (feeling sad, blue, or depressed) within the past 30 days was more limited than that of younger adults (Kobau *et al.*, 2004). Another study revealed that, in comparison to young adults, older adults generally preserve positive emotional states for a longer duration and experience comparatively fewer negative emotions (Carstensen *et al.*, 2000). Further, in general, older adults show satisfaction (Myers & Diener, 1995). They also reveal lower emotional reactivity to interpersonal tensions if they are able to avoid arguments (Charles *et al.*, 2009). They also can recover from adversity more quickly and are less likely to respond to verbal slights with anger (Charles & Carstensen, 2008). Looking at their ability to handle emotionally charged situations in a better way makes them more effective problem-solvers than the younger generation. Due to their experience, they apply flexible problem-solving methods and possess superior modifying strategies to improve the situation (Blanchard-Fields *et al.*, 1997; Blanchard-Fields *et al.*, 2004; Blanchard-Fields, 2007).

Some longitudinal studies also observed similar findings. Charles *et al.* (2003) reported an increase in positive affect and a decrease in negative affect with advancing age, while Carstensen *et al.* (2011) found that older adults have more positive emotional experiences and higher emotional stability due to a variety of emotional experiences. These findings indicate that old age has better emotional regulation. Numerous explanations exist for the positive emotions experienced by older adults. All over the world, including India, a significant proportion of the elderly suffer from depression. These may be biological or pathological, but most are emotional or stress-related. These reasons are variable, i.e., feelings of loneliness due to the demise of a spouse, a significant reduction in the number of relatives and friends, restricted social circles due to retirement, migration (shifting from one's place to other residential places), reduced income or financial dependency, shifting of children, feeling of a non-significant contribution to the family or society, etc. Environmental factors

significantly disrupt an individual's emotional and psychological health, necessitating an increasing number of empirical investigations in this area.

Strategies for regulating emotions : Emotion Regulation (ER) is a developing field that not only explains how individuals can acceptably express their feelings, but also aids in maintaining health, calmness, and composure. However, the field has primarily focused on the developmental stages of life, specifically biological maturation. Work in the field for degenerative stages (old age) is meagre. One of the important findings is that affective well-being does not deteriorate during most of the adult lifespan (Charles and Carstensen, 2008; Isaacowitz and Choi, 2011). We provide some relevant Western and Indian strategic theories and techniques below to enhance emotion regulation in old age.

The Socioemotional Selective Theory (SST) (Carstensen, 2006; Carstensen *et al.*, 2003) : This theory suggests that setting planned future goals is crucial during old age. As growing age is associated with the end of life and limited time, the elderly should prioritize social and emotional goals for a better livelihood, well-being, and health, as well as proper resource utilization. As we age, we often develop an awareness of our limited future, leading to a tendency for older adults to become more selective in pursuing their goals. Extensive data supports SST's primary assumptions, indicating that older adults exhibit greater selectivity in choosing social companions and derive more emotional satisfaction from their social contacts compared to younger individuals (Carstensen *et al.*, 1999; Fingerman & Charles, 2010).

According to Kunzmann *et al.* (2014), this selective attitude helps the elderly better manage and regulate their emotions as they get older (Fredrickson & Carstensen, 1990; Fung *et al.*, 1999); attend (Isaacowitz *et al.*, 2006a, 2006b; Mather & Carstensen, 2003); and remember (Carstensen *et al.*, 2003) positive emotional information.

Selection, Optimisation, and Compensation with ER (SOC-ER): The SOC model essentially necessitates the demand for selecting goals based on available resources to boost success and compensate for age-related deterioration (Baltes & Baltes, 1990; Baltes & Carstensen, 2003). This theory primarily promotes the selection of activities that enhance functioning, with the aim of maintaining a healthy lifestyle and sustaining physical functioning.

According to Labouvie-Vief and Medler's (2002) theory of dynamic integration for emotion regulation, our understanding of ourselves and our surroundings consists of both emotional (subjective and tangible) and cognitive (objective and intangible) systems. In adulthood, the emotional and cognitive systems become more integrated, and the ultimate amalgamation occurs in middle age. Cognitive-affective complexity is one indicator of successful regulation.

Strength and vulnerability integration (SAVI): It acknowledges that emotional well-being depends upon age-related differences in experience. It says that longstanding life experience improves one's cognitive schema and ability to handle emotions in a better way by applying various controlling strategies. This experience helps the older adults to work proactively to avoid taxing circumstances and/or enable them to make quick decisions to resolve negative emotions. At the same time, limited biological or physiological plasticity threatens their well-being in the context of high or sustained negative arousal (Charles, 2010). According to the selection, optimization, and compensation model, older adults can only observe ER gains with age if they adapt their regulatory strategies to their evolving cognitive and social resources (Opitz *et al.* 2012). Based on their strong knowledge base and experiences, older adults learn how to handle their emotions with the help of conscious and unconscious efforts.

Interventions aimed at promoting adaptive strategies such as cognitive reappraisal, self-compassion, and mindfulness can be

beneficial in supporting emotional regulation during old age (Birditt *et al.*, 2020; English, 2023; Sardella *et al.*, 2022).

To reduce distress and develop positive emotions, some culture-specific practices in India may be beneficial for the elderly:

Detachment practices along with participation in social and cultural activities : Participating in cultural and religious activities helps an individual to provide a sense of community and spiritual comfort. One needs to adopt such activities and participate actively in festivals, religious gatherings, and rituals that can offer emotional solace and reduce feelings of isolation. One also needs to start practicing detachment after coming into his/her middle adulthood. For this, we need to revisit Vanprasth. The author developed Revisiting Vanprasth: A Road to Healthy Aging, an online presentation in October 2018, based on his observations and ancient Indian literature. The author prepared it by considering Ashram Vyavstha (life stages: Brahmacharya, Grihastha, Vanaprastha, and Sanyas) and the principle of detachment (nisprihta). Srimad Bhagwad Geeta provides a clear explanation: Karmnevaadhikraste, Ma Faleshu Kadachan; Makarmfalheturbhuma, Te Sangiastvakarmani [2.47]. Your right is to work only, but never think about the fruit thereof. Be not instrumental in making your actions bear fruit, nor let your attachment be to inaction. This is a frequently cited statement that leads to successful emotion regulation. The author also did case studies on older adults, which are worth mentioning herewith.

Case 1: An 82-year-old retired male with an amputated limb and a history of hypertension and kidney disease lives in a joint household with a son and daughter-in-law. He used to perform his routine activities on his own. During an interview, we discovered that he holds a firm faith in God, coexists with his entire family, actively engages in his daily activities (ADL) and instrumental activities (IADL), yet maintains a detached perspective on everything.

Case 2 : A 78-year-old widow and housewife residing with her son and daughter-in-law said that she is the witness to many ups and downs in life. She lost her spouse at the age of 48, with the responsibility of five small children, and had a fractured right thigh at the age of 18. She struggled with depressive symptoms for nearly two years, but she succeeded in defeating all adversity by devoting her life to the almighty. She adopted a neutral stance and progressive

Because nothing lasts forever and everything happens for a reason, it's important to maintain a calm and collected demeanour in the face of adversity. The early practices eventually become habits, which aid in the development of a strong attitude.

Meditative practices : To the best of the author's knowledge, there are few meditative practices that can be used in scientific discussions, teaching, and training. These practices include breath awareness, visualisation, chanting, movement meditation, Kundalini Jagriti, and others, and they all help to manage a variety of problems and regulate emotions. Proper documentation and practice are necessary for the use of such practices.

Internal composure: strategies and psycho-spiritual maturation: Internal composure is the need of the hour to develop a sense of cohesiveness within oneself as well as societal harmony and integrity. In today's world, we witness chaos everywhere; individuals are emotionally tense, and the burden also falls on the elderly. Knowing oneself and searching for the meaning of life can lead to internal composure. Knowing oneself requires taking many steps, as it is not an easy task. Knowing ourselves frees us from worldly life, allowing us to develop a better understanding of ourselves and others. Such an exercise may help in searching for meaning and purpose in life. How could it be developed? What are the strategies to develop internal composure? Where will it lead? With these questions in mind, the author has developed a model to develop internal composure among the elderly. Dr. Jared Kass's latest book, A Person-Centered

Approach to Psychospiritual Maturity: Mentoring Psychological Resilience and Inclusive Community in Higher Education (2017), explains the know-yourself curriculum model that forms the basis of the concept.

The author, with consent and age-appropriate adjustments, established a concept and proposed its application to maintain or enhance the internal tranquillity of senior people. To do this, the author has adopted a 7-step approach to develop internal composure, as detailed below:

- Identify problems in various areas, including psychosocial, emotional, economic, environmental, health, religious, and spiritual.
- Identify problem areas and develop intervention themes based on available information.
- The process involves identifying behavioural anomalies, establishing objectives, and implementing strategic interventions. Examples of behavioural anomalies include a person's attitude towards life, level of satisfaction, self-confidence, and coping strategies during stressful situations.
- Set behavioural change goals by categorising them as psychosocial and emotional, environmental, health, and religious/spiritual.
- To promote psycho-spiritual maturity in older adults, it's important to assess their religious, sociocultural, educational, and personal identities. After identifying stressors and emotional dysregulation in cognitive responses, conflict resolution strategies should be developed.
- Encourage individuals to engage in self-inquiry and meditate using their methods.
- I am committed to living life to the fullest and cultivating an inclusive worldview.

Concluding remarks : It may be concluded that emotional regulation is necessary for maintaining inner satisfaction and mental

clarity as one gets older. It is imperative to effectively handle stress, anxiety, and depression while comprehending one's emotions. Elderly individuals can enhance their emotional regulation skills by incorporating indigenous techniques that align with their evolving physical, psychosocial, and cognitive capabilities. In India, the implementation of culturally-specific practices such as meditation and detachment has been found to alleviate distress and enhance positive emotions. Self-reflection and contemplation aid senior individuals in managing emotional volatility. Self-compassion, cognitive reappraisal, and mindfulness are effective strategies for regulating emotions. Internal composure may help older adults in managing their emotions. This article has examined the difficulties that older adults encounter when it comes to regulating their emotions. Alas it provided an account of several effective indigenous strategies that can be used to address these challenges. There is need to identify modalities to align these strategies with other interventions for the elderly in different contexts.

Acknowledgement : We express gratitude to both cases for granting their verbal consent to discuss them anonymously. We appreciate our ancient scriptures for providing us with fresh perspectives on everyday practices as well. We acknowledge the AI assistance to improve the grammar and language of the manuscript.

References

Kuru Alici, N., & Kalanlar, B. (2024). Challenges and Coping Strategies of Older Adults in the Aftermath of Kahramanmaraº Earthquake in Türkiye: A Qualitative Research. *Journal of Applied Gerontology*, *0*(0). https://doi.org/10.1177/07334648241241299

Baltes, M. M., & Carstensen, L. L. (2003). The process of successful aging: Selection, optimization and compensation. In U. M. Staudinger & U. L. Indenberger (Eds.), Understanding Human Development: Dialogues with Lifespan Psychology (pp. 81–104). Dordrecht, Netherlands: Kluwer Academic Publishers.

Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes (Eds.), Successful Aging: Perspectives from the Behavioral Sciences (pp. 1–34). New York: Cambridge University Press. doi:10.1017/CBO9780511665684.003.

Blanchard-Fields, F. (2007). Everyday problem solving and emotion: An adult developmental perspective. Current Directions in Psychological Science, 16 (1), 26–31. doi:10.1111/j.1467-8721.2007.00469.x.

Blanchard-Fields, F., Chen, Y., & Norris, L. (1997). Everyday problem solving across the adult life span: Influence of domain specificity and cognitive appraisal. Psychology and Aging, 12 (4), 684–693. doi:10.1037/0882-7974.12.4.684.

Blanchard-Fields, F., Stein, R., & Watson, T. L. (2004). Age differences in emotion-regulation strategies in handling everyday problems. The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 59B (6), P261–P269. doi:10.1093/geronb/59.6.P261.

Birditt, K. S., Polenick, C. A., Luong, G., Charles, S. T., & Fingerman, K. L. (2020). Daily interpersonal tensions and well-being among older adults: The role of emotion regulation strategies. Psychology and Aging, 35(4), 578–590. https://doi.org/10.1037/pag0000416

Cacioppo, J. T., Berntson, G. G., Bechara, A., Tranel, D., & Hawkley, L. C. (2011). Could an aging brain contribute to subjective wellbeing? The value added by a social neuroscience perspective. In A. Tadorov, S. T. Fiske, & D. Prentice (Eds.), Social neuroscience: Toward understanding the underpinnings of the social mind (pp. 249–262). New York: Oxford University Press.

Carstensen L. L. (2006). The influence of a sense of time on human development. Science (New York, N.Y.), 312 (5782), 1913–1915. https://doi.org/10.1126/science.1127488.

Carstensen, L. L., Fung, H. H., & Charles, S. T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. Motivation and Emotion, 27, 2, 103–123. doi:10.1023/A:1024569803230

Carstensen, L. L., Isaacowitz, D. M., and Charles, S. T. (1999). Taking time seriously: a theory of socioemotional selectivity. Am. Psychol. 54, 165–181. doi: 10.1037/0003-066x.54.3.165.

Carstensen, L. L., Pasupathi, M., Mayr, U., & Nesselroade, J. R. (2000). Emotional experience in everyday life across the adult life span. Journal of Personality and Social Psychology, 79 (4), 644–655. doi:10.1037/0022-3514.79.4.644.

Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershfield, H., Samanez-Larkin, G. R. *et al.* (2011). Emotional experience improves with age: Evidence based on over 10 years of experience sampling. Psychology and Aging, 26 (1), 21–33. doi:10.1037/a0021285.

Charles, S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. Psychological Bulletin, 136 (6), 1068–1091. doi:10.1037/a0021232.

Charles, S. T., & Piazza, J. R. (2009). Age differences in affective well being: Context matters. Social and Personality Psychology Compass, 3(5), 711-724.

Charles, S. T., Carstensen, L. L., & McFall, R. M. (2001). Problem-solving in the nursing home environment: Age and experience differences in emotional reactions and responses. Journal of Clinical Geropsychology, 7(4), 319–330.

Charles, S. T., Mather, M., & Carstensen, L. L. (2003). Aging and emotional memory: The forgettable nature of negative images for older adults. *Journal of Experimental Psychology: General*, 132 (2), 310–324. doi:10.1037/0096-3445.132.2.310.

Charles, S. T., Piazza, J. R., Luong, G., & Almeida, D. M. (2009). Now you see it, now you don't: Age differences in affective

reactivity to social tensions. *Psychology and Aging,* 24 (3), 645–53. doi: 10.1037/ a0016673.

Charles, S.T., Carstensen, L. L. (2008). Unpleasant situations elicit different emotional responses in younger and older adults. *Psychology and Aging*, 23(3),495–504. doi: 10.1037/ a0013284.

Danner, D. D., Snowdon, D. A., & Friesen, W. V. (2001). Positive Emotions in Early Life and Longevity/ : *Findings from the Nun Study*. 80(5), 804–813.

Davis, S. W., Dennis, N. A., Daselaar, S. M., Fleck, M. S., & Cabeza, R. (2008). Que PASA? The posterior-anterior shift in aging. Cerebral cortex (New York, N.Y.: 1991), 18(5), 1201–1209. https://doi.org/10.1093/cercor/bhm155.

Djernes J. K. (2006). Prevalence and predictors of depression in populations of elderly: a review. Acta psychiatrica Scandinavica, 113(5), 372–387. https://doi.org/10.1111/j.1600-0447.2006.00770.x.

English T. (2023). Cognitive aspects of managing stress and unwanted emotion successfully in old age. Innovation in Aging, 2023, Vol. 7, No. S1 DOI: https://doi.org/10.1093/geroni/igad104.0109.

Fingerman K.L. & Susan, T. C. (2010). It Takes Two to Tango: Why Older People Have the Best Relationships. Current Directions in Psychological Science, 19 (3), 172-176 DOI: 10.1177/0963721410370297. http://cdps.sagepub.com.

Fingerman, K. L., and Charles, S. T. (2010). It takes two to tango: why older people have the best relationships. Curr. Dir. Psychol. Sci. 19, 172–176. doi: 10.1177/0963721410370297

Fredrickson, B. L., & Carstensen, L. L. (1990). Choosing social partners: How old age and anticipated endings make us more selective. Psychology and Aging, 5, 335–347.

Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. Motivation and Emotion, 24, 237–258.

Fung, H. H., Carstensen, L. L., & Lutz, A. (1999). The influence of time on social preferences: Implications for life-span development. Psychology and Aging, 14, 595–604.

GOI (2021). Elderly in India. Report. https://mospi.gov.in/sites/default/files/publication_reports/Elderly%20in%20India%202021.pdf

Grühn, D., Scheibe, S., & Baltes, P. B. (2007). Reduced negativity effect in older adults' memory for emotional pictures: The heterogeneity-homogeneity list paradigm. Psychology and Aging, 22(3), 644–649. https://doi.org/10.1037/0882-7974.22.3.644

Gunning-Dixon, F. M., Gur, R. C., Perkins, A. C., Schroeder, L., Turner, T., Turetsky, B. I., Chan, R.M., Loughead, J.W., Alsop, D.C., Maldjian, J., & Gur, R. E. (2003). Age-related differences in brain activation during emotional face processing. Neurobiology of Aging, 24, 285–295. doi:10.1016/S0197-4580(02)00099-4.

Gutchess, A. H., Kensinger, E. A., & Schacter, D. L. (2010). Functional neuroimaging of self-referential encoding with age. Neuropsychologia, 48(1), 2 11–219. doi:10.1016/j.neuropsychologia.2009.09.006.

Hammen C. (2005). Stress and depression. Annual review of clinical psychology, 1, 293–319. https://doi.org/10.1146/annurev.clinpsy.1.102803.143938.

Isaacowitz , D. M. , & Choi , Y. (2011). Looking, feeling, and doing: Are there age diff erences in attention, mood, and behavioral responses to skin cancer information? Health Psychology . doi:10.1037/ a0026666

Isaacowitz, D. M., Wadlinger, H. A., Goren, D., & Wilson, H. R. (2006a). Is there an age-related positivity effect in visual attention? A comparison of two methodologies. Emotion, 6 (3), 511–516. doi:10.1037/1528-3542.6.3.511.

Isaacowitz, D. M., Wadlinger, H. A., Goren, D., & Wilson, H. R. (2006b). Selective preference in visual fixation away from

negative images in old age? An eye-tracking study. Psychology and Aging, 21 (1), 40–48. doi:10.1037/0882-7974.21.1.40.

Kass, J. D. (2017). A person-centered approach to psychospiritual maturation: Mentoring Psychological Resilience and Inclusive Community in Higher Education. Palgrave Macmillan/Springer Nature. https://doi.org/10.1007/978-3-319-57919-1

Kobau, R., Safran, M. A., Zack, M. M., Moriarty, D. G., & Chapman, D. (2004). Sad, blue, or depressed days, health behaviors and health-related quality of life, Behavioral Risk Factor Surveillance System. Health and Quality of Life Outcomes, 40 (2), 1995–2000.

Kunzmann, U., & Grühn, D. (2005). Age differences in emotional reactivity: the sample case of sadness. Psychology and aging, 20(1), 47–59. https://doi.org/10.1037/0882-7974.20.1.47.

Kunzmann, U., & Richter, D. (2009). Emotional reactivity across the adult life span: the cognitive pragmatics make a difference. Psychology and aging, 24(4), 879–889. https://doi.org/10.1037/a0017347.

Kunzmann, U., Kappes, C., & Wrosch, C. (2014). Emotional aging: a discrete emotions perspective. Frontiers in psychology, 5, 380. https://doi.org/10.3389/fpsyg.2014.00380.

Labouvie-Vief, G., & Medler, M. (2002). Affect optimization and affect complexity: Modes and styles of regulation in adulthood. Psychology and Aging, 17, 571-587.

Labouvie-Vief, G., Diehl, M., Jain, E., & Zhang, F. (2007). Six-year change in affect optimization and affect complexity across the adult life span: A further examination. Psychology and Aging, 22(4), 738–751. https://doi.org/10.1037/0882-7974.22.4.738.

Labouvie-Vief, G., Lumley, M. A., Jain, E., & Heinze, H. (2003). Age and gender differences in cardiac reactivity and subjective emotion responses to emotional autobiographical memories. Emotion (Washington, D.C.), 3(2), 115–126. https://doi.org/10.1037/1528-3542.3.2.115.

Mather, M. (2004). Aging and emotional memory. In D. Reisberg & P. Hertel (Eds.), Memory and emotion (pp. 272–307). New York: Oxford University Press.

Mather, M., & Carstensen, L. L. (2003). Aging and attentional biases for emotional faces. Psychological Science, 14 (5), 409–415. doi:10.1111/1467-9280.01455.

Mather, M., & Carstensen, L. L. (2005). Aging and motivated cognition: The positivity effect in attention and memory. Trends in Cognitive Sciences, 9 (10), 4 96–502. doi:10.1016/ j.tics.2005.08.005.

Mather, M., & Knight, M. (2005). Goal-directed memory: The role of cognitive control in older adults' emotional memory. Psychology and Aging, 20 (4), 554–570. doi:10.1037/0882-7974.20.4.554.

Mather, M., & Ponzio, A. (2016). e book. In J. M. Barrett, Lisa Feldman; Lewis, Michael; Haviland-Jones (Ed.), Handbook of Emotions (Fourth). The Guilford Press. www.guilford.com

Mather, M., Canli, T., English, T., Whitfield, S., Wais, P., Ochsner, K. *et al.* (2004). Amygdala responses to emotionally valenced stimuli in older and younger adults. Psychological Science, 15 (4), 259–263. doi:10.1111/j.0956-7976.2004.00662.x.

Misra, G. (2004), 'Emotion in Modern Psychology and Indian Thought', in K. Joshi and M. Cornelissen (Eds.), Consciousness, Science, Society and Yoga, New Delhi: Centre for Studies in Civilizations.

Myers, D. G., & Diener, E. (1995). Who is happy? Psychological Science, 6 (1), 10–19. doi:10.1111/ j.1467-9280.1995.tb00298.x.

Opitz, P. C., Gross, J. J., & Urry, H. L. (2012). Selection, optimization, and compensation in the domain of emotion regulation: applications to adolescence, older age, and major depressive disorder. Soc. Pers. Psychol. Compass 6, 142–155. doi: 10.1111/j.1751-9004.2011.00413.x

Paranjpe, A.C. (2009). In Defence of an Indian Approach to the Psychology of Emotion, Psychological Studies, 54,1, 1–22.

Ramamurti, P. V., & Jamuna, D. (2010b). Geropsychology in India. In G. Misra (Ed.), Psychology in India Volume 3: Clinical and health psychology (pp. 185–253). New Delhi, India: Pearson.

Reed, A. E., Chan, L., & Mikels, J. A. (2014). Meta-analysis of the age-related positivity effect: age differences in preferences for positive over negative information. Psychology and aging, 29(1), 1–15. https://doi.org/10.1037/a0035194.

Samanez-Larkin, G. R., & Carstensen, L. L. (2011). Socioemotional functioning and the aging brain. In J. Decety & J. T. Cacioppo (Eds.), The Oxford Handbook of Social Neuroscience (pp. 507–521). New York: Oxford University Press.

Samanez-Larkin, G. R., & Knutson, B. (2015). Decision making in the ageing brain: changes in affective and motivational circuits. Nature reviews. Neuroscience, 16(5), 278–289. https://doi.org/10.1038/nrn3917.

Samanez-Larkin, G. R., Gibbs, S. E. B., Khanna, K., Nielsen, L., Carstensen, L. L., & Knutson, B. (2007). Anticipation of monetary gain but not loss in healthy older adults. Nature Neuroscience, 10 (6), 787–791. doi :10.1038/nn1894.

Sardella, A., Lenzo, V., Basile, G., Martino, G., & Quattropani, M. C. (2022). Emotion regulation strategies and difficulties in older adults: A systematic review. *Clinical Gerontologist*, *46*(3), 280–301. https://doi.org/10.1080/07317115.2022.2128706

Shweder, R.A. (1993). The Cultural Psychology of Emotions. In M. Lewis and J. Haviland (Eds.), Handbook of Emotions, New York: Guilford Press.

St Jacques, P. L., Bessette-Symons, B., & Cabeza, R. (2009). Functional neuroimaging studies of aging and emotion: fronto-amygdalar differences during emotional perception and episodic memory. Journal of the International Neuropsychological Society: JINS, 15(6), 819–825. https://doi.org/10.1017/S1355617709990439.

Stone, A. A., Schwartz, J. E., Broderick, J. E., & Deaton, A. (2010). A snapshot of the age distribution of psycho- logical well-being in the United States. Proceedings of the National Academy of Sciences, 107(22), 9985–9990. https://www.pnas.org/content/107/22/9985

Teachman, B. A., & Gordon, T. (2009). Age differences in anxious responding: Older and calmer, unless the trigger is physical. Psychology and Aging, 24 (3), 703–714. doi :10.1037/a0016813.

Tessitore, A., Hariri, A. R., Fera, F., Smith, W. G., Das, S., Weinberger, D. R., & Mattay, V. S. (2005). Functional changes in the activity of brain regions underlying emotion processing in the elderly. Psychiatry Research, 139 (1), 9–18. doi:10.1016/j.pscychresns.2005.02.009.

Tiwari, S. C., & Pandey, N. M. (2013). The Indian concepts of lifestyle and mental health in old age. *Indian Journal of Psychiatry*, *55*(SPEC. SUPPL.). https://doi.org/10.4103/0019-5545.105553

Tsai, J. L., Levenson, R. W., & Carstensen, L. L. (2000). Autonomic, subjective, and expressive responses to emotional films in older and younger Chinese Americans and European Americans. Psychology and Aging, 15 (4), 684–693. doi:10.1037/0882-7974.15.4.684.

Vreeburg, S. A., Zitman, F. G., van Pelt, J., Derijk, R. H., Verhagen, J. C., van Dyck, R., Hoogendijk, W. J., Smit, J. H., & Penninx, B. W. (2010). Salivary cortisol levels in persons with and without different anxiety disorders. Psychosomatic medicine, 72(4), 340–347. https://doi.org/10.1097/PSY.0b013e3181d2f0c8.

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