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MOBILITY LIMITATIONS AND ITS ASSOCIATION WITH SOCIAL PARTICIPATION AMONG OLDER ADULTS WITHIN THE INDIAN SOCIO-CULTURAL CONTEXT

RATHOD V*[1] AND DAVE D[2]

1: (PT) M.P.T, Ph.D Scholar, Ashok & Rita Patel Institute of Physiotherapy, Charotar University of Science and Technology, CHARUSAT Campus, Anand, Gujarat, India; Associate Professor, SPB Physiotherapy College, Ugat bhesan road, Surat, Gujarat. India - 395005.

2: (PT) Associate Professor, Department of community Physiotherapy, Ashok & Rita Patel Institute of Physiotherapy, Charotar University of Science and Technology, CHARUSAT Campus, Anand, Gujarat, India

***Corresponding Author: Dr. Vandana J. Rathod: E Mail: vannu6686@gmail.com**

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ABSTRACT

Purpose: This study aimed to analyze the relationship between mobility limitations and social participation among the elderly in India.

Materials and methods: A cross-sectional survey was conducted to assess social participation (N= 307). Social participation was measured using a participation scale, and mobility limitations were measured using 4 meter walk test, FES I, community balance and mobility scale, and a questionnaire for assistive devices.

Results: Mobility-related factors explained 50% of the variation in social participation (F (6, 299) = 50.774, p=0.000). It was found that fear of falling, walking capacity, community balance and mobility, having hearing aids, using sticks/walker, and using adjustable shower stools/commodes significantly affect social participation among the elderly.

Conclusion: Mobility limitations were significantly associated with reduced social participation. This demonstrates the need for interventions to improve accessibility and participation among older Indian adults at various levels

Keywords: Social participation, mobility, older adults, Indian elderly

BACKGROUND

Mobility limitations, defined as difficulties in walking, climbing stairs, or moving around, among older adults can significantly impact their social engagement and overall well-being **[1]**. Mobility limitations can be a key individual characteristic that moderates the effect of environmental factors on social participation **[2, 3]**. For example, older adults with mobility limitations may feel more unsafe in the neighborhood, and may avoid walking in their neighborhood. Conversely, higher population density is associated with increased social activities due to more interaction opportunities, as denser areas provide more chances for casual encounters and community engagement **[4]**. In the Indian socio-cultural context, these interactions might manifest uniquely. Therefore, understanding these dynamics within the Indian socio-cultural context is essential.

Many Indian households have multiple generations living together, where older adults with mobility limitations can still participate in family activities due to the inclusive efforts of family members **[5]**. This strong familial support contrasts with Western settings, where professional care giving is more common, and social participation might decline if older adults rely solely on caregivers who may not facilitate social interactions as effectively **[6]**. However, this interdependence can present challenges specific to India. The reliance on family for care can overburden family members, particularly women, who are often the primary caregivers, potentially straining relationships and reducing the quality of care **[7]**. Additionally, the stigma associated with hiring professional caregivers may limit external support, placing further pressure on the family.

In rural and semi-urban areas, community gatherings like festivals and religious ceremonies are common **[8]**. While older adults with mobility limitations might be unable to physically attend these events, community members often visit their homes to keep them engaged. Despite this support, poor road conditions, lack of accessible public transport, and limited mobility-friendly facilities can further isolate these older adults, making full participation in community life challenging **[9, 10]**. This contrasts with many Western countries, where better infrastructure, accessible public transportation, and mobility aids are more readily available, facilitating greater social participation for older adults with mobility limitations. Understanding these unique challenges is crucial for developing culturally appropriate interventions that

enhance social participation and overall well-being for older adults with mobility limitations in India.

Therefore, existing research on mobility limitations and their relationship to social participation may be inadequate or may not fully represent the unique socio-cultural context, familial structures, and infrastructural challenges present in India. The interplay of these factors creates distinct dynamics that differ significantly from Western contexts. Despite these findings, few studies have explored the interactions between mobility limitations and socio-cultural features **[11]** as they relate to social participation in older adults.

MATERIALS AND METHODS

Study design and ethics

We conducted a cross sectional survey using a questionnaire on the mobility related factors and by assessing their mobility by using a scale for mobility. The study was done with prior ethical approval from institutional ethical committee. Before enrolment of the participants for the study, the study procedure was fully explained to the patients, and written informed consent was obtained. They were assured that their participation was voluntary; they could withdraw at any time without giving any explanation.

Study setting

As participants were community dwelling elderly, data has been taken according to the feasibility of participants either at their home, park or clinics/OPDs. Participants were recruited from the community from urban area of Ahmadabad, and urban and rural areas of Panchamahal district and Surat district of Gujarat, Western India through personal contacts, friends, relatives, or family members.

Participants

Sample size was determined by a-priory sample size online calculator for SEM (structural equation modeling) (free statistics calculator version 4.0). It was computed by given the number of observed and latent variables. By keeping the anticipated effect size (0.1), the desired probability (0.05) and statistical power levels (0.8), minimum recommended sample size was 100.

The study has included 307 community dwelling elderly with aged above 65 according to WHO classification of elderly. Elderly with significant visual, hearing, communication problems; severe cognitive impairment (according to short portable mental status questionnaire) and severely bed ridden or ill elderly were excluded from the study. Potential study participants were individually contacted to seek their willingness to participate based on

the inclusion criteria set for the study. Those who refused to give consent were not included in the study. This approach was primarily based on available time and resources for collecting the data. Forty-two refused to participate due to lack of interest or fear to perform or share the details. Demographic information of patients such as age, gender, marital status, education levels and their geographic area was presented in **Table 1**.

Procedure

First author trained in data collection procedure recorded the demographic details of participants, fear of fall, walking capacity, community balance and mobility status and questionnaire for using assistive devices. Fear of fall was assessed by FES I. It is 16 items four point likert scale that measures fear of fall. Higher score indicating greater rate of fall (1 is not all concern about fall and 4 is very concern about fall). The FES-I shows excellent internal consistency (Cronbach's alpha = 0.96 and 0.92), test-retest reliability (ICC = 0.96 and 0.83) and validity (r>0.90) in a community dwelling population **[12-14]**.

Community balance and mobility status was checked by community balance and mobility and balance scale (CB&M- performance based scale) It is designed to evaluate balance and mobility in patients who, although ambulatory, have balance impairments that reduce their full engagement in community living **[15]**. It is performance based which includes unilateral stance, tandem walking, 180-degree tandem pivot, lateral foot scooting, hopping forward, crouch and walk, lateral dodging, walking and looking, running with controlled stop, forward to backward walking, walk-look & carry, descending stairs, and step ups one stair. It has continuous measurement on the Likert scale. The CB&M has been able to define decrease in balance that occurs with aging in healthy individuals supporting the validity and sensitivity of the scale **[16]**.

Walking capacity was measured by 4 meter walk test (performance based) and assistive device usage by questionnaire from Longitudinal aging study in India (LASI) **[17]**. Time required to complete the data collection procedure for each participant was approximately 25 min. Measures of social participation have multiple aspects like type of activities, activity level, and the importance of activity, satisfaction, and frequency of activities **[18]**. Due to these differences, cross-study comparisons are difficult. It can also be measured through a generalized scale that measures their activity. In this study we measured social participation using the participation scale (P-scale). The P-scale is an 18 items- interview based questionnaire

which includes closed ended structured questions, with higher score indicating more restrictions **[19]**.

RESULTS

Descriptive statistics were calculated to summarize the socio-demographic characteristics of the study participants including age, gender, marital status, education level, and geographic location. Given the ordinal nature of the data, non-parametric tests were conducted to analyze the distributions.

To determine the influence of various mobility factors on restrictions in social participation a Spearman's correlation analysis was conducted to ascertain the relationships between multiple mobility-related variables and the extent of social participation restrictions. Subsequent to the correlation analysis, variables demonstrating significant associations were selected for further examination through multiple linear regression analysis.

Demographic characteristics

The study included 307 participants with a mean age of 72 years (SD = 6.21) ranging from 65 to 108 years, females more than males (Table 1). More participants were married (73%, n=224) than widowed (26.4%, n=81). Most of the participants were from urban area (65.8%, n = 202). **(Table 1)**

Correlation analysis

Correlation analysis identified several key variables, namely, the fear of fall, walking capacity (measured as walking speed in meters per second), community mobility and balance, and the utilization of walkers or walking sticks—as significantly correlated with the degree of social participation restrictions **(Table 2)**.

The correlation analysis conducted on mobility factors related to social participation restrictions yielded significant findings. The Fall Efficacy Scale (FES I), with a correlation coefficient of 0.525, indicated that a greater fear of falling correlates with increased restrictions in social participation, highlighting the impact of psychological factors on social engagement. Walking capacity exhibited a moderate positive correlation of 0.482, suggesting that improvements in this area are associated with decreased social participation restrictions. Furthermore, community balance and mobility status, with a strong negative correlation of -0.621, revealed that poorer conditions in these areas are significantly linked to greater social participation restrictions.

The analysis of the correlation between the use of various assistive devices and social participation restrictions shows

variable influence of assistive devices on the social participation of individuals with mobility concerns. Hearing aids, with a correlation coefficient of -0.200, demonstrate a weak negative correlation, suggesting that their use may be associated with slightly reduced restrictions in social participation. In contrast, walkers/walking sticks and adjustable shower stools/commodes, showing moderate negative correlations of -0.469 and -0.355 respectively, are linked to more substantial restrictions in social participation. Wheelchair use, indicated by a negligible correlation of 0.011, appears to have no significant impact on social participation restrictions, suggesting that wheelchair mobility does not inherently constrain social involvement. Other devices, including spectacles/contact lenses, back/neck collars, orthoses and prostheses, and others, with correlations ranging from -0.410 to -0.041, exhibit weak or non-significant correlations, indicating minimal or indeterminate effects on social participation restrictions **(Table 2)**.

Regression analysis

Key predictors identified through the analysis include the Fall Efficacy Scale (FES I), community mobility and balance, and the use of walkers or walking sticks, each demonstrating a significant impact on social participation restrictions **(Table 3)**. The FES I, with a beta coefficient of 0.242, emerged as a significant predictor, indicating that an increase in the fear of falling substantially contributes to greater social participation restrictions. Community mobility and balance, with a beta coefficient of -0.291, was another critical predictor, showing that improvements in these areas can significantly reduce participation restrictions. The use of walkers or walking sticks, indicated by a beta coefficient of -0.256, also stood out as a significant factor. The model's explanatory power, with an R-squared value of 0.505, suggests that over half of the variability in social participation restrictions can be accounted for by the factors included in the model, indicating a strong predictive capability **(Table 3)**.

Table 1: Demographic characteristics of the study participants

Characteristics (N=307)	No. of participants %
Age (Mean ± SD, Range)	72.44 ± 6.21, 65-108
Gender (M, F)	47.9 (147), 51.1(160)
Marital status	
Currently married	73 (224)
Widowed	26.4 (81)
Divorced	0.3 (1)
Others	0.3 (1)
Education level (Mean ± SD)	9.37 ± 4.87
Geographic location	
Town	3.9 (12)
Rural	30.3 (93)
Urban	65.8 (202)

Table 2: Results of correlation

Mobility related factors (n=307)		
Dependent variable: Social participation		
Variable	**Correlation co efficient**	**Standard error**
FES I	**0.525****	**0.000**
Walking capacity	**0.482****	**0.000**
Community balance and mobility status	**-0.621****	**0.000**
Use of assistive devices		
Hearing aid	**-0.200****	**0.004**
Spectacles/contact lenses	**-0.410**	**0.476**
Walker/ walking Sticks	**-0.469****	**0.000**
Wheelchair	**0.011**	**0.849**
Adjustable shower stools /Commodes	**-0.355****	**0.000**
Back/ neck collar	**-0.045**	**0.430**
Orthosis and prosthesis	**-0.064**	**0.265**
Others	**-0.041**	**0.477**
****. Correlation is significant at the 0.01 level (2-tailed)**		

Table 3: Results of regression

Variables	Beta co efficient
FES I	**0.242**
Walking capacity	**0.008**
Community mobility & balance	**-0.291**
Hearing aid	**-0.065**
Walker/ walking Sticks	**-0.256**
Adjustable shower stools /Commodes	**-0.071**
R squared	**0.505**
Adjusted R squared	**0.495**
S.E of regression	**5.676**
Sum squared residual	**9636.058**
Durbin- Watson statistics	**1.897**
F -statistics	**50.774**

DISCUSSION

The objective of the study was to analyze the relationship between mobility limitations and social participation. This study adds evidence on restrictions in participation in Indian elderly due to different mobility limitations. The results of our study identify that reduced mobility irrespective of any other identified factors in later age reduces the participation level among the elderly.

The relationship between mobility limitations and social participation has been well established **[1, 2]**. They have reported that decreased mobility hampers the involvement in social life, particularly in activities inside and outside the home. In addition, there are previous research results that show, good mobility of elderly ultimately has a positive effect on different health outcomes and the quality of life of older people **[20, 21]**. Therefore, it is necessary to develop various supportive programs that can improve mobility by monitoring the factors that affect the mobility of elderly. In addition, given the physical limitations of elderly, it is necessary to provide an age-friendly

environment in late life. However, the extent to which limitations in mobility affect participation, particularly in the Indian elderly was unknown.

In the present study, we explored the potential association between social participation and different mobility-related factors. Social participation was affected in different situations described by the P-Scale items (90%) among the participants. Four mobility-related factors, fear of falls, walking capacity, community balance & mobility, and usage of assistive devices were related to social participation in different ways.

Fear of fall was found significant predictor among all mobility-related factors (β= 0.242, p=0.000). Elderly were more concerned in certain events like walking on uneven surfaces and slippery surfaces, walking up or down a slope and stair climbing and down according to the components of FESI. For other activities, the elderly were moderately concerned about falls. Previous researches show that fear of falls leads to a loss of confidence in one's ability to move and affect their self-efficacy which makes them more hesitant to engage socially. Fear has also a negative impact on mental health. It leads to fear of stigma which leads to avoidance of social situations in turn reduce participation **[22, 23]**. A cycle of inactivity can develop where fear of fall reduces physical activity which further limits social participation.

On the other side, a study done by Pin *et al*. suggested that frailty is more effective than fear of falling to the participation level. However, our analysis showed that fear of fall leads to a decrease in attending social events like weddings, funerals, religious activities, etc, and work done outside the home **[23]**. It may be due to the Indian elderly facing different environmental barriers as we have different urban and rural environmental sets ups which lead to difficult accessibility in the community. So they try to avoid going outside homes with full street areas or traffic areas. Moreover, they feel fear of injury or fear of care after injury. They feel that if anything happens to them it will increase the financial burden and dependency on their families which further limits their participation.

Community balance and mobility also found another critical predictor (β= -0.291, p= 0.000) which shows affection in most mobility-related items. Elderly were found maximum difficulty in performing running, tandem pivot, lateral dodging, lateral foot scooting, descending stairs, and tandem walking. Though some these activities they do not perform at this age, collectively mobility is restricted overall by adding these items as per the scoring criteria for the scale. It shows

an overall limitation in mobility. Previous research shows mixed evidence related to balance and mobility. Most evidence supports that balance and mobility affect participation, **[12, 23, 24]** but study done by Warren *et al* (2016) was showing no relation between balance and social participation **[25]**.

In our study, the components of community and balance were performance-based which indicates the wide range of balance and mobility deficit. It measures dynamic instability. It also measures underlying postural control mechanisms in different tasks that stimulate real-life activities. So affection for dynamic balance and postural control due to physical and functional limitations may reduce participation.

In the usage of assistive devices, spectacles/contact lenses, and adjustable shower tools/commodes were the most used assistive devices by the elderly. The second most frequent use was a walker/stick and hearing aids. Studies reported mixed findings for using assistive devices. A systematic review report by Marasinghe *et al* (2022) shows no impact of using assistive devices on community-dwelling elderly **[26]**. In opposite, the study results of Park *et al* (2023) show wearing assistive devices reduce formal social activities but not informal social contacts **[27]**. Also, study results by Judith *et al* (2014) prove use of hearing aids emerges as the most dominant device in explaining how likely older adults are to participate, particularly in religious services, joining clubs, and volunteering. In contrast to that, the use of walkers among those with mobility needs is negatively associated with participation in these same activities **[28]**.

Our study results show using walkers/ sticks most significant predictor compared to other assistive devices. It may be due to the Indian elderly facing different challenges in terms of inaccessibility of buildings, roads, and transport with the use of assistive devices may add restrictions to the participation. Also, the use of these devices puts public, social, and personal consequences such as stigma, low status, and being viewed as a dependent person, may make them think twice about using mobility devices in particular. Using these devices makes the individual self-conscious about participating in social activity. So they tend to avoid participation.

Adjustable showers/ commodes and hearing aids have less significant influence in participation. However, hearing aids can improve hearing functions; participation may decrease due to negative attitudes about hearing impairment/ aid, lack of knowledge, or financial difficulties to afford the hearing

aid. Along with these predictors for social participation, walking capacity was also a negligible predictor which has minimal contribution in participation.

Despite the accessible environment participation in society is still challenging for people who use mobility devices. Our study interpretation makes evidence to make the rehabilitation more effective to remove the barriers related to mobility for Indian elderly to make them independent, enhance social participation, and better quality of life in later age.

This study has a few limitations. There may be selection bias as the study focused only on the 307 participants from urban and rural areas of Gujarat. So, the sample may not fully represent the Indian elderly. Note should be taken while applying these results to the general population. Moreover, the culture and facilities of urban and rural areas of Gujarat are also different, which may impact mobility and thereby social participation differently which is further limiting the generalizability of the findings. Our study results might have been influenced by variations in socio-demographic characteristics such as age, gender, marital status, education level, economic status as well as personal physical and mental health, and therefore, further researches are needed to better understand their impact on social participation among this population.

Our study highlights specific mobility-related limitations to the elderly in the Indian context. In low-medium countries like India, modifications in terms of environment will be difficult due to geographical diversity. So, considering mobility is modifiable with respect to age-related other physical and functional limitations, the need for assessment of mobility limitations, additional assistance, and proper interventions are evident for improving social participation.

It contributes to the existing literature on mobility limitations and social participation focusing on the importance of comprehensive holistic rehabilitation interventions that go beyond goal-orientated treatment to improve the overall quality of life and to engage the elderly in all spheres of life. Therefore, the study has implications for healthcare providers and policymakers in India who are working to improve the quality of life for the elderly. They need to be aware of these challenges faced by the elderly in the context of geography, culture, and ethnicity. They should consider the development of appropriate interventions to address these challenges.

CONFLICTS OF INTEREST

No potential conflict of interest was reported by the author(s).

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DATA ACCESS STATEMENT

Upon reasonable request to the corresponding author, RV, the data that support the findings of this study will be available.

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