

## Promoting Mobility in Older People

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Out-of-home mobility is necessary for accessing commodities, making use of neighborhood facilities, and participation in meaningful social, cultural, and physical activities. Mobility also promotes healthy aging as it relates to the basic human need of physical movement. Mobility is typically assessed either with standardized performance-based tests or with self-reports of perceived difficulty in carrying out specific mobility tasks. Mobility declines with increasing age, and the most complex and demanding tasks are affected first. Sometimes people cope with declining functional capacity by making changes in their way or frequency of doing these tasks, thus avoiding facing manifest difficulties. From the physiological point of view, walking is an integrated result of the functioning of the musculoskeletal, cardio-respiratory, sensory and neural systems. Studies have shown that interventions aiming to increase muscle strength will also improve mobility. Physical activity counseling, an educational intervention aiming to increase physical activity, may also prevent mobility decline among older people. Sensory deficits, such as poor vision and hearing may increase the risk of mobility decline. Consequently, rehabilitation of sensory functions may prevent falls and decline in mobility. To promote mobility, it is not enough to target only individuals because environmental barriers to mobility may also accelerate mobility decline among older people. Communities need to promote the accessibility of physical environments while also trying to minimize negative or stereotypic attitudes toward the physical activity of older people.

**Key words:** Aging, Walking, Motor activity, Muscle strength, Environmental barriers, Health promotion

### INTRODUCTION

“Sarah, an older lady with a walker, was waiting for me with her outdoor clothes on in her studio apartment. The stairs and the heavy front door keep her indoors as she is unable to maneuver them with her walker. My job was to help her go outdoors once a week. We met for the first time last week when we were introduced to each other after I enrolled in a volun-

tary work program. She was really delighted go out. It was early spring and trees were just beginning to turn green. We walked around the block very slowly and did lotto in the kiosk and came back home. She said that the previous time she went outdoors was six months ago.”

Most people wish that they could live a long, productive, and autonomous life without debilitating disability. However, in old age, progressing diseases and the consequent impairments and functional limitations increase the risk of mobility decline, potentially resulting in a situation where the person becomes practically home confined. Participation in meaningful activities and running daily errands, both of which are key elements for life satisfaction, require the ability to access the outdoors. Outdoor physical activity, particularly walking, plays a key role in the maintenance of functional independence in old age [1]. With populations aging worldwide, there is an increasing need for knowledge and evidence-based policy to

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promote independence in older people to ensure the sustainability of societies while also ensuring good quality of life for older people. Understanding different factors affecting outdoor mobility in older adults helps identify approaches to planning accessible and safe environments and to motivating older adults to move about outdoors and thus prevent the development of disabilities.

## MOBILITY

Outdoor mobility refers to the physical ability to move. It refers to all types of trips outside home, either by foot or by other means of transportation [2]. Mobility is necessary for accessing commodities, making use of neighborhood facilities, and participation in meaningful social, cultural, and physical activities. Mobility also promotes healthy aging as it relates to the basic human need for physical movement. Unmet physical activity need, defined as inability to increase physical activity despite being willing to do so, is common among community-living older people who have mobility problems and who report negative environmental features in their neighborhood [3]. Commuting and transportation systems influence mobility; however, the focus here is on walking. Walking is an integral part of mobility and may be considered a prerequisite for unassisted use of other forms of transportation.

## ASSESSMENT OF MOBILITY

Walking as a physical ability is often assessed by asking people whether they experience difficulties walking given distances. Another option is to use standardized tests of walking. Typically, for gait speed calculation, a person is asked to walk a specific distance, which is timed. The advantage of self-reports is that they provide us with subjective evaluation of one's mobility in one's everyday environment and thus carry immediate relevance to people's lives. However, they also reflect the challenges in the environment and may not be comparable across localities or countries. In addition, most existing self-report instruments primarily assess difficulty, inability, or degree of assistance required to perform specific tasks of mobility. Thus, these measures may not be sensitive enough to identify early stages in the course of mobility decline.

The advantage of performance-based assessments, such as gait speed, is that they may be administered in a standardized environment and provide information that is universally com-

parable. However, it may be difficult to interpret changes in walking speed in terms of how big an improvement is clinically significant. Recently, estimates of small meaningful change in gait speed (approximately 0.05 m/s) have been suggested by contrasting walking speed against perceived walking difficulties [4].

## MOBILITY DECLINE

The first signs of declining mobility are typically observed for more demanding mobility tasks, such as walking longer distances or running. Perceived running difficulties are already common in midlife [5]. In the early stages of functional decline prior to the onset of task difficulty, older persons may be able to compensate for underlying disease by modifying their task performance and thereby maintain their function without the perception of difficulty. This stage of functional decline, that is, changes in method, frequency, or time used in task performance or increased tiredness has been proposed as preclinical disability [6-8].

In our study among more than 600 community-dwelling people aged 75 to 81 years, participants with preclinical mobility limitation showed intermediate levels of walking speed and muscle power, compared with those with no limitation or manifest mobility limitation. Participants reporting baseline preclinical mobility limitation had a 3- to 6-fold higher age- and sex-adjusted risk of progressing to major manifest mobility limitation during the 2-year follow-up compared with participants with no limitation at baseline [8]. These results suggest that it is also possible to identify people in the early phases of mobility decline by relatively simple self-report tools.

Those in the early phases of mobility decline will benefit most from preventive interventions because their own physical resources will still allow them to increase their physical activity and training on their own without intensive support from other people. We studied physical activity counseling as a way to promote the mobility of older people. The intervention included one face-to-face counseling session with a physiotherapist and follow-up phone contacts every four months for two years. The aim of the counseling was to increase the physical activity of the participant [9]. This intervention increased physical activity and slowed down progression of mobility decline [10]. We concluded that physical activity counseling was efficacious in preventing mobility decline, especially among people who were still in the early phase of mobility decline.

## PHYSIOLOGICAL REQUIREMENTS FOR WALKING

From the physiological point of view, walking is an integrated result of the functioning of musculoskeletal, cardio-respiratory, sensory and neural systems. Two of the most immediate prerequisites for walking are lower extremity strength and postural balance [11,12]. These are needed to generate movement and to maintain a balanced upright position while moving. Consequently, progressive resistance training and balance training may help maintain or rehabilitate walking ability among older people at risk of accelerated mobility decline.

In particular among older people, immobility while being ill may result in critical mobility decline. Among older people, mobility may not spontaneously recover to its pre-illness level. In an American study, it was observed that in the year during which severe disability developed, hospitalizations were documented for 72% of those developing sudden, catastrophic disability and for 49% of those developing progressive disability, while only 15% of those who were stable with no disability and 22% of those with some disability were hospitalized [13].

We studied the effects of progressive resistance and functional training among older frail patients discharged from a hospital ward after an acute illness. Maximal voluntary isometric strength of knee extension and hip abduction, dynamic balance, and maximal walking speed were measured before and after the 10-week training period, and 3 and 9 months after the end of the intervention. After the intervention, significant improvements were observed in the training group compared to the control group in the maximal voluntary isometric knee extension strength (20.8% vs. 5.1%,  $p=0.009$ ), balance scale (+4.4 vs. -1.3 points,  $p=0.001$ ), and walking speed (+0.12 vs. -0.05 m/s,  $p=0.022$ ). Effects on knee extension and hip abduction strength, balance, and walking speed were observed 3 months later, and some effects on hip abduction strength (9.0% vs. -11.8%,  $p=0.004$ ) and mobility were still apparent even 9 months after the intervention [14]. These results suggest that the negative consequences of acute diseases and hospitalizations may be counteracted among older people by intensive physical training.

A recent meta-analysis of the effects of strength training included 121 trials with 6700 participants [15]. In most of the trials, progressive resistance training was performed two to three times per week and at a high intensity. Progressive resistance training had a large positive effect on muscle strength (73 tri-

als; 3059 participants; standardized mean difference, 0.84; 95% confidence interval [CI], 0.67 to 1.00) and a modest but positive effect on gait speed (24 trials; 1179 participants; mean difference, 0.08 m/s; 95% CI, 0.04 to 0.12). This review provided evidence that progressive resistance training is an effective intervention for improving physical functioning in older people, including improving strength and the performance of some simple and complex activities.

## SENSORY FACTORS, FALLS, AND WALKING

Adequate sensory functioning, that is, receiving accurate information about potential environmental risks through different sensory channels, plays an important role in safe walking. We observed that hearing and vision impairments correlated with increased fall risk and that the risk of falls was particularly high among people who had multiple sensory impairments [16,17]. Falls may accelerate the worsening of walking difficulties even further. We observed in a prospective study that even non-injurious falls increased the risk of walking difficulties at least partly due to reduction of walking activity among those who sustained falls [18]. We also found that women with hearing or vision impairments had slower maximal walking speed and poorer balance than people without these impairments [16,19]. It is possible that people may adjust to a gradually declining function of a single sensory modality and learn to compensate for the deficiency by utilizing information from the other sensory modalities. However, when multiple sensory difficulties are present, it becomes more and more difficult for the person to receive accurate information about the environment, which may eventually lead to increased fall risk, avoidance of walking, and finally to increased risk of walking difficulty. It is important to rehabilitate vision and hearing, because they provide us with feedback about the environment needed for safe mobility. Rehabilitation of sensory impairments may also improve mobility and reduce fall risk.

## ENVIRONMENTAL BARRIERS AND WALKING

Older people with mobility limitations often report more barriers in their outdoor environment than people with intact mobility. Need for assistive walking devices makes people especially vulnerable to environmental barriers. However, it is uncertain whether older people perceive their environment as problematic because of their mobility limitations or whether

the environmental barriers precede incident mobility limitation and consequently contribute to the progression of mobility decline. We observed in a prospective study that the presence of specific environmental barriers (long distances, lack of resting places, high hills, poor street conditions, and busy traffic) in a person's living environment increased the risk for developing new walking difficulties by up to almost three-fold. Differences in socio-demographics, health, and physical activity explained part of the increased risk, but not all of it [20]. It is possible that environmental barriers, by reducing physical activity, lead to accelerated mobility decline. We observed that environmental barriers correlate with fear of moving outdoors, which typically manifests in avoidance of outdoor activities that are within a person's health capacity. Fear of moving outdoors was found to increase the risk of mobility decline and may be one of the underlying factors in the association between environmental barriers and mobility decline [21].

Decreasing mobility barriers in the environment will have an immediate effect on mobility by improving accessibility. However, removing barriers may also slow down progression of mobility decline by helping to maintain adequate activity levels.

## PROMOTING MOBILITY

"Use it or lose it" is definitely true for mobility in old age. Consequently, it is important to find ways to increase or maintain the active mobility of older people. Promoting mobility should happen at the community level as well as at an individual level. Community planning strategies and community amenities are important to minimize environmental and social barriers and also to ensure equal opportunities for mobility among those with functional limitations. In addition, older people should have opportunities to participate in physical activities. Physical exercise classes should be adapted to the possible special needs of older people, the classes should be inexpensive, and exercise facilities should be accessible, so that all have an equal opportunity to participate. It is also important to promote positive attitudes toward physical exercise among older people and avoid stereotypic images and negative messages. For example, we found that many older people recalled that their doctor had advised them to avoid physical exertion [22]. Such a message may have been intended for a limited time; however, older people may consider it to be definitive.

Even though older people may have many problems related to mobility, sometimes solving just one of them may critically improve the opportunities to solve the other problems. Health care providers, engineers, community planners and decision makers, leisure service providers, civil society, as well as family members and other loved ones of older people should work together to optimize opportunities for older people to maintain independent mobility as long as possible.

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## CONFLICT OF INTEREST

The author has no conflicts of interest with the material presented in this paper.

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