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The predictive value of physical fitness for falls in older adults with intellectual disabilities



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ABSTRACT

A high incidence of falls is seen in people with intellectual disabilities (ID), along with poor balance, strength, muscular endurance, and slow gait speed, which are well-established risk factors for falls in the general population. The aim of this study was to assess the predictive value of these physical fitness components for falls in 724 older adults with borderline to profound ID (≥ 50 years). Physical fitness was assessed at baseline and data on falls was collected at baseline and after three years. Gait speed was lowest in participants who fell three times or more at follow-up. Gait speed was the only physical fitness component that significantly predicted falls, but did not remain significant after correcting for confounders. Falls at baseline and not having Down syndrome were significant predictors for falls. Extremely low physical fitness levels of older adults with ID, possible strategies to compensate for these low levels, and the finding that falls did not increase with age may explain the limited predictive value of physical fitness found in this study.

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1. Introduction

A high incidence of falls and related injuries is seen in people with intellectual disabilities (ID) (Cox, Clemson, Stancliffe, Durvasula, & Sherrington, 2010; Enkelaar, Smulders, van Schrojenstein Lantman-de Valk, Weerdesteyn, & Geurts, 2013b; Hale, Bray, & Littmann, 2007; Hsieh, Rimmer, & Heller, 2012; Sherrard, Tonge, & Ozanne-Smith, 2001). Falling is not restricted to the elderly in the population of ID (Sherrard et al., 2001), but fall risk does increase with advancing age (Chiba et al., 2009; Cox et al., 2010; Hsieh, Heller, & Miller, 2001; Willgoss, Johannes, & Mitchell, 2010).

A number of personal and medical characteristics can lead to an increased fall risk. In people with ID, older age, being female, more severe level of ID, impaired mobility, physically active, back pain, arthritis, fracture history, cerebral palsy, good visuo-motor capacity, good attentional focus, urinary incontinence, heart condition, epilepsy, visual impairments, polypharmacy, and behavioral problems have been mentioned as possible risk factors for falls (Cox et al., 2010; Enkelaar

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et al., 2013b; Finlayson, Morrison, Jackson, Mantry, & Cooper, 2010; Hsieh et al., 2012; Willgoss et al., 2010). Having Down syndrome (DS) was found to reduce the risk for falls and related injury (Finlayson et al., 2010).

Next to personal and medical characteristics, physical fitness may be an important aspect for falls in people with ID. Older adults with ID have poor balance, strength, muscular endurance, and slow gait speed (Hilgenkamp, van Wijck, & Evenhuis, 2012b; Oppewal, Hilgenkamp, van Wijck, & Evenhuis, 2013). In the general population, these physical fitness components are well-established risk factors for falls (American Geriatrics Society, British Geriatrics Society, & American Academy of Orthopaedic Surgeons Panel on Falls Prevention, 2001; Close, Lord, Menz, & Sherrington, 2005; Deandrea et al., 2010; Muraki et al., 2013; Quach et al., 2011; Stenhagen, Ekstrom, Nordell, & Elmstahl, 2013; Tinetti & Kumar, 2010). However, results from prospective studies performed in the general population may not apply to older adults with ID. The predictive value of physical fitness for falls in the general population is related to an age-related decrease in physical fitness or due to diseases. This relationship may be confounded by the lifelong cognitive impairment of people with ID. This lifelong cognitive impairment may negatively influence their motor development since childhood, which may negatively influence their balance, strength, endurance, and gait throughout their life, and not just at an older age. This line of thinking is supported by the finding that motor and cognitive functioning are fundamentally interrelated, with similar developmental trajectories and the use of similar brain structures (Diamond, 2000). Impairments in physical fitness may not necessarily be related to an increased fall risk in the same amount as in the general population because people with ID may have developed different compensation strategies and utilize them over their entire lifespan. For example, people with DS show more variability in gait than people with normal intelligence, but they use this variability functionally to optimize their movement. This implies the use of different control strategies to compensate for their limitations (Black, Smith, Wu, & Ulrich, 2007; Smith, Stergiou, & Ulrich, 2011). Based on this hypothesis, the correlation between a decrease in physical fitness and falls may be less strong.

A recent prospective study investigating risk factors for falling in older adults with mild to moderate ID did not find balance and gait speed to differ between fallers and non-fallers. However, adults who fell indoors, performed worse on balance and gait tests (Enkelaar et al., 2013b). In contrast, retrospective studies did find strength and gait impairments to be associated with an increased fall risk in people with ID (Chiba et al., 2009; Hale et al., 2007; Hsieh et al., 2012). More knowledge is needed to identify the predictive value of the physical fitness in predicting fall risk. This will help to identify people at risk and thereby the decision-making for treatment.

The aim of this study was to assess the predictive value of balance, gait speed, strength, and muscular endurance for falls, over a 3-year period, in a large sample of older adults with ID.

2. Methods

2.1. Study design and participants

This study was part of the large Dutch 'Healthy ageing and intellectual disabilities' (HA-ID) study performed in a consort of three ID care organizations in collaboration with two university departments in the Netherlands (Intellectual Disability Medicine, Erasmus MC, University Medical Center Rotterdam and the Center for Human Movement Sciences, University of Groningen, University Medical Center Groningen). For the baseline measurements all 2150 older clients with ID (≥ 50 years) of the care organizations were invited to participate, resulting in a near-representative sample of 1050 clients. Themes in the study were physical activity and fitness, nutrition and nutritional state, and mood and anxiety. Data collection on these themes took place between February 2009 and July 2010. Details about design, recruitment, and representativeness of the sample have been presented elsewhere (Hilgenkamp et al., 2011). Three years after the baseline measurements, follow-up data on falls were collected with a questionnaire.

This study was approved by the Medical Ethical Committee at Erasmus Medical Center (MEC 2008-234 and MEC 2011-309) and by the ethical committees of the participating ID care organizations. Informed consent was obtained from all participants or their legal representatives for both baseline and follow-up measurements; however, unusual resistance was a reason for aborting measurements at all times. This study followed the guidelines of the Declaration of Helsinki (Helsinki, 2008).

2.2. Baseline measurements

Of the risk factors for falls mentioned in the introduction, the following risk factors were collected in the HA-ID study: age, gender, level of ID, Down syndrome (DS), mobility, physical activity levels, fracture history, spasticity of the legs (as an aspect of cerebral palsy), urinary incontinence, heart condition, epilepsy, visual impairments, polypharmacy, and behavioral problems. In this study, these risk factors are used to describe the study sample and as possible confounders in the analyses.

2.2.1. Personal characteristics

Age and gender were collected from administrative systems of the care organizations. Level of ID was categorized by behavioral therapists or psychologists as borderline (IQ = 70–84), mild (IQ = 50–69), moderate (IQ = 35–49), severe (IQ = 20–34), or profound (IQ < 20) (World Health Organization, 1996). The presence of DS was collected through the medical files. Professional caregivers provided information about mobility (independent, walking with an aid, or wheelchair-bound). Physical activity was measured with pedometers (NL-1000 pedometer, New Lifestyles, MO, USA). A minimum of 7500 steps per day was classified as sufficient.

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