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Feasibility and outcomes of the Berg Balance Scale in older adults with intellectual disabilities

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ABSTRACT

High incidence of falls and increased risk of fall-related injuries are seen in individuals with intellectual disabilities (ID). The Berg Balance Scale (BBS) is a reliable instrument for balance assessment in the population of (older) adults with ID. The aims of this study were to assess the balance capacities of a large group of older adults with ID with the BBS and look for gender and age effects, as well as reasons for drop-out on separate items, and to identify feasible subtests for subgroups in which the complete BBS is not feasible. The balance capacities of 1050 older clients with borderline to profound ID of three Dutch care-provider services (mean age 61.6 [*sd* = 8.0]) were assessed with the BBS. The participants who completed all items of the BBS ($n = 508$) were the functionally more able part of the study sample. Results showed that even this functionally more able part had poor balance capacities, with a mean BBS score of 47.2, 95% CI [46.3, 48.0], similar to adults in the general population aged around 20 years older. Balance capacities decreased with increasing age and females had poorer balance capacities than males. Difficulties understanding the task and physical limitations were most often the reasons for drop-out. Feasible subtests were identified for the subgroups with very low cognitive levels and wheelchair users. Low balance capacities of older adults with ID show the need for regular screening and the urge for fall prevention programs for individuals with ID.

1. Introduction

A high incidence of falls and increased risk of fall-related injuries is seen in individuals with intellectual disabilities (ID) (Cox, Clemson, Stancliffe, Durvasula, & Sherrington, 2010; Hale, Bray, & Littmann, 2007; Hsieh, Rimmer, & Heller, 2012; Sherrard, Tonge, & Ozanne-Smith, 2001). The broad age range of participants in these studies indicates that falling is not restricted to older individuals with ID. However, the risk of falling increases with advancing age (Cox et al., 2010; Hsieh, Heller, & Miller, 2001; Wagemans & Cluitmans, 2006; Willgoss, Yohannes, & Mitchell, 2010), with notable increases in falls found for individuals with ID in their 40s and 50s (Cox et al., 2010). Chiba et al. (2009) reported a 2.5 times (odds ratio = 2.46)

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higher fall risk in those over 50 years of age compared to those younger than 50 years of age (Chiba et al., 2009), and Hsieh et al. (2001) reported a 10-fold risk (odds ratio = 10.63) in those over 70 years of age for falls and related injuries in comparison to those younger than 70 years of age (Hsieh et al., 2001). Furthermore, falling seems to lead more often to injury and hospitalization in individuals with ID than in the general population (Sherrard et al., 2001; D.Wang, McDermott, & Sease, 2002).

Balance assessment instruments are used in the general population to identify fall risk and target and evaluate fall prevention programs. However, not all of these instruments are applicable to individuals with ID, because of their limited cognitive ability and comorbidities (Enkelaar, Smulders, van Schrojenstein Lantman-de Valk, Geurts, & Weerdesteyn, 2012; Hale et al., 2007; Hilgenkamp, van Wijck, & Evenhuis, 2010). Based on a review by Hilgenkamp et al. (2010), the Berg Balance Scale (BBS) was proposed as the most applicable instrument to assess balance capacities and fall risk in older adults with ID (Hilgenkamp et al., 2010). The BBS is a 14 item performance-based instrument that measures balance capacities (Berg, Wood-Dauphinee, Williams, & Maki, 1992). A higher score corresponds to better balance capacities. A score of 45 (of the maximum score of 56) has been proposed as a cut-off to differentiate between those at risk for falls (<45) and those not at risk for falls (≥ 45) (Berg et al., 1992). Residents of a home for the elderly without ID with a score below 45 had a 2.7 times (relative risk = 2.7, 95% CI [1.5, 4.9]) greater risk to fall over the next 12 months, than those with a score above 45 (Berg et al., 1992). However, the BBS is better at identifying non-fallers than fallers (Riddle & Stratford, 1999). The BBS was found valid for balance assessment in residents of a home for the elderly without ID, with significant correlations with other balance scales such as the Timed Up and Go ($r = -0.76$) and the Tinetti Balance subscale ($r = 0.91$) and reliable, with high inter-rater reliability (ICC = 0.98), intra-rater reliability (ICC = 0.97), and internal consistency (ICC = 0.83) (Berg, Wood-Dauphinee, & Williams, 1995; Conradsson et al., 2007; C.Y. Wang et al., 2006).

In the population with ID, the BBS was found to be a reliable instrument (Jonge, Tonino, & Hobbelen, 2010; Sackley et al., 2005) and feasible for older adults with mild to moderate ID who are able to walk for at least 10 m and understand simple instructions (Enkelaar, Smulders, van Schrojenstein Lantman-de Valk, Weerdesteyn, & Geurts, 2013). Validity has not yet been investigated in this group.

In the 'Healthy aging and intellectual disabilities' (HA-ID) study, the health of 1050 older adults (50+) with borderline to profound ID was investigated (Hilgenkamp et al., 2011). The BBS was used to assess the balance capacities and was found feasible for this group, except for the subgroups with severe to profound ID and older adults who use a wheelchair inside their homes (Hilgenkamp, van Wijck, & Evenhuis, 2013). Completions rates of these subgroups were lower than 25% (Hilgenkamp et al., 2013). In order to interpret BBS results correctly for the subgroups with a large drop-out, more detailed analysis of the reasons for drop-out of these subgroups is necessary. Furthermore, analysis on item level is important to identify subtests that are feasible in these individuals.

Therefore, the aims of this study were (a) to assess the balance capacities of older adults with ID with the BBS, and look for gender and age effects (b) to assess the reasons for drop-out on item level for subgroups with low completion rates ($<25\%$), and (c) to identify feasible subtests of the BBS for these subgroups.

2. Methods

2.1. Study design and participants

This study was part of the large Dutch cross-sectional HA-ID study executed by a consort consisting of three ID care-provider services in collaboration with two university departments (Intellectual Disability Medicine, Erasmus Medical Center at Rotterdam and the Center for Human Movement Sciences, University Medical Center at Groningen). All 2150 clients with ID, aged 50 years and over, of the three care-provider services were invited to participate, resulting in a near-representative sample of 1050 clients. Details about design, recruitment, and representativeness of the sample have been presented elsewhere (Hilgenkamp et al., 2011). Data collection took place between February 2009 and July 2010.

Ethical approval was provided by the Medical Ethical Committee at Erasmus Medical Center (MEC 2008-234) and by the ethical committees of the participating ID care-provider services. Informed consent was obtained from all participants; 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. Procedure

Data were collected as part of an extensive physical fitness assessment, which was conducted on locations familiar or close to participants: A large room within their home, a familiar daycare center, or a gym. Assessments were guided by test instructors, who all were physiotherapists, occupational therapists, or physical activity instructors with experience with individuals with ID. They all received an instruction manual and followed two days of training for the execution of all assessments.

Standardized encouragement provided by test instructions for testing individuals with normal intellectual capabilities is unsuitable for individuals with ID. To keep this motivational aspect as equal as possible, we prescribed 'maximal motivation' to the test instructors for all tests. In some cases, this meant that participants were motivated to engage in the assessments by constant verbal encouragement and verbal rewarding, in other cases the test instructor had to remain very calm and quiet