



Reliability and validity of the 6-min walk test in adults and seniors with intellectual disabilities



Myriam Guerra-Balic ^{a,1,*}, Guillermo R. Oviedo ^{a,b,1}, Casimiro Javierre ^c,
Jesús Fortuño ^a, Silvia Barnet-López ^a, Oscar Niño ^c, Juan Alamo ^c, Bo Fernhall ^d

^a FPCEE-Blanquerna, University Ramon Llull, c/ Cister 34, Barcelona 08022, Spain

^b School of Biokinetics, Recreation and Sport Science, North-West University (Potchefstroom Campus), Private Bag X 6001, Potchefstroom 2520, South Africa

^c Department of Physiological Sciences II, School of Medicine, University of Barcelona, Feixa Llarga Street, L'Hospitalet del Llobregat 08907, Spain

^d Department of Kinesiology and Nutrition, University of Illinois at Chicago, 1919 West Taylor Street, Chicago, IL 60612, USA

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ABSTRACT

Introduction: Adults with intellectual disabilities (ID) have significantly lower rates of physical activity and fitness than adults without ID. The 6-min walk test (6MWT) is an inexpensive and simple way to test mobility and submaximal work capacity.

Purpose: To evaluate the test–retest reliability and validity of the 6MWT in adults and seniors with ID and explore factors contributing to the 6MWT distance (6MWD).

Methods: 46 participants with mild, moderate and severe ID levels (age = 41 ± 11 years) performed the 6MWT three times (T1; T2; T3) to determine test–retest reliability. To test validity, peak oxygen uptake (VO₂ peak) was measured using a treadmill protocol. To analyze factors contributing to the 6MWD, sex, height, fat mass % and fat free mass %, ID level, isometric leg strength and relative VO₂ peak were also measured.

Results: The walking distances for T1, T2 and T3 were 460.3 ± 76.9; 489.4 ± 81.2 and 491.4 ± 77.9 m, respectively. The 6MWDs between T1–T2 and T1–T3 were significantly different ($p < 0.001$), but T2 and T3 were not different. The intraclass correlation coefficient between T2 and T3 was 0.96 indicating high reliability. Relative VO₂ peak and isometric leg strength significantly contributed to the 6MWD ($R^2 = 0.55$).

Conclusions: The 6MWT is an easy, inexpensive, reliable and valid test in adults and seniors with ID. Familiarization is necessary to obtain reliable values. Relative VO₂ peak and leg strength have significant impact on the distance walked.

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1. Introduction

Increasing life expectancy in persons with intellectual disabilities (ID) (Berjano Peirats & García Burgos, 2010) empathizes the importance of physical activity (PA). PA reduces limitations for daily activities and job performance, and also prevents

* Corresponding author at: c/ Cister 34, Barcelona 08022, Spain.

E-mail addresses: miriamelisagb@blanquerna.url.edu (M. Guerra-Balic), guilermorubeno@blanquerna.url.edu (G.R. Oviedo), cjavierre@ub.edu (C. Javierre), jesusfg@blanquerna.url.edu (J. Fortuño), silviabl0@blanquerna.url.edu (S. Barnet-López), oninomen9@alumnes.ub.edu (O. Niño), jalamopi7@alumnes.ub.edu (J. Alamo), fernhall@uic.edu (B. Fernhall).

¹ These two authors contributed equally to the present work.

cardiovascular (CV) risk (Barnhart & Connolly, 2007), osteoporosis (Srikanth, Cassidy, Joiner, & Teeluckdharry, 2011) and obesity (Pett et al., 2013) among others.

Adults and seniors with ID have low rates of PA and fitness compared to peers without disabilities (Baynard et al., 2008; Temple, Frey, & Stanish, 2006). Baynard et al. (2008), also showed that individuals with ID but without Down syndrome (DS) exhibit similar age related declines aerobic power and peak heart rate (HR) as the general population. Individuals with DS have lower values of aerobic capacity as well as peak HR which also decline with age (Baynard et al., 2008; Fernhall et al., 1996; Pitetti, Rimmer, & Fernhall, 1993).

Usually the aerobic power and capacity of populations with ID is evaluated with laboratory tests using a treadmill or a cycle ergometer with metabolic data analyses. If evaluations are made through field tests, several tests can be applied, including the 20 meters shuttle run test (20MRT) (Fernhall, Millar, Pitetti, Hensen, & Vukovich, 2000; Montgomery, Reid, & Koziris, 1992), 1-mile walk test (McCubbin, Rintala, & Frey, 1997), the 1.5-mile run test (Fernhall & Tymeson, 1988) and the 600-yard walk/run test (Fernhall et al., 1998).

The 6MWT is a valid, inexpensive and simple way to test mobility and submaximal exercise performance (Enright, 2003; Enright & Sherrill, 1998). Practical guidelines have been provided by the American Thoracic Society (ATS) (ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories, 2002), especially in adults and senior persons, as it is a comfortable test, safe, easy to perform and uses walking as a natural way of exercising (Enright, 2003). It is a sub-maximal test that measures cardiopulmonary functional capacity, especially for daily life activities. The ATS suggest encouraging the participants every minute, in order to obtain the best results (ATS, 2002). It is often chosen because it is easier to administer, better tolerated and better reflects activities of daily living than other walk tests (ATS, 2002; Takken et al., 2009).

The 6MWT was originally created for patients with heart and/or lung disease, in order to assess how their disease was developing. The test is reliable for patients with heart disease (Demers, McKelvie, Negassa, & Yusuf, 2001) and lung disease (Jenkins, 2007), and for other diverse populations (Casey, Wang, & Osterling, 2012; Elmahgoub, Van de Velde, Peersman, Cambier, & Calders, 2012; Eng, Dawson, & Chu, 2004; Geiger et al., 2007; Harada, Chiu, & Stewart, 1999; Nasuti, Stuart-Hill, & Temple, 2013; Pankoff, Overend, Lucy, & White, 2000; Rikli & Jones, 1998; Vis et al., 2009; Waninge, Evenhuis, van Wijk, & van der Schans, 2011).

Several studies that show how the 6MWT is also reliable in this populations with ID. Andersson, Asztalos, and Mattsson (2006) found an ICC of 0.99 while Casey et al. (2012) showed an ICC between 0.80 and 0.98, depending on ID level (mild, moderate and severe), for a population with DS. Waninge et al. (2011) have found good reliability for the 6MWT in adults with severe and profound ID.

Only two previous studies evaluated the reliability and validity of the 6MWT in a population with ID, showing good reliability and validity in groups of adolescents and adults, both with and without DS. Elmahgoub et al. (2012) performed their study with a sample of adolescents and Nasuti et al. (2013) with young Special Olympics athletes. It is unknown if the test is valid and reliable for adults and seniors with ID.

The purpose of this study was to assess the reliability and validity of the 6MWT as a test of cardiovascular fitness in a population of adults and seniors with ID, both with and without DS, in both genders and to identify predictors that contribute to the 6MWD achieved by this population.

2. Methods

2.1. Participants

Participants were from a convenience sample recruited from an Occupational Day Center for people with ID (Girona, Spain). The 116 adults (65 males/51 females) between 20 and 75 years old, with mild to severe ID from this center were invited to participate in the present study. Before beginning the study two meetings were held with the participants and parents/legal tutors to outline testing procedures, potential benefits, associated risks, and the period of time required for the study. Twenty women and twenty-six men (41 ± 11 years old) with mild to severe ID agreed to participate in the study.

There were 15 subjects with mild ID, 18 with moderate ID and 13 with severe ID. The etiology of 18 participants was obtained from their medical screening, and diagnosed as Down syndrome ($n = 13$), West syndrome ($n = 1$), cerebral palsy ($n = 2$), Cornelia Lange syndrome ($n = 1$) and Microcephaly ($n = 1$). In the rest of the 28 participants the ID etiology was unknown. Conduct disorder ($n = 13$); epilepsy ($n = 3$) and autism ($n = 2$) were associated with ID. None of the recruited participants withdrew during the study.

The classification of ID was obtained from patients' medical files and represents a combination of patient's level of intelligence and adaptive behavior. According to the National Government (Real Decreto 1971/1999), our participants' level of ID was mild to and severe. This Government order classifies the % of disability (physical, intellectual and/or sensorial) in 5 degrees as follows: non-existent (0%), border-line (15–29%), low (30–59%), moderate (60–75%) severe and very severe (profound) (>76%). It includes items such as the ability to adapt to different daily life environments (professional, cultural, family or social) and the IQ, among others.

Thirty one women (44 ± 10 years old; $n = 9$ with mild ID; $n = 13$ with moderate ID; $n = 9$ with severe ID) and thirty nine men (47 ± 11 years old; $n = 13$ with mild ID; $n = 16$ with moderate ID; $n = 10$ with severe ID) refused to be part of the study.

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