



The effect of exercise intervention on daily life activities and social participation in individuals with Down syndrome: A systematic review



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ABSTRACT

Background: Few systematic reviews have looked at the effect of exercise intervention on activities of daily living and social participation in individuals with Down syndrome (DS) across the lifespan.

Aims: To evaluate the research on the effectiveness of exercise intervention on daily life activities and participation in individuals with DS.

Methods and procedures: Studies are from six electronic databases (CINHAL, Cochrane, ERIC, PEDro, PubMed, and PsycINFO) from 1987 to 2016. Nineteen studies met inclusion criteria. American Academy for Cerebral Palsy and Developmental Medicine (AAPDM) levels of evidence and an Intervention Clinical Appraisal Form were used to independently assess study quality and outcome measures coded using the International Classification of Functioning, Disability, and Health (ICF).

Outcomes and results: There were 525 participants, age range, 3–65.5 years. The quality of the studies ranges from AAPDM Level I–IV and Intervention Clinical Appraisal Form scores of 4 to 10. A meta analysis was not conducted due to heterogeneity of studies.

Conclusions and implications: Exercise intervention was supported for both daily life activities and participation. Rigorous research studies are needed across the lifespan using objective outcome measures for ICF levels.

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What this paper adds

This study adds to the limited research evaluating the effectiveness of exercise interventions on activities of daily living (ADLs) and participation for individuals with Down syndrome (DS). Evidence does support a positive impact of exercise intervention on individuals with DS' daily life activities and participation. It was determined more rigorous research studies with objective measures analyzing level of activity and participation are needed.

Abbreviations: AAPDM, American Academy for Cerebral Palsy and Developmental Medicine; DS, Down syndrome; ICF, International Classification of Functioning, Disability, and Health; RCT, randomized controlled trial; PRT, progressive resistance training; BSF, Body, Structure, Function; RM, repetition maximum; BMI, body mass index; PedsQL, Pediatric Quality of Life Inventory; BOTMP, Bruininks-Oseretsky Test of Motor Proficiency; GMFM-88, Gross Motor Function 88.

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1. Introduction

Down syndrome (DS) is estimated to occur in approximately 1 in 732 live births in the United States. It is the most frequently identified genetic cause of developmental delay and intellectual disability (Sherman, Allen, Bean, & Freeman, 2007). Recent evidence supports an average yearly increase of 0.94 life years over the last 50 years for individuals with DS, with an average life expectancy of 60 years (Bittles & Glasson, 2004). The life expectancy trend suggests individuals with DS could be living as long as the general population within the next generation (Bittles & Glasson, 2004).

Exercise interventions and physical activity for individuals in many populations, including those with obesity, cardiovascular disease, and cancer have been well researched with strong evidence to support the benefits (Penedo & Dahn, 2005). Research results also support positive effects of exercise intervention on increased cardiovascular and muscular endurance, increased strength, and reduction in total body fat mass percentage in individuals with DS (Dodd & Shields, 2005; Mendonca, Pereira, & Fernhall, 2011; Ordonez, Rosety, & Rosety-Rodriguez, 2006; Rimmer, Heller, Wang, & Valerio, 2004).

Recently, research has begun to focus on the psychosocial implications of exercise intervention and physical activity, looking at variables such as self-efficacy, motivation, mood, satisfaction, and quality of life, also with positive results (Lee & Kim, 2014; Wilson et al., 2012). As individuals with DS are living longer, it is critically important to consider the impact of a lifetime with a disability, and areas in which impact can be made in order to increase quality of life. By impacting an individual's activities of daily living and social participation, it may be possible to increase quality of life.

With the introduction of the *International Classification of Functioning, Disability, and Health* (ICF) model by the World Health Organization (WHO), the shift has occurred in rehabilitation that focuses on the whole person and the quality of life for individuals. This standard framework for classification focuses on an individual's health, rather than disability (World Health Organization, 2002). The ICF model describes health and health-related domains as related to an individual's body function and structure, activity, and participation (World Health Organization, 2002). Body function is defined as the psychological and physiological functions of body systems; Body structure refers to all anatomical parts of the body (World Health Organization, 2002). Activity is defined as a task/action executed by an individual (World Health Organization, 2002). Participation is defined as involvement in a life/social situation (World Health Organization, 2002). The ICF model further increases the focus on an individual's health as a whole person, rather than limiting the focus to disability. One use of the ICF model is to provide a framework for research results to be systematically compared across studies. Therefore, research that focuses on the psychosocial, long term implications of exercise intervention and physical activity could be classified using the ICF model.

However, little research includes the implication of exercise intervention on activities of daily living and social participation in individuals with DS; and to date, few systematic reviews have looked at the effect of exercise intervention on activities of daily living and social participation in individuals with DS across the lifespan.

The purpose of this systematic review is to evaluate the effectiveness of exercise intervention on daily life activities and social participation in individuals with DS using all study designs in published literature.

2. Method

The method used was a systematic review with reporting according to the preferred reporting items for systematic reviews and meta-analyses statement (Moher, Liberati, Tetzlaff, & Altman, 2010).

2.1. Inclusion/exclusion criteria

Inclusion criteria: (1) all study design types; involving (2) child participants (18 years or younger) or adult participants (older than 18 years of age) diagnosed with DS (trisomy 21 (nondisjunction), translocation, or mosaicism) and results specifically pertaining to participants with DS were presented separately if other diagnoses were included; (3) all types of exercise intervention; (4) outcomes of activity limitation and/or societal participation using an objective outcome measure; (5) English language. Exclusion criteria: (1) results specifically pertaining to participants with DS were not presented and analyzed separately; (2) activity limitation and/or societal participation were not included as outcomes and objectively assessed. Exercise can be defined as any activity with physical effort.

2.2. Search strategy

Six electronic databases (CINHAL, 1937 to March 2016; Cochrane, 1955 to March 2016; ERIC, 1966 to March 2016; PEDro, last updated March 7 2016; PubMed, 1966 to March 2016, and PsycINFO, 1887 to March 2016) were searched to identify relevant articles using the following key terms: *Down syndrome* or *trisomy 21* in combination with *participation, social, social participation, muscle strength, strength, physical therapy, exercise, activities of daily living, self-care, dance, hippotherapy, and balance*. Detailed search strategies are included as Appendix A–D.

A sample of 3 titles and abstracts were screened by both authors in order to determine reliability for this process. Full text was reviewed if necessary to determine if the study met inclusion criteria.

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