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Review article

A systematic review on the effect of exercise interventions on challenging behavior for people with intellectual disabilities



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ABSTRACT

Background: Challenging behavior, such as aggressive or self-injurious behavior, is a major concern for the health and well-being of people with intellectual disabilities (ID) and for their relatives, friends, and caregivers. The most common contemporary treatments have drawbacks, such as the adverse side effects of antipsychotics. Exercise interventions could be a good alternative, but little is known about its beneficial effects on challenging behavior in people with ID yet.

Method: A systematic review of the literature was done and methodological quality of the selected studies has been judged on four points. With one-way Analysis of Variance (ANOVA), the effect of exercise interventions on challenging behavior was studied. The effect of low versus high intensity exercise interventions was studied with independent samples *T*-test using mean improvement scores.

Results: Twenty studies studying the effects of exercise interventions on challenging behavior in people with ID have been found. A quantitative evaluation of the results showed a significant decrease in challenging behavior after participating in an exercise intervention ($M = 30.9\%$, 95% CI: 25.0, 36.8). Furthermore, no significant difference was found between high ($M = 32.2\%$) and low ($M = 22.9\%$) intensity exercise interventions.

Conclusions: The found decrease in challenging behavior shows that exercise seems to be recommendable as an effective treatment for people with challenging behavior and ID. However, most studies were of low methodological quality and more research is needed to optimize recommendations about the exact intensity, duration, frequency, and mode (group or individual) of exercise interventions for this group of people.

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1. Introduction

Challenging behavior is observed in a substantial number of people with intellectual disabilities (ID). Individuals with ID are three to five times more at risk of displaying challenging behavior when compared to the general population (Emerson & Einfeld, 2011). The estimated prevalence rates of challenging behavior in people with ID vary from 10% to 19% (Emerson et al., 2001; Holden & Gitlesen, 2006; Jones et al., 2008; Lundqvist, 2013; Sigafos, Elkins, Kerr, & Attwood, 1994). The term 'challenging behavior' is used to capture abnormal, disordered behaviors such as stereotypical behavior, self-injurious behavior, aggressive or disruptive behavior, and hyperactivity (Emerson & Einfeld, 2011). In several studies, it has been shown that the occurrence of challenging behavior is higher in people with more severe ID (Borthwick-Duffy, 1994; Bosch & Ringdahl, 2001; Cooper, Smiley, Allan, et al., 2009; Cooper, Smiley, Jackson, et al., 2009; Gardner, 2002; Holden & Gitlesen, 2006; Jones et al., 2008; Kiernan & Kiernan, 1994; Oliver, Murphy, & Corbett, 1987). In a Californian study that was done years ago, one or more types of challenging behavior were reported for 7.6% of the people with mild ID, 13.6% of those with moderate ID, 22.0% of those with severe ID and 32.9% of the people with profound ID (Borthwick-Duffy, 1994). In addition to the overriding effects of level of ID, challenging behaviors are also more likely to be seen in people with additional impairments, such as vision impairments, hearing impairments (Cooper, Smiley, Jackson, et al., 2009; Jones et al., 2008; Kiernan & Kiernan, 1994; Poppes, van der Putten, & Vlaskamp, 2010), or communication problems (Emerson et al., 2001; Holden & Gitlesen, 2006; Kiernan & Kiernan, 1994; Sigafos, 2000).

Besides the fact that challenging behavior may be harmful for the individual (e.g. eating inedible objects), these behaviors are also burdensome for caregivers or care staff (e.g. non-compliance, persistent screaming, overactivity), or objectionable to others (e.g. regurgitation of food, the smearing of feces) (Emerson & Einfeld, 2011; Lundqvist, 2013). Challenging behavior diminishes opportunities to integrate in the community (Matson, Cooper, Malone, & Moskow, 2008; Rojahn, Matson, Lott, Esbensen, & Smalls, 2001; Symons, 2008) and increases the risk of overmedication (Matson et al., 2000; Stolker, Scheifes, Egberts, & Heerdink, 2008), abuse (Rusch, Hall, & Griffin, 1986), and avoidance by parents or care staff (Hastings & Brown, 2002). Furthermore, it involves high costs for society because of higher staffing ratios in these residences (Robertson et al., 2004).

Psychopharmacological interventions are the most commonly applied interventions for challenging behavior, but also restrictive measures (e.g., mechanical restraints and segregation) and behavioral approaches (e.g., functional displacement or extinction) are used (Emerson & Einfeld, 2011). In many Western countries, a significant reduction in the use of restrictive measures is pursued (Huckshorn, 2006; Inspectie voor de gezondheidszorg, 2008) along with the decrease of psychopharmacological interventions (Emerson & Einfeld, 2011; Gardner, 2002). Psychopharmacological treatments have limited efficacy, particularly when the challenging behaviors are severe (McClintock, Hall, & Oliver, 2003). Emerson and Einfeld (2011), mention several disadvantages of behavioral approaches: they often require detailed functional assessment, are complex to implement, are relatively slow acting, have a poor generalization and may be ineffective for some escape-motivated challenging behaviors (pages 123–127). These drawbacks, combined with the negative consequences of challenging behavior, stress the importance of studying alternative interventions with fewer disadvantages, such as exercise interventions. The effects of exercise interventions in the general population are well described. For example, the Physical Activity Guidelines Advisory Committee (2008) of the U.S. stated that regular physical exercise protects against the onset of depression, anxiety and feelings of distress and has a positive influence on the onset and symptoms of cognitive decline (Physical Activity Guidelines Advisory Committee, 2008). Another argument to pursue exercise interventions is that there are hardly any disadvantages or side effects of this particular intervention (Lox, Martin Ginis, & Petruzzello, 2010). In the limited studies performed with people with ID, an association between inactivity and challenging behavior has repeatedly been found (Beisser, 1970; Dodson & Mullens, 1969; Elliott, Dobbin, Rose, & Soper, 1994; Nunley, 1965; Paxton, 1970). In a literature review, Gabler-Halle, Halle, and Chung (1993) concluded that there is a strong and consistent positive correlation between participating in an exercise program and changes in behavior for people with ID. With this in mind, it is unfortunate that studies show that only 4–9% of people with ID are physically active (Emerson, 2005; Messent, Cooke, & Long, 1998). In the general worldwide population, almost 70% of the population engages in exercise activities (Hallal et al., 2012).

In the exercise literature, positive effects of exercise on mental health in the general population are well-documented (Physical Activity Guidelines Advisory Committee, 2008). Explanations for its effects that might also apply to people with ID are the sense of mastery people get after exercising (Carmeli, Orbach, Zinger-Vaknin, Morad, & Merrick, 2008; Gencoz, 1997), the increased attention participants get during intervention (Bluechardt & Shephard, 1995; Carmeli et al., 2008; Ellis, MacLean, & Gazdag, 1989; Gabler-Halle et al., 1993), fatigue from physical exertion (Bachman & Fuqua, 1983; Kern, Koegel, & Dunlap, 1984), the homeostatic regulation of arousal by exercise (Allison, Basile, & MacDonald, 1991; Henderikse, Heuvel

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