

Physical Disabilities: Education and Related Services, 2017, 36(1), 13-28.
doi: 10.14434/pders.v36i1.23144
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PDERS

ISSN: 2372-451X

<http://scholarworks.iu.edu/journals/index.php/pders/index>



Article

OBESITY, NUTRITION, AND PHYSICAL ACTIVITY FOR PEOPLE WITH SIGNIFICANT DISABILITIES

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Abstract: This review of literature focuses on health issues for individuals with Intellectual Disabilities (ID), Intellectual and Developmental Disabilities (IDD), and Multiple Impairments (MI). This population has two to three times higher overweight and obesity prevalence than typically developing individuals. Furthermore, they have higher risk for obesity related diseases such as reduced lifespan and quality of life. Contributing factors for higher rates of overweight or obesity, effective interventions, and barriers to health knowledge and practice are discussed. Implications and future research needs are highlighted.

Keywords: *multiple impairments; cognitive impairments; obesity; nutrition; physical activity*

Introduction

The United States is facing an urgent health dilemma with the current level of obesity for adults at 36.5% of the population, children and youth ages 2 to 17 at 17% (National Center for Health Statistics [NCHS], 2016). Obesity is defined as a body mass index (BMI) of 30 or higher and is calculated by a person's weight in kilograms divided by the square of height in meters (Centers for Disease Control, 2016). Obesity is associated with an increased risk for further health conditions including diabetes, hypertension, high cholesterol, cardiovascular disease, stroke, arthritis, and certain cancers (NCHS, 2016). The threat these conditions pose to public health has precipitated a focus on research, treatment, and prevention. Increasing attention focuses on dietary habits of children as childhood obesity becomes a widespread health concern, especially in terms of costs for outpatient treatments, prescription drugs, and emergency room visits (Neufeld, 2016; Trasande & Chatterjee, 2009). Health of children with significant disabilities such as intellectual disability (ID), multiple impairments (MI), or intellectual/developmental disabilities (IDD) warrants special attention because of further complications with health compared to the typical population (Gibson, Temple, Anholt, & Gaul, 2011; Stewart et al., 2009). Significant disabilities refer to several types of diagnoses (e.g., ID, MI, IDD) that prevent individuals from achieving the same number and level of skills as their typically developing peers (United States Department of Education, 2007).

ID is defined by the American Association on Intellectual and Developmental Disabilities (AAIDD) as a combination of significant deficits in both intellectual functioning (reasoning, learning, problem solving) and adaptive behavior, resulting in an IQ score of 70-75 or lower and manifesting prior to age 18 years (AAIDD, 2013). Similarly, ID is defined by the Individuals with Disabilities Education Act (IDEA) of 2004 as “significantly subaverage general intellectual functioning, existing concurrently [at the same time] with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child’s educational performance” (IDEA, 2004).

Some individuals with ID have comorbid conditions such as autism, cerebral palsy, epilepsy, communication disorders, as well as other conditions and are identified as having multiple impairments. IDEA (2004) defines multiple impairments as

concomitant [simultaneous] impairments (such as intellectual disability-blindness, intellectual disability-orthopedic impairment, etc.), the combination of which causes such severe educational needs that they cannot be accommodated in a special education program solely for one of the impairments. The term does not include deaf-blindness.

When individuals have developmental disabilities, such as autism, as well as intellectual disabilities, they are sometimes referred to as having intellectual/developmental disabilities (IDD).

Prior literature reviews indicate significant disparities in health, namely higher rates of obesity, between people with ID and people who are typically developing (Humphries, Traci, & Seekins, 2009; Reeve, Ashe, Farias, & Gostin, 2015). Areas of concern include weight, diet, and physical

activity, with a lack of sufficient behaviors related to preventing weight problems (Lin et al., 2010; Salaun & Berthouze-Aranda, 2011). These concerns for youth with ID interact with the physical and social environments in which children grow up, serving to enhance or impede improvements in health (Hubbard, Bandini, Folta, Wansink, & Must, 2014). These issues can be of concern to families, school personnel, community members, and those who work in vocational settings.

The purpose of this narrative literature review is to broadly examine the issue of obesity and related conditions for people with significant disabilities, including ID, IDD, or MI. A narrative literature review summarizes a topic using informal or subjective methods to gather the information. It differs from a systematic review in that it does not focus on a clinical research question or employ stringent or systematic search or elimination strategies (Kysh, 2013). This review was conducted by searching the terms “significant disabilities” and “health” in the ERIC, Education Research Complete, Education Full Text, and PsychInfo databases for scholarly (peer-reviewed) journal articles from 2007 to 2017. The results centered on nutrition and health habits and needs/educational needs for people with significant disabilities (i.e., ID, MI, or IDD). This review is organized around recent research pertaining to these research questions: What is the prevalence of obesity for this population and what are factors that contribute to obesity and related conditions? What interventions can facilitate a healthy lifestyle for individuals with significant disabilities? What are the barriers to acquisition of knowledge and implementation of skills needed to lead a healthy lifestyle?

Obesity: Prevalence and Contributing Factors

Children and adolescents with IDD are 2 to 3 times more likely to be obese than the general population (Rimmer, Yamaki, Davis Lowery, Wang, & Vogel, 2010; Salaun & Berthouze-Aranda, 2011). Obese children and adolescents with ID are at risk for later occurrence of hypertension, heart disease, stroke and Type II diabetes (Reilly & Kelly, 2011). Obesity in individuals with ID raises the risk of related health conditions as well as future weight gain, shorter life span, and overall diminished quality of life (Pett et al., 2013). It could thus be argued that obesity and related conditions can create further struggles for those already living with the challenges associated with ID (Begarie, Maiano, Ninot, & Azema, 2009). Furthermore, research indicates that specific disability groups are associated with the highest body mass indices (BMI): autism, spina bifida with co-occurring ID, and Down syndrome (Rimmer et al., 2010). Additionally, females with ID are more likely to have higher levels of overweight and obesity than their male counterparts (De, Small, & Baur, 2008). There are a number of factors that contribute to the increased prevalence of obesity in individuals with significant disabilities.

Contributing Factors

One factor that might contribute to increased likelihood of obesity relates to mobility issues for those who have multiple impairments. It may be that the number of people with ID who use a wheelchair or who otherwise have limited mobility could be contributing to the unusually high prevalence of obesity for those with ID due to lower levels of physical activity. Although research does support this hypothesis, there is also an extremely high rate of obesity within the ambulatory segment of this population (Ells et al., 2008; Stewart et al., 2009).

Other comorbidities include nutrition deficiencies, including both under- and overweight caused by feeding/oral motor difficulties, narrow food preferences, frequent choking episodes, dental issues, food allergies, specialized diets, and medication side effects that influence diet or metabolism (Gibson et al., 2011). Some of these comorbidities might contribute to increased risk of obesity. Although factors related to the disabling condition (e.g., mobility, medication side effects) can contribute to obesity, additional factors likely contribute to increased obesity in individuals with significant disabilities.

Just as food availability, family eating habits, convenience, preference and peer influence shape nutrition habits of typically developing adolescents (Rhee, 2008), they also influence habits of adolescents with ID (George, Shacter, & Johnson, 2011). For adolescents with significant disabilities, these factors can be compounded further into weight gain due to medication side effects and more frequent participation in and longer time periods of sedentary activities compared to typically developing peers. George et al. go on to claim that adolescents with ID frequently have inadequate comprehension of what constitutes healthy diet and exercise. Their study examined rates of obesity in the parents of children with ID, as well as common attitudes about children's weight, family diet, and exercise habits. Parents of children with ID were more likely to be obese than parents of children who were typically developing. The children with ID in the study were more likely to be obese than their typically developing peers. Also important was the discrepancy between the parents' perceptions of children's weight status (they rated it as healthy) and children's actual BMI (many of them were actually obese) calculated by the researchers.

The prevalence of, and factors contributing to, obesity for those with significant disabilities have resulted in a variety of interventions targeting obesity. The goal of many interventions is to improve the skills of individuals with significant disabilities as related to nutrition/dietary patterns and physical activity.

Effective Interventions

Two factors that contribute to obesity in the ID population are dietary patterns and level of physical activity. There is evidence supporting interventions that target nutrition and exercise interventions, separately or combined (Katz, O'Connell, Njike, Yeh, & Nawaz, 2008).

Nutrition Interventions

The literature indicates need for improvement in lifestyle behaviors for individuals with significant disabilities. Within the existing body of literature there are promising methods for delivery of diet and nutrition information. These methods include picture-supported guides (e.g., line drawings, photographs), sorting visuals such as line drawings or photos and actual foods into categories and bins according to food type and healthfulness, practice with measuring food into appropriate portions, and tasting and rating healthy snacks for preference (Fleming et al., 2008).

Further evidence suggests that research-based health improvement programs can benefit from modifications to target youth with moderate to high support needs. Modifications are needed due to special dietary needs, recipe complexity, family involvement, and communication deficits

(Hinckson, Dickinson, Water, Sands, & Penman, 2013). These researchers go on to suggest that incorporating picture supports, color coding, age appropriate music, as well as game- and water-based exercise have been shown to improve access to health programming. In this same study, targeted skills for teaching revolved around portioning, selecting food types, eating out, grocery shopping, identifying triggers for overeating, and learning proper sleep habits. The authors found trivial or unclear outcomes, except for one significant outcome, which was that participants increased the distance walked for exercise. However, parents of participants reported fewer doctor visits and school absences and there was an overall reduction in eating sweets for the participants during the program.

Physical Activity Interventions

Interventions targeting increased exercise or physical activity can be school- or community-based as well as involve technology. School-based interventions include those incorporated into the daily schedule or into the curriculum and can involve peers. Community-based interventions can include various after school activities and those based in the community such as Special Olympics. Technology-related activities can revolve around popular technologies such as Nintendo Wii as well as more specialized technologies involving micro-switches.

School settings. Children with ID tend to exercise less than typically developing peers and levels of exercise decline as children with ID move through adolescence into adulthood (Shields, Dodd, & Ablitt, 2009). Of further concern are changes to school schedules to allow for more instructional time and less physical education and recess. Unfortunately, when physical education and athletics for children with ID do occur, these activities are often adult-led and presented in structured settings that do not include many, if any, typical peers (including adaptive physical education services targeting students with disabilities only, and activities led by teachers of self-contained adaptive skills programs) (Casey, Rasmussen, MacKenzie, & Glenn, 2010).

In response to these problems, there have been some recent efforts to examine the role that peers have in motivating children with significant disabilities to develop healthy play and exercise behaviors at a young age. There is evidence that structured interventions in school settings through peer training and support can significantly enhance social connections for adolescents with significant disabilities (Asmus et al., 2017).

Though some studies have shown positive outcomes with modeling of exercise with error correction (Fleming et al., 2008), it has been the goal of recent research to improve levels of physical fitness through promotion of positive peer relationships. One study showed an increase in interaction among students with significant disabilities and their peers following peer training in how to provide coaching to students with disabilities (Klavina & Block, 2008). Other researchers suggest that children with significant disabilities in school settings may need a continuum of options to participate in physical activity, including specialized settings, reverse inclusion, and full inclusion (Block, Taliaferro, & Moran, 2013).

Community settings. Various Special Olympics chapters at the state and local levels have developed initiatives to improve food choice, weight, hygiene, strength, flexibility, endurance, exercise and sleep habits. These initiatives have various levels of participation with varying

degrees of support from Special Olympics' employees and community partners, and include classes for athletes and their families or caregivers to improve health knowledge and practice as measured by pre- and post-tests. Marks, Sisirak, Heller and Wagner (2010) found evidence for improvements in all of the above health indicators within five of the organization's pilot projects across five different states. Although over four million individuals with disabilities participate in Special Olympics-affiliated events (Special Olympics, 2015), which are considered "specialized" sports with all participants having a disability, there has been a recent goal to expand their integration into sports with peers without disabilities.

According to Grandisson, Tetreault, and Freeman (2012), "integration" is defined as most of the participants being typically developing, rather than "unified" (about half have disabilities), or inclusion into school-based physical education. Their research maintains that gains made by participating in sports appear to generalize to other areas of life, such as school and career for adolescents with ID, and families of participants report less stress and more fulfillment. Other research emphasizes the importance of activity preference, context, and experience when encouraging peer support for children with significant disabilities in community settings (Shields, Synnot, & Kearns, 2015).

Norins, Harada, Parker, and Brecklinghaus (2008) have claimed gains for typically developing peers in integrating children with disabilities into sports such as increases in tolerance for differences and building of respect and equity between themselves and those with disabilities. Stanish and Temple (2012) found evidence that pairing adolescents with ID with typically developing peers in community settings improved physical fitness levels for those with ID.

Other community-based initiatives exist that have indicated social, fitness, and weight reduction benefits for adults with ID (Heller, McCubbin, Drum, & Peterson, 2011). Yan, Finn, and Corcoran (2015) specifically found reductions in waist circumference, level of participation in exercise, improvement in sit-to-stand, and balance tests following a 6-week program of one-to-one peer models. Other researchers found improvement in cardiovascular fitness, balance, upper and lower body strength, and flexibility in adults with ID compared to a control group after 14 weeks of guided training in endurance, strength, and balance exercises. Endurance exercises included walking, jogging, and aerobics. Strength training included free weights, resistance bands, and medicine balls. Balance training included varying stride length, work on single legs, line walking, and use of some balancing pads of different elevations (Oviedo, Guerra-Balic, Baynard, & Javierre, 2014).

Use of technology. Dickinson and Place (2014) sought to utilize the engagement that many children with multiple impairments, specifically ID and autism, have in electronics to improve physical health. In a randomized controlled study, they assigned children with multiple impairments to a Nintendo Wii exercise game, with hopes that the children's markers of physical fitness would improve significantly over the course of a year compared to a control group. The authors did find improvement in all markers of physical fitness on the Eurofit fitness assessment, except for flexibility. The children improved significantly in strength, endurance, speed and BMI measurements.

In another study using technology to improve health for obese students with ID, Chang, Shih, and Lin (2014) evaluated activation of students' favorite music videos by students pedaling a stationary bicycle with the pedaling motion linked to the screen by use of an air mouse device. The authors predicted that the students would be more likely to continuously pedal, and therefore exercise, if the pedaling kept the videos on display. A significant increase in pedaling time was found for the condition of the video stimuli compared to the condition in which no video stimuli were received.

Summary

Specific interventions (e.g., adapted materials using picture supports) can lead to improved dietary behaviors for individuals with significant disabilities. Additionally, individuals with significant disabilities can experience enhanced physical activity when they are involved with their typically developing peers in both school- and community-based programs. Finally, technology-based interventions (e.g., Nintendo Wii) also contribute to increased physical activity for individuals with significant disabilities. Unfortunately, a variety of barriers interfere with knowledge and skill acquisition.

Barriers to Knowledge and Skill Acquisition

Barriers to acquisition of knowledge and skill in multiple areas are well documented for people with significant and multiple disabilities. Some of these barriers are related to the disability itself while others are more logistical. Barriers include lack of understanding of consequences for choices or overestimation of actual health status for all ages in this group (Brehmer-Rinderer, Zigrovic, & Weber, 2014). Similarly, implementation of acquired knowledge by the individuals with ID is made more complex by the tendency of those individuals to overestimate their own competence (Salaun, Reynes, & Berthouze-Aranda, 2014). Existence of diminished motor capabilities is also problematic for some, as it affects participation in physical activity (Rimmer et al., 2010). Another barrier related to the disability itself can be the need for expensive specialized equipment and transportation for participation in community recreation (Mulligan, Hale, Whitehead, & Baxter, 2012).

Age appropriate leisure activities that tend to be passive such as watching television, playing games, or looking at magazines (Block et al., 2013) present a barrier. Organizational and individual constraints, such as resources, age limits, ease of access, motivation, skill level, and reliance on caregivers were also identified as barriers (Taliaferro & Hammond, 2016). There is also a lack of professionals who have exercise and nutrition expertise and who are also trained in instruction of people with significant disabilities (Fleming et al., 2008).

Another barrier is lack of assessment of knowledge of children with ID (Maiano, Begarie, Morin, Garbarino, & Ninot, 2010). There are assessment tools to measure nutritional deficiencies and risks completed by the parent or caregiver, though not from the child's perspective (Penagini, Marni, Fabiano, Brunetti, Dilillo, & Zuccotti, 2015). Instrumentation also exists to assess nutrition knowledge of individuals with physical, but not intellectual disabilities (Rastmanesh, Taleban, Kimiagar, Mehrabi, & Salehi, 2007) and adults, but not children, with ID (Illingworth, Moore, & McGillivray, 2003). This lack of knowledge assessment designed for children with

significant disabilities is problematic for school age students because assessment is an essential step of building an Individualized Education Program (IEP) (U.S. Department of Education, 2007). If the school team wishes to address health as part of the child's adaptive behavior skills, there is a gap in instrumentation to do so. For individuals that have transitioned out of the school system, this lack of assessment during their K-12 experience could present a barrier to independent living skills.

Furthermore, many individuals require intervention from families or caregivers in order to maintain consistent use of skills (Kleinert, Miracle, & Sheppard-Jones, 2007). This includes the need for caregivers to identify and help implement life goals that avoid the deficit view of disability, when the focus should be on positive lifestyle and independent living (Carrington & Lennox, 2008). Unfortunately, research demonstrates that caregivers may have poor levels of knowledge about proper diet and exercise (Melville et al., 2009). Data from these authors indicate that over 25% of caregivers acknowledged barriers to changing a person's lifestyle; however, the caregivers reported that the barriers were irrelevant to their client's abilities to change diet choices (Melville et al., 2009). Melville et al. went on to show that caregivers' attitudes toward physical activity are that it is much less important in maintaining a healthy lifestyle than food choices. These limitations in caregivers' knowledge and attitudes can restrict their guidance in facilitating lifestyle changes for individuals with ID (Melville et al.).

Recommendations

A number of recommendations emerge directly or are implied from this literature review:

- University teacher education programs are encouraged to embed more training in health education for future special education teachers so that teachers can incorporate effective interventions such as:
 - Specifically including information about nutrition, diet, and exercise in classroom curriculum
 - Providing adaptations such as picture supports to teach nutrition and other related skills
 - Directly teaching individuals with significant disabilities to participate in physical activities
 - Encouraging physical activity interactions with peers without disabilities to facilitate improved skills for individuals with significant disabilities
 - Encouraging participation in community-based activities
 - Supporting student knowledge of cause and effect, as well as teaching students concrete definitions of healthy choices. Student should also be taught how to compare their own behavior to the definitions of healthy habits.
- Address logistical barriers through strategies such as:
 - Using a community facility that has universal access
 - Holding activities in a central location within a town or city
 - Holding activities at a time where caregiver schedules most likely allow assistance in getting to and from the location
 - Holding activities often enough that individuals get a chance to practice skills regularly and ensuring sessions are long enough to build and practice skills, but not so long that the time commitment is too great to hold sessions consistently.

- Prioritizing activities that can be enjoyed by all without the use of specialized equipment to avoid lack of equipment as a barrier.
- Provide caregiving training on supporting people with significant disabilities to improve health habits. This includes building caregiver knowledge of healthy choices, as well as methodology in teaching that knowledge to those with significant disabilities in their care.

Future Research

When considering the issue of appropriate nutrition and physical activity for individuals with significant disabilities, there are still questions that need to be answered. Some future research needs emerged from this current review and expand on research already conducted while in other cases new research may be needed.

Expanding Existing Research

Future research should include measures of social validation by participants with significant disabilities in research studies. Social validity refers to how interventions are accepted by participants as well as participant satisfaction with procedures. Including such measures might help to determine the likelihood of generalization and maintenance of improved behavior of participants with significant disabilities. If participants and their families are satisfied with changes in behavior and perceive procedures as acceptable, it might be more likely that improved behavior will be maintained and perhaps even generalized. In contrast, if participants indicate dissatisfaction upon completion of a study, it is likely that any improvements in behavior will not be maintained or generalized. It is important that successful interventions are acceptable to both participants with significant disabilities and their families to increase the likelihood of maintenance and generalization.

Another area of future research should specifically target a systematic review of the existing research using recommendations from the *What Works Clearinghouse* (WWC). The WWC provides guidelines for evaluating the methodological rigor of studies as well as assessing the strength of intervention effects. Such a systematic review could further contribute to the literature by providing a comprehensive synthesis of rigorous, effective interventions.

New Areas of Research

There are a number of topics which were not addressed within the current review because there appears to be no or limited research on the topics. These topics may be of importance for future research targeting nutrition or physical activity for individuals with significant disabilities.

How does socioeconomic status (SES) affect individuals with disabilities and their families? What is the incidence of individuals with ID living in “food deserts?” Food deserts are areas of the country where fresh food is scarce, usually within impoverished areas (American Nutrition Association, 2015). Are there higher numbers of individuals with significant disabilities living within food deserts than outside of them? Is there a shortage of adult disability services that cause lower SES for individuals with ID, thereby contributing to living in poverty?

For adult individuals with significant disabilities who live in supported living (group homes), what level of support is needed for the individuals to exercise healthy food choices? Are they being taught to shop for groceries themselves or relying on staff to shop? If so, how much control do the individuals with ID or IDD have over what is purchased? Additionally, how much control do these adults have over menu planning, portion sizes, as well as options for type and amount of exercise? How much preparation is being given to adolescents in the school system before they transition to these settings?

For those individuals living in ICF-IDDs (Centers for Medicaid and Medicare Services, 2016), what level of services in nutrition and other areas of health are provided? What are the minimum requirements for services to the residents? At what level of fidelity are these services actually provided? This review touched upon narrow food preferences or options for this population. What research and intervention exist in treating food refusal for this population? Can restrictive choices be improved through applied behavior analysis?

Limitations

A limitation of this literature review is that it was conducted as a narrative review rather than as a systematic review. Following the guidelines of a systematic review would have served to strengthen the quantitative credibility of research to date related to obesity, nutrition, and physical activity for individuals with significant disabilities. A systematic analysis of the quality of current research might result in different findings than the current review as well as identify limitations in research quality that should be addressed in future research.

Closing Comments

There is a substantial amount of evidence outlining the risks faced by individuals with ID if the level of obesity and related conditions continue to increase. Also, the barriers faced by this population create a greater risk of health conditions than the typically developing population, which is facing its own rise in health problems. Although the barriers are clear and include those related to the disability itself (e.g., co-morbid conditions), knowledge (e.g., over estimation of competence or of cause and effect), and logistical concerns (e.g., scheduling, specialized equipment), there is some early and emergent methodology to suggest specific interventions can lead to improvements for people with significant disabilities (e.g., adapted materials, peer supports, use of technology). However, there is a need for continued research in the area (e.g., social validation of interventions, existence of food deserts and their impact, effective interventions in supported living situations). Providing specific interventions for individuals with significant disabilities and training for caregivers, parents, and teachers on instilling behaviors conducive to health improvement beginning early in life can lead to improved outcomes for individuals with significant disabilities.

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