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Reducing Obesity Among People With Disabilities

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Abstract

Achieving healthy weight for people with disabilities in the United States is a challenge. Obesity rates for adults and children with disabilities are significantly higher than for those without disabilities, with differences remaining even when controlling for other factors. Reasons for this disparity include lack of healthy food options for many people with disabilities living in restrictive environments, difficulty with chewing or swallowing food, medication use contributing to changes in appetite, physical limitations that can reduce a person's ability to exercise, constant pain, energy imbalance, lack of accessible environments in which to exercise or fully participate in other activities, and resource scarcity among many segments of the disability population. In order for there to be a coordinated national effort to address this issue, a framework needs to be developed from which research, policy, and practice can emerge. This paper reviews existing literature and presents a conceptual model that can be used to inform such a framework, provides examples of promising practices, and discusses challenges and opportunities moving forward.

Keywords

disability; conceptual model; disparities; obesity; surveillance

The scope and breadth of disparity in obesity between disability and nondisability populations is still emerging, largely owing to a relatively small amount of dedicated research that has been undertaken examining this area in great depth. Disability and health communities face many pressing health-related issues, among which, achieving healthy weight by reducing obesity may not have been considered among their highest profile. Scientific inquiry that investigates more closely the complex relationships between obesity and disability using currently available population data can expand the science in this area and inform policies leading to medical and public health practices that may help reduce this disparity. But to do so in a systematic and coordinated manner first requires a broad

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understanding of the context of the problem. This contextual overview is noticeably lacking in the scientific and policy-related literature at this point. This paper is intended to help fill this gap through a discussion of science associated with obesity and disability, describing a sample of public health efforts being used to address the issue, updating an approach to modeling the problem, and synthesizing this further into key challenges that represent problems and opportunities for researchers, policy makers, and health professionals moving forward.

While it may be emergent, the evidence presented from population-based data sources seems compelling. People with disabilities are at disproportionate risk for obesity. Adults with a disability are 53% more likely to be obese (38.5% vs. 25.1%) than adults without a disability. Nearly half (46.7%) of adults who report ambulatory difficulty and about a third of adults with a cognitive limitation (32.7%) or visual limitation (34.5%) are obese (Fox, Swanson, & Krahn, 2012). Obesity among children with developmental disabilities (29.7%) and autism (30.4%) also appears significantly higher compared with children in the general population (Bandini, Curtin, Hamad, Tybor, & Must, 2005; Curtin, Anderson, Must, & Bandini, 2010), while obesity rates in children with chronic conditions ranged from 58% to 93% higher than in children without them (Chen, Kim, Houtrow, & Newacheck, 2010; Rimmer, 2011). In addition, people with disabilities are at an increased risk for experiencing multiple related comorbidities and serious health conditions related to obesity, including type 2 diabetes and cardiovascular disease (Reichard & Fox, 2013; Reichard, Stolzle, & Fox, 2011).

Although obesity affects individuals of all ages, genders, and racial/ethnic groups, there are some subpopulations which appear to be at highest risk. Rimmer, Yamaki, Davis, Wang, and Vogel (2011) have presented prevalence rates for youth and adults with disabilities in separate works that demonstrate the added effects of race and ethnicity on obesity for those with disabilities. Among adolescents, when broken out by race/ethnicity, 17% of Caucasians with disabilities were obese, compared with 25% of African Americans and 23% of Hispanics, all well above averages for youth in the general population (Rimmer et al., 2011). Among adults, 54% of Caucasians with disabilities were obese, compared with 70% of African Americans and 44% of Hispanics, also higher than for the general populace (Rimmer & Wang, 2005). There is reason to believe that cultural, environmental, and socioeconomic factors are associated with the higher prevalence of obesity in disability populations, including lack of physical activity (Centers for Disease Control and Prevention [CDC], 2008), differences in attitudes, and cultural norms regarding body weight (Millstein et al., 2008), lack of access to affordable, healthful foods, and safe locations for physical activity (Adler & Stewart, 2009). As these studies help illustrate, the epidemiology of obesity and disability suggests a complex relationship between the two factors.

The Relationship Between Obesity and Disability

An association between obesity and disability has been recognized for some time (Ferraro, Su, Gretebeck, Black, & Badylak, 2002; Launer, Harris, Rumpel, & Madans, 1994; Weil et al., 2002), but categorizing the nature of this association has proven challenging. Research related to obesity and disability can broadly be grouped into (a) analyses that help us

understand the target population better, including studies using existing surveillance tools, or studies that identify, provide greater focus to, or characterize the problem, and (b) research that evaluates or describes interventions among subsets of the disability population with obesity. At present, both bodies of research primarily explore the relationship between weight and disability on older individuals, with the intent of investigating causal pathways that seek to interpret how obesity influences disability over the course of the life span. Vincent, Vincent, and Lamb (2010) systematically reviewed 795 such research studies using criteria of medical subject headings and keywords like obesity, obese, disability, mobility, functional limitation, body fat, adiposity, older adult, old age, and elderly for published literature from 1965 through 2009. After excluding studies using self-reported data or those that did not adequately measure mobility or perform statistical testing, 28 studies, 13 cross-sectional and 15 longitudinal, were identified. Summarizing the results of these studies led to their conclusion that increased fat combined with the relative or absolute reduction in skeletal muscle influences the development of mobility and functional impairments, which appears more severe in women than men as people age. Notably, only two of the cited studies included adults under the age of 50, in both cases utilizing subjects as young as those in their early 20s.

Establishing the link between obesity and disability among older persons is important to understand some of the commonalities that may extend to younger populations. Functionally, disability among older persons has many parallels with other segments of the disability community, extending all the way to children. If a person has a mobility limitation, he or she shares potential health risks and more limited opportunities for full participation in society with many other people with disabilities across the life span. Aside from the potential interaction effect that obesity and old age have (i.e., obesity placing additional stress on body systems that decline in efficiency as a consequence of the aging process), the primary limitation of this research appears to be its directionality; does disability lead to obesity or does obesity lead to disability? Most of the studies cited by Vincent and colleagues (2010) identify ways in which obesity can lead to disability rather than the potential of disability leading to obesity. This avenue of analysis can lead to discussions of whether obesity itself represents a disability. These can be found in legal commentaries that speculate on the potential impact of the Americans With Disabilities Act Amendment Act of 2008 (ADAAA) on obesity as a disability based upon discrimination toward persons who have an actual or perceived impairment associated with their obesity (Sack & Green, 2010; Thompson, 2010). This approach to considering the relationship between obesity and disability assumes a causal pathway in which obesity leads to disability, an effect that could be disproportionately magnified by stress on body systems that decline in efficiency as a consequence of the aging process.

This is not, however, the only way to consider this relationship. McDermott and Turk (2011) stress the need to identify obesity as an outcome of the disability condition, and other research that focuses on people with disabilities supports this approach. A number of studies provide evidence of increased obesity in children with disabilities compared with typical children (Bandini et al., 2005; Rimmer, Rowland, & Yamaki, 2007; Yamaki, Rimmer, Lowry, & Vogel, 2011). Consistent findings of disparities in obesity rates between children with and without disability suggest that obesity can be associated with the existence of the

disability and that the disability may increase the risk of obesity, not necessarily be caused by it.

In addition to identifying evidence that the relationship between obesity and disability is bidirectional depending on age and condition, the question could be raised about how much this really matters. Regardless of whether disability precedes or follows the underlying condition, public health practice requires developing interventions that focus on the known consequences of obesity, such as heart disease, diabetes, arthritis, asthma or injuries, inclusive of all people. The public health burden associated with disability and obesity remains constant no matter which comes first. For interventions to be translated into practice that can address the unique needs of people with disabilities throughout the life span, research must help us better understand the population at risk and point us toward effective systemic or personalized public health practices specifically designed for our entire population, inclusive of people with disabilities.

Scientific and Policy-Related Issues

Complicating research on the prevalence of obesity and public health interventions in the disability population are several key science and policy issues, including those related to the measurement of obesity, medication use, and physical activity, each briefly discussed here.

Disability status can affect how obesity is determined, among children and adults, due to physiological and anatomical differences as well as access issues. Body mass index (BMI), calculated using an individual's height and weight, is one of the most commonly used approaches for determining obesity status; however, its application among individuals with disabilities presents many issues. Many people with disabilities have gone an extended period of time without having their height or weight accurately measured for a variety of reasons, making it difficult to accurately self-report height and weight (Froehlich-Grobe, Nary, Van Sciver, Washburn, & Aaronson, 2012). These reasons may include delaying visits to physicians for reasons related to cost or other factors, thereby preventing weight and height from being measured (Iezzoni & O'Day, 2006; Lee, Hasnain-Wynia, & Lau, 2012; Reis, Breslin, Iezzoni, & Kirschner, 2004). In addition, physicians' offices have limited availability of accessible scales, and therefore may be unable to accurately measure the weight of patients who use wheelchairs and other mobility devices (Graham & Mann, 2008). It is also difficult to achieve an accurate measurement of height for individuals with mobility limitations who are unable to stand or lay completely straight (Rimmer & Wang, 2005).

Behavioral factors associated with people with intellectual disabilities (ID), such as lack of cooperation or sensitivity to touch, may further inhibit the quality of measurement in a clinical setting (Havercamp, Scandlin, & Roth, 2004; Parish & Saville, 2006). For those who are able to obtain accurate height and weight measurements, BMI still presents challenges because the generally accepted cut-points do not address differences in body shape, including limb loss/limb difference, and body composition (Alschuler, et al., 2012; Bucholz & Bugaresti, 2005; Laughton, Martin Ginis, Goy, & SHAPE SCI Research Group, 2009). Changes in body shape and composition raise additional questions regarding the use of BMI and other norm-referenced anthropometric assessments of obesity, including circumference

and skin fold measurements (Alschuler, et al., 2012; Bucholz & Bugaresti, 2005; Laughton et al., 2009; Rajan, McNeely, Warms, & Goldstein, 2008).

The immediate implications of these measurement issues is that existing surveillance of obesity, often based on the calculation of BMI, is suspect for many segments of the disability population. For example, research suggests that dual-energy X-ray absorptiometry (DEXA) scans in people with spinal cord injury, a form of measurement that accurately determines fat in body mass through the use of specialized equipment unavailable for large-scale use, show excessive body fat even when BMIs are within the normal range (Laughton et al., 2009; McDonald, Abresch-Meyer, Nelson, & Widman, 2007). However, even DEXA scans are not practical for use on a large scale because of their cost and availability. Adjustments using condition-specific cutoffs (McDonald et al., 2007; Temple, Walkley, & Greenway, 2010) or adjusted calculations for BMI (Shurtleff, Walker, Duguay, Peterson, & Cardenas, 2010) and other measures may help lessen misclassification of obesity for some people with disabilities, increasing the accuracy of identifying health disparities, at-risk groups, and effective interventions.

In addition, as a result of the condition causing the disability or related secondary conditions, people with disabilities are more likely to take medication than people without a disability (Mueller, Schur, & O'Connell, 1997; Pastor, Rueben, & Loeb, 2009). Certain types of medications such as antipsychotics, antidepressants, mood stabilizers, anticonvulsants, and corticosteroids often include weight gain as a potential side effect, and these medications are used in treatment of people with a variety of disabling conditions (Minihan, Fitch, & Must, 2007). New research can help determine what role medication plays in the development of obesity among people with disabilities and what the best policies may be to encourage a balance of pharmacologic benefit of medication with maintenance of a healthy weight.

Physical activity is regularly cited as a means for managing weight, but people with disabilities may face an array of barriers to participation. For people with physical and sensory disabilities, they may be limited in the types of physical activity in which they can safely participate (Buffart, Westendorp, van den Berg-Emons, Stam, & Roebroek, 2009; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). Limitations must be considered in developing interventions related to physical activity for these populations, and more research may lead to the development of parameters to account for these limitations. At issue for people with disabilities is whether energy expenditure during physical activity compares with people without a disability (Lante, Reece, & Walkley, 2010). Research on energy expenditure for people with physical disabilities can provide better information about caloric expenditure during physical activity and will likely lead to policies related to updated activity recommendations among people with physical disabilities in the future. This line of research can be enhanced further if it is possible to evaluate what effect obesity has on disability over time, an emerging issue as new medical treatment allows people with disabilities opportunities to live longer and with improved quality of life.

Programs Targeting Obesity Among People With Disabilities

While it is known that regular physical activity and good nutrition provide important health benefits for people with disabilities similar to people without disabilities (White, Gonda, Peterson, Drum, & RRTC Expert Panel on Health, 2011), few studies have evaluated interventions that target these behaviors among people with disabilities. This is not surprising given the relative paucity of systematically reviewed, evidence-based provider or community-based obesity-reduction strategies shown to be effective for the general population (Community Preventive Services Task Force, 2010). A summary of obesity-related interventions focusing on children and adolescents with disabilities concluded that most studies were conducted in clinical settings where common barriers to participation such as transportation, lack of knowledgeable staff, and program or facility adaptation were eliminated (Rimmer & Rowland, 2008). This limits the ability to generalize results of these studies to community settings where people with disabilities live and where many environmental and personal factors influence access to physical activity and good nutrition (Rimmer & Rowland, 2008).

The challenges to evaluating community-based health promotion programs targeting people with disabilities are many. They include issues such as the ability to accurately define disability and distinguish disability type within community settings (e.g., physical versus intellectual, functional versus conditional, severity), measuring weight for people with disabilities whose conditions may compromise measuring height relative to weight or body mass (e.g., limb loss, paralysis, curvature of the spine; Rajan et al., 2008), the difficulty of controlling for external factors tied to varying levels of social capital, such as family supports or accessible environments (Fox, White, Rooney, & Cahill, 2010), potential interactions between disabling conditions, and other health conditions that may contribute to weight gain, either through medication use or physiological processes, (Minihan et al., 2007), and challenges in recruiting members of the target population (Nary, Froehlich-Grobe, & Aaronson, 2011). Despite these evaluation challenges, much can be learned from promising public health practices that have begun to address obesity in this population.

Overview of Some Existing Obesity Programs Targeting People With Disabilities

Current efforts to reduce disparities in obesity among children, youth, and adults with disabilities can best be described as being undertaken through (a) including them in efforts and programs offered to the general population where possible, (b) taking an across-disabilities approach where necessary, and (c) using a condition-specific approach where that is essential. These programs, practices, and policies can be categorized as either *systemic* or *personalized* approaches to addressing the problem. Systemic approaches are those in which broad changes are initiated in ways that can alter the person–environment dynamic for people with disabilities. Personalized approaches focus more on individual behavioral change.

Examples of Systemic Approaches to Reducing Obesity Among People With Disabilities

The North Carolina Office of Disability and Health, funded by the CDC, has developed a community-centered training model based on the publication *Removing Barriers to Health Clubs and Fitness Facilities: A Guide for Accommodating All Members, Including People With Disabilities and Older Adults* (North Carolina Office on Disability and Health, 2008). Aiming to create inclusive fitness environments, training involves an on-site workshop at a community fitness facility, an accessibility survey, and development of a plan of action to remove identified barriers. In addition, Just Push Play was released by Be Active North Carolina in 2009 to promote environmental policy change in the school setting so that healthy, active lifestyles are the “norm,” not the exception (NC Prevention Partners, 2012). Be Active NC targets all areas of the school including classrooms, before- and after-school programs, physical education classes, and school employees.

The National Center on Health, Physical Activity, and Disability (NCHPAD), in partnership with the Inclusive Fitness Coalition (IFC), strives to break down the environmental, programmatic, and attitudinal barriers that people with disabilities face through increasing inclusion of people with disabilities into mainstream fitness and recreation, and providing a collective voice to educate people working in the fitness sector (NCHPAD, 2012a). One approach they take is to work with the American College of Sports Medicine (ACSM) on certifying fitness professionals to be proficient in approaches that are inclusive of people of all abilities (ACSM, 2011).

A complementary approach has been taken by Special Olympics (SO) in its Healthy Athletes program (SO, 2012). Healthy Athletes uses participation in SO as an opportunity to provide health assessments at selected events. By linking fitness to overall wellness, SO offers a model for linking sports, health, and medical screenings that shows promise for preventing or reducing obesity in the population of individuals with ID who participate in their program.

Examples of Personalized Approaches to Reducing Obesity Among People With Disabilities

Living Well With a Disability, is a 10-week wellness workshop for people with disabilities that aims to help participants develop goals for meaningful activities that are linked to the development of a healthy lifestyle (University of Montana, 2009). Nutrition and physical activity are heavily incorporated into the curriculum intended to promote improvements in outlook, community participation, lifestyle, and health.

Steps to Your Health, developed by the South Carolina Disabilities and Health Project and the University of South Carolina School of Medicine, is a 10-week, community-based health promotion and wellness program designed for adults with ID (South Carolina Disability and Health Project, 2003). The goal of developing healthy behaviors and improving health status is achieved through two home visits and 8 weeks of small group interactive lessons covering nutrition, exercise, stress management, cognitive restructuring, communication styles, complications of obesity, behavior management, and relapse prevention.

The NCHPAD (2012b) has developed an Internet-based physical activity and nutrition program called the 14-Week Program to Healthier You. This program is free, personalized, and targets people with mobility limitations, chronic health conditions, and physical disabilities.

Materials Supporting Education and Nutrition for Adults with Intellectual or Developmental Disabilities (MENU-AIDDs) developed by the Montana Disability and Health Program, is a nutrition program designed specifically for adults with ID in a group home setting (Good Nutrition Ideas, 2008). The program provides easy-to-understand materials including a 180-page coordinated resource for menu planning, recipes, shopping assistance, and nutrition education for group home staff and residents to develop and maintain sound nutritional meals within the home.

The Oregon Office on Disability and Health developed Healthy Lifestyles for People With Disabilities, a program designed to assist individuals with disabilities in developing confidence and skills to achieve a healthy lifestyle. The program embodies the self-determination model and takes a holistic approach to health.

Building on research and existing practice, a conceptual model for a broad public health strategy to address obesity in the population of persons with disability can be used as a stepping stone toward meeting the unique challenges of this public health problem in the coming years. While the field has greatly benefited from the predominantly medical-oriented conceptual overview that has represented the dominant model in the field till now, which we describe below, we also will present a new socio-environmental model building on it in ways informed by recent research and practices described above.

Modeling Obesity, Disability, and Health

Liou, Pi-Sunyer, and Laferrere (2005) reviewed existing population-based approaches to monitoring obesity and disability. Clinical studies cited in their review document the relationship of body composition to people with physical disabilities using measurement devices such as DEXA scans or MRI (magnetic resonance imaging) which are not subject to the same limitations as self-reported data but are undertaken in studies that offer limited generalizability since they are not population based. The primary benefit of these studies is to establish baseline levels of obesity for discrete disability populations, such as people with spinal cord injuries, cerebral palsy, Duchenne muscular dystrophy, cerebrovascular accidents, multiple sclerosis, and neuromuscular disease. A review of additional clinical studies, many of which include work related to body composition, shows reduced energy expenditures for people with most of these same physical disabilities using measurement approaches such as indirect calorimetry or heart rate monitors. Another component of weight gain, reduced energy expenditures, is part of the larger mechanism that then goes into the resultant person-level (not system-level) model describing the relationship between physical disability and obesity, shown in Figure 1.

Especially noteworthy is the progression from the disabling condition (i.e., spina bifida, Duchenne muscular dystrophy, cerebral palsy, etc.) to the disability (i.e., functional and/or symptomatic expression of the condition), to physical inactivity, and muscle atrophy. Each

of these factors then lead to reduced total energy expenditure as a result of reductions in physical activity, volume of lean body mass, and the resultant decline in resting energy. Being left with an ongoing positive energy balance (more calories consumed than expended), leads to obesity and its connection to secondary conditions.

Building on this model can be done in a way which takes into account numerous socio-environmental factors and takes a more system-level approach to this relationship. One way of accounting for these factors is a visual format that identifies domains contributing to a sequential progression of inputs, conversions, and outputs associated with addressing obesity among people with disabilities, illustrated in Figure 2.

This conceptual model represents a socio-environmental roadmap for addressing obesity among people with disabilities that builds upon knowledge gained since publication of Liou's earlier model. The model illustrates a process that promotes policy guidelines, educational or communications information, cultural competencies, and evidence-based research, ultimately leading to improvements in population-based outcomes and wider inclusion of people with disabilities into programs and practices associated with maintaining health for their populations. At its core is a basic system that converts the initial resources ("inputs") into products ("outputs") such as peer-reviewed papers and interventions, becoming part of an expanded knowledge base, collaborations or policy development. The conversion process is driven by surveillance and research, operating in tandem with effective communication strategies and program implementation. The entire system is influenced by community-based and state, national, or global resources, strategic priorities, and organizational determinants.

For the conversion process to be successful at promoting sustainable system change characterized by increased quality of life, evaluation of each component (surveillance/research, communication, and program implementation) must be undertaken in ways that allow the products of these overlapping strategies to be translated into practice.

Parallel factors that are environmental (i.e., economic, political conditions, sociological, etc.), health related (i.e., research, technology, health care finance, etc.), and associated with unique stakeholders (i.e., pharmaceutical companies, disability advocacy organizations, hospitals, etc.), each exert a set of sometimes opposing influences on how obesity, disability, and health interact. These collective influences are filtered through the prism of resources, strategic priorities, and organizational determinants. This organizational environment allows for multiple inputs into the process, including those of actual staff, existing funded partners, people with disabilities, data from current surveillance systems, funding mechanisms, materials that promote the process such as policy guidelines, educational or communications information, cultural competencies, and known research.

Improvements in health and reduction in obesity for the disability population is viewed in this model as a dynamic process. As the health of the disability population improves, knowledge of what appears to work best at the system level will drive additional systemic changes that influence health determinants themselves. Outputs of this conceptual model,

including research and those promising practices described earlier, can be used as platforms on which to inform improved future efforts.

Challenges and Opportunities to Implementing Programs Targeting Obesity Among People With Disabilities

Efforts to achieve healthy weights and reduce obesity in the general population have proven to be challenging. The following additional challenges and potential opportunities suggested by the model in Figure 2 (with explicit connections to the model in parentheses below) can be considered in efforts to make inroads toward achieving healthy weight in the disability population:

- Identifying evidence (linking inputs to outputs) supporting the effectiveness of population-based healthy weight interventions for people with disabilities.
 - Problem: A dearth of current data exists that documents the impact of healthy weight interventions for people with disabilities on a population level (state, region, community, etc.). Without evidence-based practices that can be implemented at a system level, the prospect for widespread improvements in healthy weight for disability populations is limited.
 - Opportunity: Given this gap in practice intervention, the prospect for initiating new research promoting healthy weight among disability populations is particularly promising. The need for developing evidence-based intervention is great.
- Integrating disability populations into health promotion programs and activities targeting the general population (illustrating the interaction of state/national/global determinants with the conversion process).
 - Problem: Not all states effectively coordinate efforts and resources in ways which integrate the needs of people with disabilities into broader public health initiatives.
 - Opportunity: Greater coordination between activities of federal, state, and local public health programs can lead to the development of innovative strategies that link populations with similar interests, such as all those with some form of functional limitations (i.e., older people).
- Enacting state or local policies that promote active and healthy living for all people, inclusive of those with physical or intellectual disabilities (linking community-based determinants to the conversion process).
 - Problem: Although most communities support policies that promote active and healthy living, few have identified sufficiently compelling evidence and resources to commit to them. Frequently, they are framed as infringement on individual liberties or too costly.

- Opportunity: Develop a knowledge bank of evidence-based interventions that are effective for populations inclusive of people with diverse abilities where successes have occurred.
- Expanding awareness of the epidemiology of healthy weight and obesity among disability populations, recognizing prevalence disparities compared with populations without disabilities (continuous improvement through improved use of outcomes).
 - Problem: The scope and breadth of disparity in healthy weight and obesity between disability and nondisability populations are not sufficiently understood, largely owing to the relatively small body of dedicated research being undertaken that examines this more closely.
 - Opportunity: Scientific inquiry further investigating correlations and outcomes associated with obesity and disability using currently available population data is possible. Additional approaches that explore development of longitudinal studies that can investigate etiology and causal relationships in greater depth would be part of this.
- Developing valid and reliable metrics to accurately assess or measure obesity and its related health risk among disability populations (surveillance and research as the core of the conversion mechanism).
 - Problem: Most widely accepted means of measuring healthy weight or obesity do not factor in conditions associated with disability such as limb loss, spinal cord contraction, medication use, or report bias so that the use of BMI may not be valid for subsets of the disability population. In addition, identifying health risk and the effects of possible effective interventions may be reduced based upon the documented underrepresentation of people with disabilities in clinical trials.
 - Opportunity: Cost-effective approaches to measuring fat mass in ways that can be applied to all segments of the population can be considered, with additional research that correlates BMI or waist circumference to these adiposity measures undertaken so that the use of measures for healthy weight at the population level for people with varying types of disabilities are better understood and more widely accepted.
- Achieving a unified voice within the disability and health community that speaks to the importance of healthy weight as a national priority (elevating the importance of community-based determinants and their interaction with public health priorities).
 - Problem: Varying degrees of coordination exist between agencies at federal, state, and local levels promoting healthy weight among people with disabilities.
 - Opportunity: Increasingly high-profile health promotion activities are in place nationally that offer segments of disability communities better means to become more aware of other key stakeholders addressing this issue.

Improved activity and nutrition has become a national priority in recent years, allowing for greater opportunities for cooperation.

- Controlling expectations for unrealistically rapid reductions in obesity prevalence among disability populations or the general population (balancing research translation, social capital, and evaluation in developing achievable outcomes).
 - Problem: Given the complexity of the issue and the overall challenges to decreasing obesity within the general and disability populations, balancing expectations with evidence-based achievable results is difficult.
 - Opportunity: Identifying impact at the community level before bringing interventions to scale offers great promise. Moving evaluation away from individual behavior modifications and toward implementation and monitoring of systemic changes that more indirectly influence behavior is becoming more commonplace as a public health strategy.
- Taking into account technology development, health system changes, budget allocations, public policies, or other environmental or systemic factors that can influence healthy weight for disability populations (responsiveness to state, national, and global determinants as they emerge and develop).
 - Problem: Given the continuous evolution of environmental components influencing healthy weight and obesity for the general and disability populations, staying current with factors influencing obesity and disability requires great effort.
 - Opportunity: Development of new forms of healthy community indices inclusive of people with varying types of disabilities can help public health agencies and other stakeholders understand and take into account many of these factors.

Conclusion

Adults and children with disabilities are at disproportionate risk for obesity. However, research to date has only begun to identify many of the unique challenges to addressing this issue. Creating the framework in which to employ resources to address these challenges that can move from “you should” to “here’s how” represents one of our immediate challenges. Information that speaks to understanding the limitations of disabling conditions, informs people with disabilities on how to adapt physical activities around their condition, and provides advice on how nutritional and activity challenges can be overcome will help meet these challenges. Expanding the target audience of these communications to focus on caregivers, health care professionals, educational professionals, owners/operators of exercise centers, food retailers, transportation officials, schools, early childcare and education centers, local public health and recreation officials, elected leaders, insurance companies, and employers can also help fill additional gaps in our current national efforts at addressing the obesity epidemic.

Evidence shows that regular physical activity and good nutrition provide important health benefits for people with disabilities. Benefits include improved cardiovascular and muscle fitness, enhanced mental health, and a better ability to perform tasks of daily life. Rimmer (2011) presents arguments that policies and practices should be extended to school-age children and adolescents with disabilities in ways that allow them to reap similar rewards to those of their classmates without disabilities. There is an equally pressing need to extend these policies and practices across the life span.

The conceptual model presented in this discussion recognizes the components necessary to address this need. They include better surveillance, a clearer identification of the population, expanded effectiveness research on existing or proposed practices, and strategies to inform and communicate results of these efforts. It is hoped that this model can be part of a roadmap leading to a reduction in obesity disparities experienced by people with disabilities, and, ultimately, increased opportunities to improve their overall quality of life.

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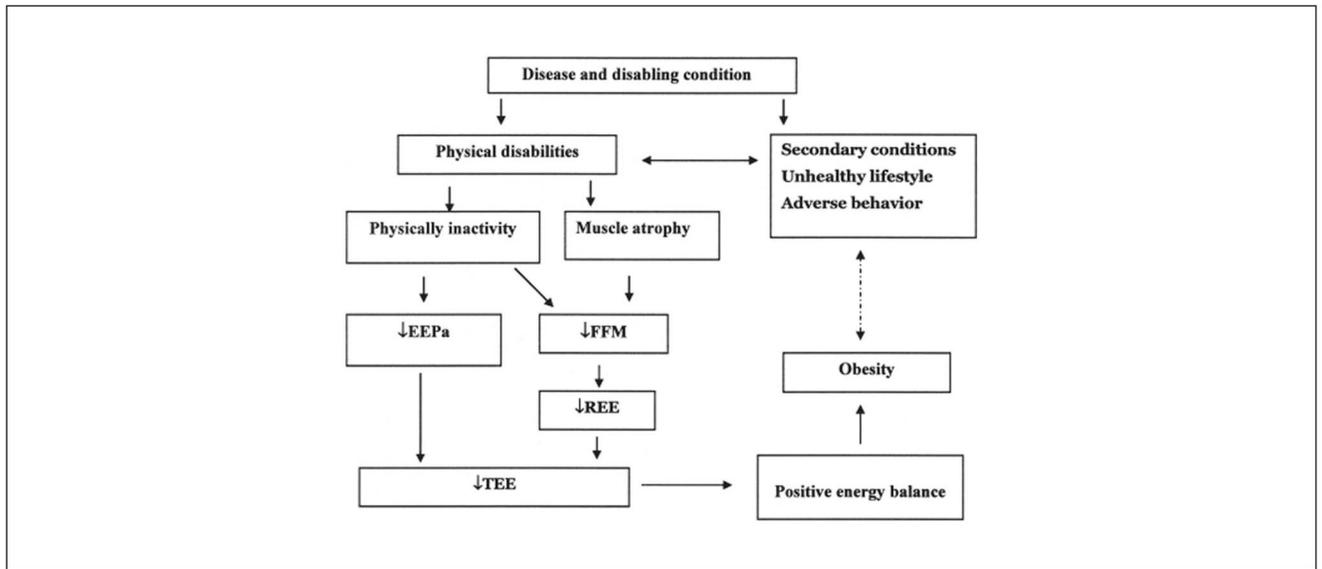


Figure 1. Possible mechanism of obesity development in people with physical disabilities (after Liou, 2005).
Note. ↓ = decrease; EEPa = energy expenditure of physical activity; FFM = fat-free mass; REE = resting energy expenditure; TEE = total daily energy expenditure.

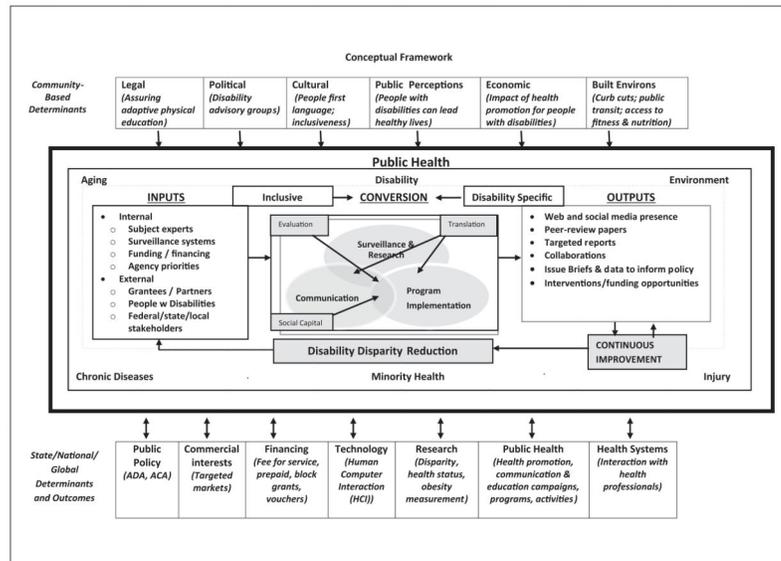


Figure 2. Reducing obesity and achieving healthy weight among people with disabilities.
Note. ADA = Americans with Disabilities Act; ACA = Affordable Care Act.