



Prevalence of obesity-related chronic health conditions in overweight adolescents with disabilities

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ARTICLE INFO

Article history:

Received 23 September 2010

Received in revised form 29 September 2010

Accepted 7 October 2010

Keywords:

Adolescents
Disability
Obesity
Overweight
Health
Chronic disease

ABSTRACT

The prevalence of 15 common obesity-related chronic health conditions was examined in a convenience sample of adolescents, ages 12–18 years old, with mobility and non-mobility limitations ($n=208$ and 435, respectively). In both groups, overweight adolescents ($BMI \geq 85$ th %ile) had a significantly higher number of obesity-related chronic health conditions than their counterparts with healthy weight status (2.74 versus 1.74 for the mobility limitation group, and 1.79 versus 1.45 for the non-mobility limitation group). Prevalence of high blood cholesterol was significantly higher among overweight adolescents than healthy weight adolescents across the two groups. While prevalence of asthma and early maturation appeared to increase as a function of body weight for both groups, a significant difference was found only in the group with non-mobility limitations. Across the two groups, there was a clear tendency toward a higher prevalence of chronic health conditions in overweight adolescents compared to their healthy weight counterparts. Greater efforts must be made to address the higher rates of obesity-related health conditions in youth with disabilities during childhood and adolescence to avoid significant health consequences and health care costs in adulthood.

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1. Introduction

An increase in the prevalence of obesity among children with disabilities has become a significant public health concern (Rimmer, Yamaki, Davis, Wang, & Vogel, 2010; Rimmer et al., in press). Analysis of national high school survey data, for example, found that one-third of 9th to 12th grade students who reported having “any physical disabilities or long term health problems” were obese or overweight (Rimmer, Rowland, & Yamaki, 2007). Data from a population-based household survey also suggested that obesity and overweight were significantly more prevalent among school age children with mobility limitations compared to those without mobility limitations (Bandini, Curtin, Hamad, Tybor, & Must, 2005). Clinical studies have also indicated a higher prevalence of obesity among children and adolescents with spina bifida (Simeonsson, McMillen, & Huntington, 2002), cerebral palsy (Hurvitz, Green, Hornyak, Khurana, & Koch, 2008) and Down syndrome (Luke, Roizen, Sutton, & Schoeller, 1994).

Children who are obese often develop chronic health conditions previously seen only among adults (Daniels, 2006; Reilly et al., 2003). Examples of these conditions include high blood pressure (Rosner, Prineas, Daniels, & Loggie, 2000; Sorof & Daniels, 2002), Type 2 diabetes, hyperlipidemia (Daniels, 2006; Dietz, 1998; Nguyen et al., 2001; Steinberger, Moran, Hong,

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Jacobs, & Sinaiko, 2001), asthma (Bibi et al., 2004; Rodriguez, Winkleby, Ahn, Sundquist, & Kraemer, 2002), obstructive sleep apnea (Mallory, Fiser, & Jackson, 1989), joint disease and musculoskeletal pain (Loke, 2002; Stovitz, Pereira, Vazquez, Lytle, & Himes, 2008), gastrointestinal problems, liver and gallbladder problems, and early maturation (Adair & Gordon-Larsen, 2001; Daniels, 2006; Dietz & Gortmaker, 1993; Lavine & Schwimmer, 2004). Obese children may also experience poorer psychological and emotional health, including depression, low self-esteem (Daniels et al., 2005; Dietz & Gortmaker, 1993; Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Koplan, Liverman, & Kraak, 2005), limited peer relationships, and body dissatisfaction (Daniels, 2006; Gortmaker et al., 1993). An elevated prevalence of these and other health conditions frequently results in obese children experiencing activity limitations, reduced opportunities for school/community participation, increased use of health services, and may result in reduced quality of life (Hughes et al., 2007; Schwimmer, Burwinkle, & Varni, 2003; Williams, Wake, Hesketh, Maher, & Waters, 2005).

The purpose of the present study was to explore the prevalence of obesity-related chronic health conditions among obese and overweight children with disabilities. Despite mounting evidence on the higher incidence of chronic health conditions among obese children in general, data on the health impact of excess body weight in children with disabilities is almost nonexistent. Previously researchers who demonstrated health disparities between children with and without disability (e.g. Bitsko et al., 2009; Boulet, Boyle, & Schieve, 2009; Newacheck, Inkelas, & Kim, 2004) have not addressed obesity and its related-conditions in their analyses. Other researchers who reported higher obesity prevalence in children with disabilities failed to report on the health conditions associated with their excess body weight, (e.g. Bandini et al., 2005; Hurvitz et al., 2008; Luke et al., 1994). The present study addresses this void by examining the prevalence of obesity-related chronic health conditions in obese or overweight adolescents with disabilities.

2. Methods

2.1. Sample

A convenience sample of adult family members of adolescents with disabilities was recruited from national and local disability and health advocacy organizations, the subscriber list of a parent magazine, and a disability-related independent website from September 2008 to March 2009. Recruitment materials included blast emails, web banner advertisements and flyers, which invited eligible family members to visit the survey web site. Family members who met the following eligibility criteria were asked to complete the survey: (1) parent or guardian living with a child between the ages of 12 and 18 years; (2) responsible for providing care to the child; and (3) child has a physical or cognitive disability and receives special education services such as physical, speech or other therapies at school, or has an Individualized Education Plan (IEP). The research protocol was approved by the Institutional Review Board of the university affiliated with the first author.

2.2. Data collection

Data were obtained using the web-based *Health and Lifestyles of Youth with Disabilities Survey* developed by the current authors. The survey included a total of 32 items in the following areas as follows: 8 items related to the environment (e.g., traffic, crime, availability of sports/recreation facilities in the neighborhood, and food availability at home); 2 items related to participation (e.g., participation in physical and leisure activities); 4 items related to health consequences of obesity; and 18 items related to personal factors (e.g., primary disability, family demographics, and lifestyle behaviors). These items were derived from national and state level health surveys, current literature addressing the consequences of childhood obesity, and from focus group interviews conducted by project staff with adolescents with disabilities and their parents. A draft of the survey was revised across several iterations by a panel of survey research experts and representatives from disability and health advocacy organizations. It was then pilot tested by seven parents of adolescents with disabilities for content validity, item wording, comprehensiveness of response categories, appearance including color of font and background and font size, and navigation of the survey.

2.3. Disability etiology

The adolescents' disability information was collected by asking the family members to select up to three conditions associated with their child's disability from a list of the following 19 etiologies: autism spectrum disorder; attention deficit/hyperactivity disorder; blindness or vision problems; deaf-blind; cerebral palsy; deafness and hearing problems; Down syndrome; epilepsy or seizures; head injury; impairment or deformity of foot or leg; impairment or deformity of hand, arm or finger; learning disability; mental retardation; mental or emotional problem/disorder; missing legs, feet, hands, arms or fingers; paralysis of any kind; spina bifida; spinal cord injury; and 'other.'

2.4. Obesity-related chronic health conditions

After reviewing the current literature on the major chronic health conditions associated with childhood obesity among children without disabilities (Daniels et al., 2005; Dietz & Robinson, 1993; Loke, 2002), the following 15 conditions were included in the survey: asthma, high blood pressure, high blood cholesterol, diabetes, depression, fatigue, gastrointestinal

problems, joint or bone pain, sleep apnea, liver or gallbladder problems, low self-esteem, preoccupation with weight, Blount's disease, early maturation, and pressure ulcers. Family members were asked if they have ever been told by a health professional that their child had any of these conditions.

2.5. Body weight status

Height and weight of youth, reported by their family members, were used to compute body mass index (BMI). A percentile ranking of each adolescent's raw BMI score relative to age- and sex-specific national norms was obtained using the criteria established by the 2000 Centers for Disease Control and Prevention Growth Charts for the United States (Kuczmarowski et al., 2000). Based on the obtained percentile ranking, BMI status was classified into the following three categories: overweight (BMI \geq 85th percentile), healthy weight (BMI $<$ 85th percentile and \geq 5th percentile), and underweight (BMI $<$ 5th percentile).

2.6. Data analysis

Data were aggregated by the mobility versus non-mobility disability status of the adolescents due to anticipated divergences in body weight (Weil et al., 2002) and health conditions (Jones & Sinclair, 2008; Rasch, Magder, Hochberg, Magaziner, & Altman, 2008). Adolescents with disability who use "a wheelchair or other assistive device" were labeled as adolescents with a mobility limitation. Those who did not use an assistive device were labeled as adolescents with non-mobility limitation. Separate, but parallel, analyses were conducted for each group. The mean number of chronic health conditions experienced by the adolescent and the prevalence rate of each condition were compared between overweight adolescents and healthy weight adolescents using ANOVA and Chi-square or Fisher's exact test, respectively. Prevalence of preoccupation with weight and early maturation were calculated for females only. SPSS version 16 (SPSS Inc., 2008) was used for all statistical analysis. Level of significance was set at .05.

3. Results

Data were obtained from 643 family members of adolescents with disabilities residing in 49 states. Almost all of the family members who responded to the survey were mothers (91.1%), followed by a small number of fathers (6.6%), grandparents (1.1%) and other family or non-family members (1.3%). Overall, the majority of adolescents were male (64.9%), between the ages of 12 and 15 years old (61.1%), and White (83.5%). Most resided in the household of a married couple (79.8%) and were supported by a family member with either college (50.3%) or post-college (38.4%) education. Almost one-

Table 1
Demographic breakdown of adolescents with disabilities by mobility status.

	With mobility limitation (%) (<i>n</i> = 208)	With non-mobility limitation (%) (<i>n</i> = 435)	χ^2
Sex			
Male	54.3	69.9	14.94 [*]
Female	45.7	30.1	
Race/ethnicity			
White	81.1	84.7	1.88
Black	4.4	4.5	
Hispanic	5.8	4.0	
Other	8.7	6.7	
Age			
12	16.3	12.6	10.07
13	14.4	19.1	
14	12.5	17.2	
15	17.3	12.4	
16	15.4	11.3	
17	12.5	13.8	
18	11.5	13.6	
Family composition			
Married-couple	82.2	78.7	2.90
Single-parent	13.9	18.8	
Non-married	3.5	2.5	
Parent income			
\leq \$34,999	15.8	16.1	1.09
\$35,000–\$74,999	38.6	34.2	
\$75,000 \geq	45.7	49.9	
Parent's education			
High school/technical school	13.9	10.0	3.16
College	51.4	49.8	
Post-college	34.6	40.2	

^{*} *p* < .001.

Table 2
Adolescents with disabilities by main cause of disability and mobility status.

	With mobility limitations (<i>n</i> = 208)		With non-mobility limitations (<i>n</i> = 435)	
	<i>n</i>	(%)	<i>n</i>	(%)
Autism	4	(1.9)	155	(35.0)
ADHD	–	–	12	(2.8)
Blindness/visual impairment	3	(1.4)	6	(1.4)
Deaf-blind	3	(1.4)	2	(.5)
Cerebral Palsy	102	(49.0)	15	(3.4)
Deafness/hearing impairment	–	–	5	(1.1)
Down syndrome	4	(1.9)	77	(17.7)
Epilepsy seizure	6	(2.9)	10	(2.3)
Head injury	11	(5.3)	8	(1.8)
Impairment of hand or arm	1	(.5)	–	–
Learning Disability	1	(.5)	16	(3.7)
Mental Retardation	16	(7.7)	66	(15.2)
Mental/emotional	–	–	20	(4.6)
Missing arm or leg	1	(.5)	1	(.2)
Paralysis	1	(.5)	–	–
Spina bifida	17	(8.2)	5	(1.1)
Spinal cord injury	2	(1.0)	–	–
Other	36	(17.3)	37	(8.5)

half (48.4%) of the households exceeded an annual household income of \$75,000. Table 1 summarizes demographics of the adolescents across their mobility status. One-third of the adolescents (*n* = 208) had mobility limitations. Demographic and socioeconomic profiles of the two groups were largely similar with the exception of an overrepresentation of males in the non-mobility limitation group, $\chi^2(1, N = 643) = 14.94, p = .000$, compared to the group with mobility limitations.

One-third of family members (*n* = 208) reported a single etiology associated with their child's disability. The rest of family members attributed two (26%) or three (41%) etiologies as cause of their child's disability. Table 2 provides a breakdown of the adolescents by main cause of their disability across their mobility status. Those who listed cerebral palsy constituted half (49.0%) of the group with mobility limitations. The majority (67.9%) of respondents with non-mobility limitations reported cognitive impairments including autism (35.0%), Down syndrome (17.7%), and intellectual disability (15.2%) as their primary disability etiology. Adolescents aggregated into the "Other" category consisted of various types of movement or muscle disorders such as muscular dystrophy, ataxia, and spinal muscular atrophy.

Table 3 summarizes body weight status by sex and the presence of mobility limitation. The group with mobility limitations included a significantly higher proportion of underweight adolescents than their counterparts with non-mobility limitations (30.3% versus 8.3%, respectively, $\chi^2(1, N = 643) = 52.34, p = .000$). In contrast, the proportion of overweight adolescents was significantly higher for the group with non-mobility limitations compared to the group with mobility limitations (38.6% versus 22.1%, respectively, $\chi^2(1, N = 643) = 11.46, p = .001$). Within the group with mobility limitations, a significantly higher rate of females fell into the healthy weight category than did males (56.6% versus 39.8%, respectively, $\chi^2(1, N = 208) = 5.99, p = .014$). For the group with non-mobility limitations, there was no detectable difference in body weight distribution by sex.

Table 4 summarizes the mean number of obesity-related chronic conditions experienced by adolescents and the prevalence rate of each condition by body weight status for adolescents with mobility limitations. On average, adolescents with mobility limitations had 2.05 (*SD* = 1.72) chronic health conditions. Those who were overweight had a significantly higher number of these conditions than their healthy weight counterparts (2.74 versus 1.74, $F(1, 145) = 11.92, p = .001$). The prevalence of high blood cholesterol was significantly higher among overweight adolescents than healthy weight adolescents (7.9% versus 0%, Fisher's exact test, $p = .029$). A marginally significant difference between overweight and healthy weight females was found for the prevalence of early maturation (40.0% versus 12.8%, respectively, Fisher's exact

Table 3
Body weight status of adolescents by mobility status and sex.

	With mobility limitations			With non-mobility limitations		
	Overweight ^a	Healthy weight ^b	Underweight ^c	Overweight ^a	Healthy weight ^b	Underweight ^c
Total	22.1	47.6	30.3 [*]	38.6 [*]	53.1	8.3
Male	24.8	39.8	35.4	39.2	53.9	7.9
Female	19.0	56.6 [†]	24.2	38.2	52.7	9.2

^a BMI \geq 85th percentile.

^b BMI < 85th percentile and \geq 5th percentile.

^c 5th% > BMI.

^{*} Significantly higher than mobility/non-mobility comparison group ($p < .05$).

[†] Significantly higher than males with mobility limitations ($p < .05$).

Table 4

Mean and prevalence of chronic health conditions among adolescents with mobility limitations by body weight status.

Condition	Prevalence (%)		χ^2
	Overweight ^a	Healthy weight ^b	
Number of conditions (<i>M</i>)	2.74	1.74	11.92 ^{c,*}
Asthma	40.0	24.1	3.33
High blood pressure	10.5	2.3	.07 ^d
High blood cholesterol	7.9	0	.02 ^{d,*}
Diabetes	2.6	1.2	.53
Depression	21.1	9.9	2.77
Fatigue	22.5	14.3	1.30
Gastrointestinal problems	52.5	42.9	1.04
Joint or bone pain	37.8	35.7	.05
Sleep apnea	38.1	25.3	2.27
Liver or gallbladder problems	7.5	6.7	1.00 ^d
Low self-esteem	10.3	4.6	.25 ^d
Preoccupation with weight ^e	13.3	4.1	.232 ^d
Early maturation ^e	40.0	12.8	.054 ^d
Pressure ulcer	26.8	16.7	1.82

^a BMI for sex and age \geq 85th percentile.^b BMI < 85th percentile and BMI \geq 5th percentile.^c *F*-value derived from ANOVA.^d *p*-value derived from Fisher's exact test.^e Prevalence was calculated for females only.* *p* < .05.

test, $p = .054$). The prevalence of other conditions appeared to be higher for overweight adolescents than healthy weight adolescents, but the differences did not reach statistical significance. Blount's disease was excluded from the analysis as there were no family members who reported this condition.

Mean number of chronic health conditions for adolescents with *non-mobility limitations* was 1.60 ($SD = 1.65$); this was significantly lower than the 2.05 found for adolescents with mobility limitations, $F(1, 642) = 10.14$, $p = .002$. The mean number of conditions and prevalence of each condition, broken down by body weight status in the non-mobility limitation group is summarized in Table 5. Similar to the mobility limitation group, overweight adolescents with non-mobility limitations had a significantly higher mean number of obesity-related chronic health conditions than those in the healthy weight range (1.79 versus 1.45, $F(1, 399) = 4.36$, $p = .037$). Prevalence differed significantly by body weight status for asthma (25.2% versus 16.6%, $\chi^2(1, N = 354) = 3.92$, $p = .048$), high blood cholesterol (8.9% versus 1.0%, $\chi^2(1, N = 333) = 12.37$, $p = .000$), and early maturation (11.6% versus 1.6%, Fisher's exact test, $p = .041$). With a few exceptions, prevalence of other chronic conditions was generally higher for overweight adolescents than their healthy weight counterparts, though the differences did not reach statistical significance.

Table 5

Mean and prevalence of chronic health conditions among adolescents with non-mobility limitations by body weight status.

Condition	Prevalence (%)		χ^2
	Overweight ^a	Healthy weight ^b	
Number of conditions (<i>M</i>)	1.79	1.45	4.36 ^{c,*}
Asthma	25.2	16.6	3.92 [*]
High blood pressure	2.2	1.5	.68 ^d
High blood cholesterol	8.9	1.0	12.37 [*]
Diabetes	5.8	2.0	.07 ^d
Depression	25.7	21.5	.84
Fatigue	17.4	13.4	1.04
Gastrointestinal problems	29.9	30.9	.04
Joint or bone pain	11.6	15.1	.86
Sleep apnea	25.2	24.8	.007
Liver or gallbladder problems	5.5	1.9	.07 ^c
Low self-esteem	27.2	21.8	1.42
Preoccupation with weight ^e	9.5	6.5	.712 ^d
Early maturation ^e	11.6	1.6	.041 ^{d,*}
Pressure ulcer	2.1	.9	.40 ^d

^a BMI for sex and age \geq 85th percentile.^b BMI < 85th percentile and BMI \geq 5th percentile.^c *F*-value derived from ANOVA.^d *p*-value derived from Fisher's exact test.^e Prevalence was calculated for females only.* *p* < .05.

In summary, one in every five adolescents with a mobility limitation and one in every three adolescents with a non-mobility limitation were overweight. Overall, adolescents with mobility limitations had more obesity-related chronic health conditions than adolescents with non-mobility limitations. In both groups, overweight adolescents had a significantly higher number of chronic health conditions than their healthy weight counterparts. Prevalence of high blood cholesterol was significantly higher among overweight adolescents than healthy weight adolescents for both groups. While the prevalence of asthma and early maturation appeared to increase as a function of body weight for both groups, a significant difference was found only in the group with non-mobility limitations. Generally, there was a greater tendency toward exhibiting a higher prevalence of chronic health conditions in overweight adolescents with disabilities than their counterparts who fell into a healthy weight range, regardless of the presence of mobility limitations.

4. Discussion

In the present study, we explored the prevalence of major obesity-related chronic health conditions among adolescents with disability. Consistent with previous findings in children without disabilities (Daniels, 2006), our findings indicate that overweight adolescents with disabilities are at a higher risk for developing obesity-related chronic health conditions compared to their healthy weight counterparts. Chronic health conditions frequently require ongoing medication treatment, monitoring of symptoms, and self-management of daily behaviors. Our findings underscore that adolescents with disabilities with excess body weight are facing extra health challenges, which are likely to track into their adulthood, in addition to those associated with their primary disability.

Asthma is one of the leading chronic health conditions among children and adolescents in the United States (Akinbami, 2006). For both adolescents with mobility limitations and those with non-mobility limitations, prevalence of asthma was much higher than the reported prevalence for their same-age peers in the general population (i.e., 10%) (Akinbami, 2006) regardless of their weight status. The higher prevalence of asthma in overweight adolescents with non-mobility limitations is consistent with what has been observed in children without disability (Daniels, 2006). Excess body weight is considered an independent risk factor for increased prevalence of childhood asthma (Rodriguez et al., 2002) and its symptoms are typically more severe among children with excessive weight (Michelson, Williams, Benjamin, & Barnato, 2009). Research has found that children with asthma do not participate in physical activity regularly, despite it being an important contributor to their physical fitness, weight management, and positive self-image (Lang, Butz, Duggan, & Serwint, 2004). The particularly high prevalence of asthma observed in adolescents with mobility limitations may further exacerbate their physical inactivity and sedentary life style, and is likely to lead to lower health status in adulthood (Harsha, 1995).

Our cohort of overweight adolescents, regardless of their mobility limitation status, reported a significantly higher prevalence of high blood cholesterol than their healthy weight counterparts. Similarly, prevalence of high blood pressure was higher in overweight adolescents than healthy weight adolescents in both groups, although the difference did not reach statistical significance. These findings suggest that overweight adolescents with disabilities are at an increased risk of cardiovascular disease in adulthood. High blood pressure and high blood cholesterol have been identified as notable risk factors for coronary heart disease and stroke, two of the three leading causes of death in the U.S. (Hahn, Heath, & Chang, 1998; Minino, Heron, Murphy, & Kochanek, 2007). Mortality associated with cardiovascular disease is substantially higher for adults with excessive weight, particularly young adults (Bender, Jockel, Trautner, Spraul, & Berger, 1999; Calle, Thun, Petrelli, Rodriguez, & Heath, 1999). While advances in medicine and rehabilitation have contributed to increased longevity of children with disabilities (Bittles et al., 2002; Janicki, Dalton, Henderson, & Davidson, 1999; Patja, Iivanainen, Vesala, Oksanen, & Ruoppila, 2000; Strauss, Shavelle, Reynolds, Rosenbloom, & Day, 2007) excess weight may halt this important health improvement.

Across the two groups, overweight adolescents with disabilities exhibited higher, though non-significant, rate of diabetes than those with healthy weight. Researchers have suggested that diabetes and pre-diabetes have been increasing among adolescents who are overweight (Centers for Disease Control and Prevention, 2007; Daniels, 2006; Goran, Ball, & Cruz, 2003; Mayer-Davis, 2008; Ogden, Flegal, Carroll, & Johnson, 2002; Sinha et al., 2002). Children with diabetes can develop substantial health conditions in their adulthood, including renal failure, fatty liver, blindness, heart disease, and some develop them in young adulthood (Dean & Sellers, 2007). The American Diabetes Association recommends biennial screening for diabetes for high risk children, which includes those who are overweight (American Diabetes Association, 2000). In light of our findings, screening for diabetes and pre-diabetes in overweight adolescents with disabilities may need to be part of their regular check up.

The seemingly higher prevalence of depression and low self-esteem found among overweight adolescents in both the mobility and non-mobility limitation groups could be an indicator that mental health disparities are a critical health consequence for overweight adolescents with disabilities. Overweight and obese children, as well as adults, are often the subject of negative stereotypes and a target for teasing, which can impact their psychological well-being (Erickson, Robinson, Haydel, & Killen, 2000; Franklin, Denyer, Steinbeck, Caterson, & Hill, 2006; Wardle & Cooke, 2005). Adolescence is a time when the need for independence and self-control becomes an extremely important attribute for normal growth and development in adulthood (Susman, Feagans, & Ray, 1992). Because mental health problems among individuals with cognitive limitations may often go unnoticed (Reiss, 1990), the extent of mental health conditions identified in the present study may underestimate the true impact for adolescents in that group.

Interpretation of the present findings requires some caveats. First, the elevated number of obesity-related chronic health conditions observed in adolescents with disabilities may be attributable, at least partially, to their primary disability. Some of

obesity-related health conditions we examined are also common health conditions observed in children with disabilities. For example, gastrointestinal disorders, joint or bone pain, and pressure ulcers are frequently observed among individuals with cerebral palsy and spinal cord injury (Johnson, Gerhart, McCray, Menconi, & Whiteneck, 1998; Swiggum, Hamilton, Gleeson, & Roddey, 2001; Turk, Scandale, Rosenbaum, & Weber, 2001). Mental health issues are also common among children with mobility and non-mobility limitations (Bitsko et al., 2009; Stevens et al., 1996). Nonetheless, the generally higher prevalence of obesity-related conditions among overweight adolescents compared to their healthy weight counterparts found in the present study signifies that excess body weight appears to be a potential risk factor exacerbating youth with disabilities' susceptibility to these conditions.

Second, the extent to which our findings represent adolescents with disabilities in general is unknown due to the use of convenience samples. Overrepresentation of adolescents with cerebral palsy and autism in both mobility and non-mobility limitation groups may have skewed results. Unlike previous population-based data (Bandini et al., 2005), for example, we found a high rate of underweight adolescents in the mobility limitation group. Overrepresentation of non-ambulatory adolescents with cerebral palsy, who are often short and underweight (Hurvitz et al., 2008; Stevenson, Roberts, & Vogtle, 1995; Stevenson et al., 2006) in this group, could at least partially explain this finding. Further, adolescents with disabilities in the present study were from mostly White families of relatively high socioeconomic status. The majority of families who have a child with a disability are more likely to have lower incomes and educational status than average households in the U.S. (Boulet et al., 2009; Fujiura, 1998; Fujiura & Yamaki, 2000), common predictors of diminished health status. Third, the prevalence of health conditions was based on a relatively small number of respondents. Though true differences in prevalence may exist, statistically significant differences may not have been found due to the small sample size and relatively low incidence of these conditions. This may explain why, for example, the prevalence gap by weight status did not reach statistical significance for certain conditions such as diabetes, sleep apnea, and early maturation for the group with mobility limitations.

National prevalence of obesity among adolescents has increased more than fourfold during the last five decades (Ogden, Carroll, & Flegal, 2008; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Wang & Beydoun, 2007). One in every three in this age group is currently estimated to have excess body weight (Ogden et al., 2010). A significant proportion of today's children and young adults are expected to carry an elevated health risk for the rest of their life due to the increased prevalence of obesity-related health conditions (Olshansky et al., 2005). Thus, the epidemic of obesity and its anticipated health and social consequences among this generation of Americans has resulted in a number of federal initiatives for preventing and lowering childhood obesity (U.S. Department of Health and Human Services, 2000, 2001; White House Task Force on Childhood Obesity, 2010). Although there is currently no similar national data on adolescents with disabilities, our findings underscore that excessive body weight imposes significant health risks on already vulnerable adolescents with disabilities. The increased health care needs and restrictions in daily life associated with these conditions are likely to intensify existing limitations associated with their primary disability, decreasing their level of independence and hampering opportunities for community participation during adulthood. Weight control and chronic disease prevention may be a critical component of health education and transition planning for adolescents with disabilities.

Acknowledgements

Preparation of this article was supported, in part, by Grant No. H133A0600066 from the U.S. Department of Education, National Institute on Disability and Rehabilitation Research.

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