Counteracting Obesity with Physical Activity in Children with Cerebral Palsy

Susan Russell

Capstone project 2012

Objectives

- Understand which children with cerebral palsy are at a higher risk for being overweight or obese.

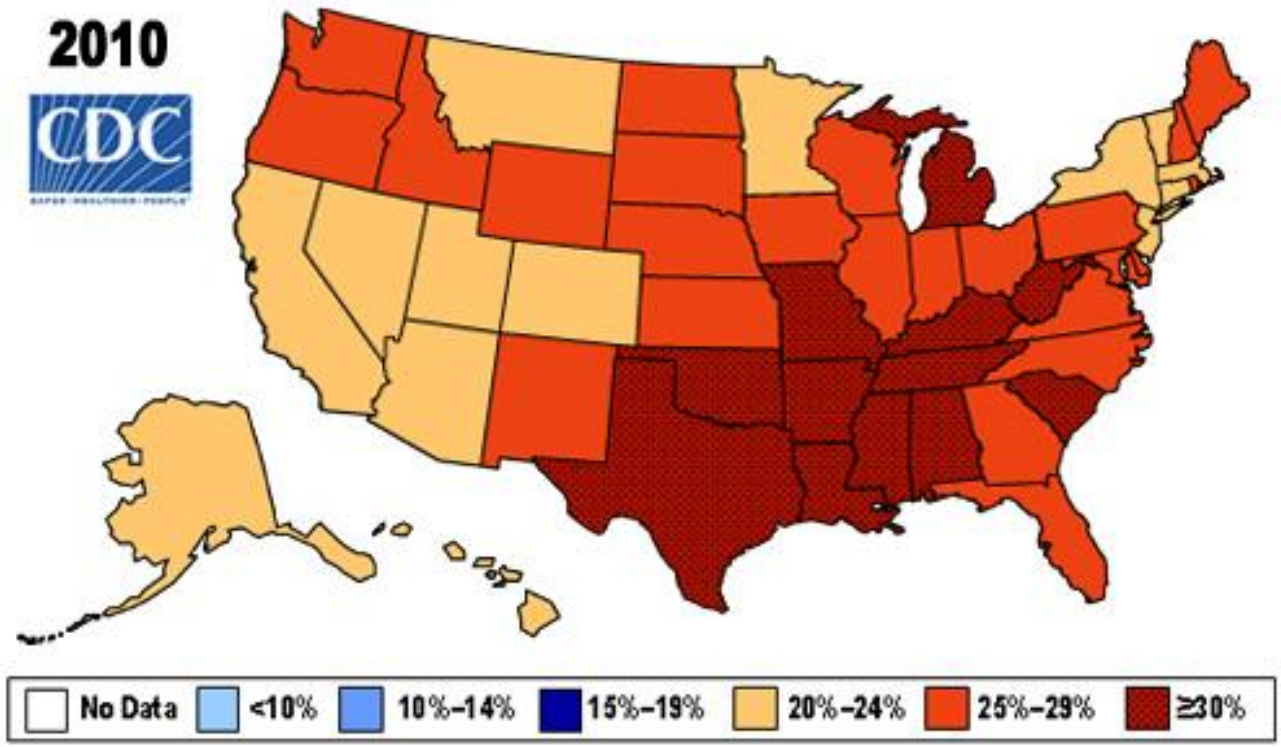
- Identify patients who would benefit from addressing weight issues.

Objectives

- Understand the benefits of incorporating physical activity goals into the plan of care.
- Identify ways that physical therapists can assist families and individuals with weight issues.
- Understand how physical activity can impact an aging child with cerebral palsy.

Obesity in America

- In 2010, CDC reported that ~17% of children and adolescents in America are obese.[1]
- In 2010, the obesity rate in North Carolina was 27.8%.[1]



What are parents saying about weight issues?

- Parents tend to underestimate their child's weight.[2]
- Parents with children who are overweight often agree with the statement that an overweight child will typically grow out of it. [2]
- Parents of overweight children believed that their child needed more physical activity. [2]
- When asked about the schools' involvement, parents wanted:
  - more sports programs after school
  - healthier school menus
  - gym class everyday

Educating our Parents

Parents' preferred method of communication:

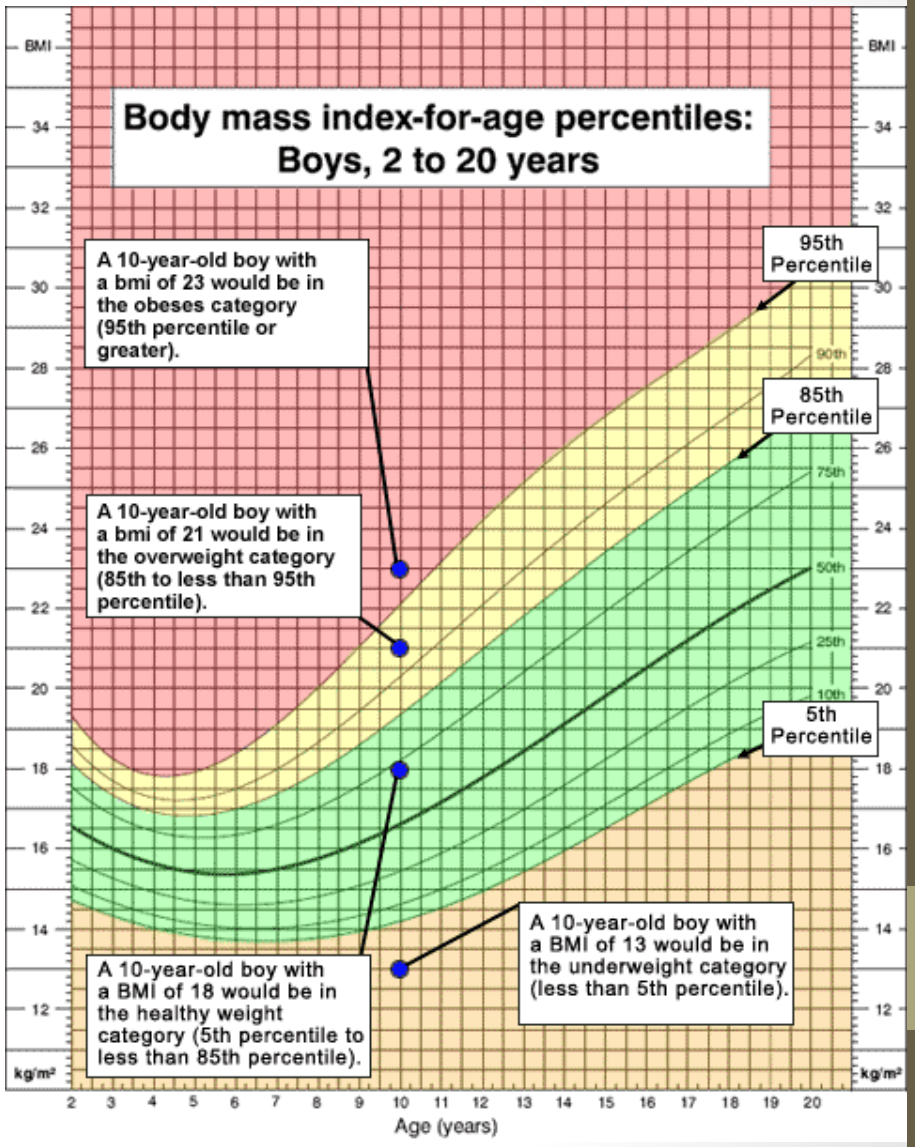
- Talk about weight gain with the child in the room.[3]
- Use gaining too much weight versus overweight.[3]
- Parents want to know about: encouraging physical activity, healthy snacks, and stress management.[3]
- The parents in the study did not want web-based information. [3]

Georgia is not sugarcoating the obesity issue anymore:

How to determine a healthy weight

$$BMI = \frac{\text{weight (lb)} * 703}{\text{height}^2 \text{ (in}^2\text{)}}$$

Weight Status	Percentile Range
Underweight	Less than the 5th percentile
Healthy Weight	5th - 85th percentile
Overweight	85th - 95th percentile
Obese	Equal to or greater than the 95th percentile



What patient population is likely to be affected by weight?

- Ambulatory children with CP. [6]

- Obesity is more prevalent in adolescents with physical and cognitive disabilities compared to adolescents without a disability. [7]

Why are higher functioning children with CP at risk?

- Children with less severe cerebral palsy (GMFCS level I and II) are following a similar trend of obesity rate as their non-disabled peers. [6]
- As a child ages, physical activity decreases. [8,9]
- Children with CP often are not involved in physical activity, thus leading to an unhealthy lifestyle, weight gain, and decreased function.

How do we know that children with CP are at risk?

- Brunton and Bartlett found that cardiovascular exercise participation was low, especially for exertion levels of moderate and vigorous exercise and that physical activity decreased over 4 years in children with CP.[6,5]

- Hurvitz's review of charts to see BMI and GMFCS of children with CP shows the need of a fitness program for children with CP who are higher functioning. [28]

- Nervik, Martin, Rundquist, and Cleland found that typically developing children's gross motor skills are affected by weight gain. Those with lower gross motor skills are less likely to participate in physical activity, leading to difficulty in losing weight. [29]

Physical Fitness Benefits

- Positive affect on HRQL (health related quality of life)[10]
- Psychosocial functioning[10]
- Physical activity is linked to functional status[10]

Strength Training and Cerebral Palsy

- Muscle force production can be improved in children with CP.
- We can use strength training principles including: specificity of training and weight progression for individuals with disabilities similarly to those without.
- Benefits in strengthening include:
  - Improved scores on the Gross Motor Function Measure (GMFM)
  - Self-selected walking speed
  - Walking cadence
  - Self-image

Evidence for Strength Training

- 2005 study by Morton, Margaret, and Angus found an improvement in quadriceps and hamstring strength, increased stride length in self-selected walking speed, and improvement on GMFM dimension D and E. [30]

- 2003 study by Blundell et al. shows that task-oriented exercises can improve strength for children with CP and work towards improving functional performance. [31]

- 2003 study by Dodd, Taylor, and Kerr found that a home strengthening program can be beneficial and a great addition to a well rounded treatment program. [32]

Anaerobic and Aerobic Programs

- Children with CP have an increase in energy cost compared to their able bodied peers that is not affected by strength training alone.

- Combining strength training along with cardiovascular exercise shows improvement in:
  - Aerobic and Anaerobic capacity
  - Scores in GMFM
  - Health Related Quality of Life Questionnaire
  - Cognitive Function
  - Also leads to a decrease in fat mass

Evidence for Anaerobic and Aerobic Exercise

- 2007 study by Verschuren et al. found significant improvement in aerobic capacity, anaerobic capacity, muscle strength, GMFM dimension D, health related quality of life questionnaire (HRQOL), and cognitive functioning from his exercise program. [14]

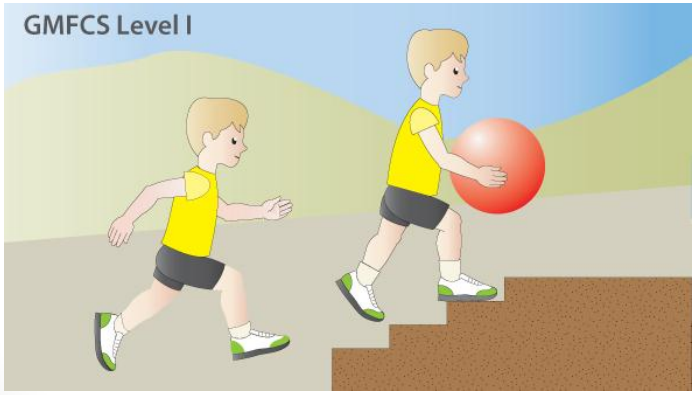
- 2007 study by Unnithan et al. found a significant reduction in submaximal VO2 and an increase in total score of the GMFM for the training group in the study. [15]

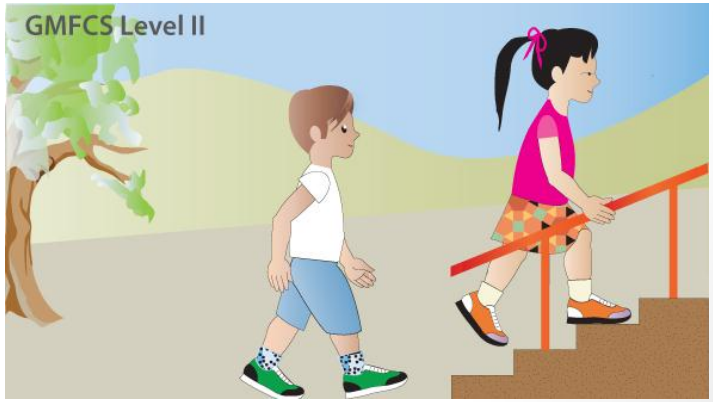
- 1998 study by Van Den Berg-Emons, Van Baak, and Speth had statistically significant results with decreasing fat mass, increase in peak torque with isokinetic testing and an increased peak aerobic power. [16]

Effects on Gross Motor Function

- Typically developing children who are overweight/obese have lower gross motor scores than non-overweight/obese peers on PDMS-2. [17]

- Physical Fitness improvement can show an improvement in gross motor function.





Things that can be done at home:

Community Resources Activity

- Wake Forest parks and recreation offers Tae Kwon Do, and Dream Leagues: Basketball, and baseball.[19]
- Triangle Bridge II Sports: Offers sports including dancing, basketball, Golf, Kayaking, swimming, table tennis, tennis, and track and field. [20]
- Triangle Special Hockey North Carolina: offers hockey to children with developmental or physical disabilities. [21]
- Miracles in Motion is a dance class for children with developmental disabilities, and/or mental disability. The class is 45 minutes long and caters to children 3-8 and 8-19 years old. [22]
- Triangle Academy of Dance in Cary NC: offers dance movement classes for 3-7 year olds with special needs. [23]

Community Resources Activity

- Helping Horse Therapeutic Riding Center in Raleigh, NC provides horseback riding lessons for those with disabilities. [24]
- The Challenger Division is a Pop Warner football and cheer program for children 5-18 years old with a developmental disability. [25]
- Chapel Hill Adaptive Aquatics teaches children with all abilities how to swim. [26]
- BikeAbility is a program where you bring your own bike or borrow a bike to learn how to ride a bike. The next date for this program will be 4/21/2012. [26]
- The National Center on Physical Activity and Disability offers a 14 week online program for becoming healthier. It allows clients to exercise with instruction geared towards their abilities and teaches about nutrition and physical activity. [27]

Community Resources For Weight Loss

- **Healthy Lifestyle Program at Duke**: This is a one year program for children with a BMI in the 95th percentile. It is a comprehensive family centered program that includes group counseling, physical activity, and nutrition.
  http://www.dukechildrens.org/services/nutritional_disorders_and_obesity

- **Active Teens Exercise Program:** Is a free exercise program for overweight teens 12-18 and their family members. Those who qualify has a nutritional and behavioral evaluation. The teen then has access to a gym and its staff to guide workouts at Duke Lenox Baker Children's Hospital.
  http://www.dukechildrens.org/services/nutritional_disorders_and_obesity/active_teens

- **Energize**: Is a program at WakeMed for children 6-18 who are at risk for type II diabetes. The program is a 12 week healthy lifestyle program for the children and family. Referral to this program is needed.
  http://www.wakemed.org/landing.cfm?id=609

Activity into Adulthood

- Hypoactive child = Sedentary adult
- Early onset of age-related changes including:[18]
  - Muscle flexibility
  - Strength
  - Endurance
  - Increased spasticity
  - Arthritis
  - Falls and fractures
  - Pain
  - Fatigue

How to incorporate this into the treatment plan:

- Add physical fitness goal measurements to show improvement:
  - Time up and Go
  - 6 min walk test
  - 10 m walk test
- Add more vigorous activity into the treatment plan
- Education on ways to incorporate physical activity into the families daily life.
- Educate parents on the benefits of physical activity as the child ages.


QUESTIONS

References

1. Center for Disease Control and Prevention. Overweight and Obesity. http://www.cdc.gov/obesity/data/trends.html. Updated July 2011. Accessed 9/15/2011.
2. Jaballas Elvira, Clark-Ott Dorothy, Clasen Carla, Stolfi Adrienne, and Urban Marianne. Parents' Perceptions of Their Children's Weight, Eating Habits, and Physical Activities at Home and at School. Journal of Pediatric Health Care. 2011;25(5):294-301.
3. Eneli U Ihuoma, Kalogiros D. Ioanna, McDonald A. Kaitlin. And Todem David. Parental Preferences on Addressing Weight-Related Issues in Children. Clinical Pediatrics. 2007;46(7):612-618.
4. Perrin M. Eliana, Skinner Cockrell Asheley, Steiner J. Michael. Parental Recall of Doctor Communication of Weight Status. Archives of Pediatrics & Adolescent Medicine. 2011:E1-E6.
5. Strong 4 Life. Georgia Campaign for Obesity. Available at: strong4life.com. Accessed on 3/10/12.
6. Rogozinski, B. M., Davids, J. R., Davis, R. B., Christopher, L. M., Anderson, J. P., Jameson, G. G., et al. Prevalence of obesity in ambulatory children with cerebral palsy. The Journal of Bone and Joint Surgery. 2007; 89(11):2421-2426.
7. Rimmer, J. H., Yamaki, K., Davis, B. M., Wang, E., & Vogel, L. C. Obesity and overweight prevalence among adolescents with disabilities. Preventing Chronic Disease, 2011;8(2).

References

8. Brunton K. Laura, Barlett J. Doreen. Description of Exercise Participation of Adolescents With Cerebral Palsy Across a 4- Year Period. *Pediatric Physical Therapy*. 2010;22:180-188.
9. Maher A. Carol, Williams T. Marie, Olds Tim, & Lane E. Alison. Physical and sedentary activity in adolescents with cerebral palsy. *Developmental Medicine & Child Neurology*. 2007;49:450-457.
10. Thorpe Deborah. The role of fitness in health and disease: status of adults with cerebral palsy. Developmental Medicine & Child Neurology. 2009;51(Suppl. 4):52-58.
11. Blundell SW, Shepherd RB, Dean CM, Adams RD, and Cahill BM. Functional strength training in cerebral palsy: a pilot study of a group circuit training class for children aged 4-8 years. Clinical Rehabilitation.2003;17:48-57.
12. Dodd J. Karen, Taylor F. Nicholas, and Graham Kerr H. A randomized clinical trial of strength training in young people with cerebral palsy. Developmental Medicine and Child Neurology. 2003;45:652-657.
13. Morton F. Jan, Brownlee Margaret, McFadyen K Angus.The effects of progressive resistance training for children with cerebral palsy. Clinical Rehabilitation.200519:283-289.
14. Verschuren Olaf, Ketelaar Marjolijn, Gorter Willem Jan, Helders J. M. Paul, Uiterwaal S.P.M. Cuno, Takken Tim. Exercise Training Program in Children and Adolescents With Cerebral Palsy. Archives of Pediatrics and Adolescent Medicine. 2007;161(11):1075-1081.

References

15. Unnithan B. Viswanath, Katsimanis George, Evanglinou Christina, Kosmas Christoulas, Kandrali Ifigenia, and Kellis Eleftherios. Effect of Strength and Aerobic Training in Children with Cerebral Palsy. Medicine and Science in Sports and Exercise. 2007;39(11):1902-1909.
16. Van Den Berg-Emons R.J., Van Baak M. A., Speth L., Saris W.H. Physical training of school children with spastic cerebral palsy: effects on daily activity, fat mass and fitness. International Journal of Rehabilitaion Research. 1998;21:179-194.
17. Nervik Deborah, Martin Kathy, Rundquist Peter, Cleland Joshua. The Relationship Between Body Mass Index and Gross Motor Development in Children Aged 3 to 5 Years. Pediatric Physical Therapy. 2011;23:144-148.
18. Haak Peterson, Lenski Madeleine, Hidecker Jo Cooley Mary, Paneth Nigel. Cerebral palsy and aging. Developmental Medicine & Child Neurology. 2009;51 (Suppl. 4):16-23.
19. Wake Forest Parks and Recreation. Youth Athletics. Available at: http://www.wakeforestnc.gov/residents/parksrecreation_youthathletics.aspx. Accessed on: 3/10/12.
20. Bridge II Sports Triangle. Available at: http://www.bridge2sports.org/programs/triangle-area. Accessed on: 3/10/12.

References

21. Triangle Special Hockey North Carolina. CAT 5 Canes. Available at: http://www.trianglespecialhockey.org/information_links/Player.aspx. Accessed on: 3/10/12.
22. Miracles in Motion Dance. Available at: http://www.dancedynamicsinc.com/Miracles-in-Motion.html. Accessed on 3/10/12.
23. Triangle Academy of Dance in Cary NC. Available at: http://www.triangle-academy-dance.com/general_info.html. Accessed on: 3/10/12.
24. Helping Horse Therapeutic Riding Program. Available at: http://www.helpinghorse.org/2009/. Accessed on 3/10/12.
25. The Challenger Division is a Pop Warner football and cheer program. Available at: http://www.cff-popwarner.com/Challenger.html. Accessed on 3/10/12.
26. Chapel Hill Parks and recreation adaptive sports: https://webtrac.townofchapelhill.org/wbwsc/webtrac.wsc/wbsearch.html?xxmod=ar&wbsi=fa1441bc-f98c-119f-e111-9f4c77ab0a93&xxtype=THER. Accessed on: 3/10/12.
27. NCPAD 14 Week to a healthier you. Available at: http://www.ncpad.org/14weeks/. Accessed on 3/07/12.

References

28. Hurvitz S. Edward, Green B. Liza, Hornayak E. Joseph, Khurana R. Seema, & Koch Gerard Lauren. Body Mass Index Measures in Children with Cerebral Palsy Related to Gross Motor Function Classification. American Journal of Physical Medicine & Rehabilitation. 2008;87(5): 395-403.
29. Nervik Deborah, Martin Kathy, Rundquist Peter, Cleland Joshua. The Relationship Between Body Mass Index and Gross Motor Development in Children Aged 3 to 5 Years. Pediatric Physical Therapy. 2011; 23:144–148.
30. Morton F. Jan, Brownlee Margaret, McFadyen K Angus.The effects of progressive resistance training for children with cerebral palsy. Clinical Rehabilitation.200519:283-289.
31. Blundell SW, Shepherd RB, Dean CM, Adams RD, and Cahill BM. Functional strength training in cerebral palsy: a pilot study of a group circuit training class for children aged 4-8 years. Clinical Rehabilitation.2003;17:48-57.
32. Dodd J. Karen, Taylor F. Nicholas, and Graham Kerr H. A randomized clinical trial of strength training in young people with cerebral palsy. Developmental Medicine and Child Neurology. 2003;45:652-657.