ADOLESCENT OBESITY AND THE RELATIONSHIP TO SCREENTIME.

A LITERATURE REVIEW

By

Kristine Elizabeth Kehler

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To the faculty of Washington State University:

The members of the Committee appointed to examine the clinical project of KRISTINE ELIZABETH KEHLER find it satisfactory and recommend that it be accepted.

Ruth Bindler
Chair, Ruth Bindler, RNC, PhD

Margaret Bruya DNSC, ARNP, FAAN

Susan Perkins MSN, RN
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Dedication

To my wonderful, supportive husband, Mike, and our three beautiful children, Nick, Katie and Madelyn. We started this journey three years ago with “I can do this!” and now all you hear is, “Can I do this??” Your love and support has meant everything to me.

I love you!
The prevalence of obesity among youth in the United States and worldwide is reaching epidemic proportions. Surveys conducted by the Centers for Disease Control and Prevention (CDC) estimate the rate of overweight and obesity in adolescents to be over 30%. This trend in adolescent obesity extends into adulthood, and consequently we see increasing morbidity and mortality from disease processes that are a result of obesity, including cardiovascular disease, type 2 diabetes and hypertension, and diseases that were primarily adult concerns until recent years. Healthcare providers should therefore focus their efforts on appropriate measurement and tracking of adolescents at risk for overweight and obesity. Also, discovery of innovative solutions to prevent the onset of obesity in adolescence is imperative, including limiting screen time (i.e. television, computer, and video game use). This paper focuses on current research regarding screen time and its relationship to rates of adolescent overweight and obesity. In addition, recommendations for further research are included.
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American society has enjoyed progress in everyday technology; this technology has impacted the lives of not only adults, but also children in both positive and negative ways. In previous decades, children spent much more time outdoors, playing with friends or engaging in physical labor of some sort. With the advent of television, videogames, computers and cell phones since the 1970s much of the outdoor active playtime has vanished. The average child in the 1970s had one family television with four channels. In contrast, today’s child commonly has an average of four television sets per family (including one in his or her bedroom) with an endless array of channels to choose from, a VCR/DVD player, one videogame console and a personal computer (Jordan, 2004). This has led to decreased interest and participation in physical activities. A report published by the Centers for Disease Control and Prevention (CDC) indicated that 61.5% of children aged 9-13 years did not participate in organized physical activity during non-school hours, and that 23% did not engage in any free time play (CDC, 2007). Further, current data from the Youth Risk Behavior Surveillance nationwide survey found that 38.2% of high school students report watching television greater than three hours per day (Institute of Medicine, 2005). Concurrently occurring with the decrease in physical activity is an increase in rates of overweight and obesity in our youth. Approximately nine million children over the age of six years are considered obese, which is reflected in the simultaneous rise in childhood obesity and related chronic diseases not only in the United States, but also in developing nations (World Health Organization [WHO], 2006). In response to the epidemic of overweight, the CDC set goals in Healthy People 2010 to lower the prevalence of obesity in our
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youth. The CDC campaign includes three specific objectives directed at increasing levels of physical activity and reducing sedentary behavior among children and adolescents. These objectives are:

1. Increase the proportion of adolescents who engage in moderate physical activity for at least 30 minutes on 5 or more of the previous 7 days, with a goal of 35% (objective 22-6).

2. Increase the proportion of adolescents who engage in vigorous physical activity that promotes cardiorespiratory fitness three or more days per week for at least 20 minutes per occasion (objective 22-7).

3. Increase the proportion of adolescents who view television less than 2 hours per day (objective 22-11).

(U.S. Department of Health and Human Services [DHHS], 2000)

The World Health Organization also recognizes adolescent obesity as a global problem, and states “childhood obesity is one of the most serious public health challenges of the 21st century.” (WHO, 2006). It is steadily affecting low and middle-income countries, in particular urban areas. These countries have to deal with a double burden as they continue to struggle with infectious disease and malnutrition in addition to increasing disease process secondary to obesity.

There are many factors that compound the problem of adolescent obesity. A study of 878 adolescents aged 11 to 15 years investigated the relationship between nutrition, physical activity and sedentary behavior with increasing rates of adolescent obesity (Patrick, K., Norman, G.J., Calfas, K.J., et al., 2004). The results of this study validated that overweight in
adolescence is secondary to a complex pattern of energy intake and expenditure. In particular, overweight status was found to be linked with time watching television and increasing amounts of sedentary behavior. The consensus was that the source of the obesity epidemic is not increased calorie intake, but in fact is due to environmental changes (Elkins, Cohen, Koralewicz, et al., 2004). Decreasing opportunities for after school activities, in particular for inner city youth, and corresponding increasing amounts of time in sedentary behavior have been related to significant increases in rates of overweight and obesity. Many types of sedentary behaviors have been studied, and in particular television, videogames and computers have been repeatedly implicated as contributors to the obesity epidemic of children. Research shows that adolescents watch TV, play video or computer games an average of 4.5 hrs/day (Hager, 2006). This indicates that adolescents spend more than 3 years of their lifetime waking hours watching television or playing computer/videogames by the age of 17 years. In fact, more time is spent in front of the “screen” than any other activity with the exception of sleeping. It is hypothesized that screen time influences obesity rates in three different ways:

1. Increased energy consumption through intake of high fat, calorie dense foods
2. Decreased energy expenditure while using electronic media
3. Displacement of other physical activities by electronic media (Epstein, Paluch, Consalvi, et al., 2002)

It is important to recognize the impact of increasing rates of obesity in youth not only on the individual, but also on society. Individual impacts include the increased risk of developing chronic health problems such as cardiovascular disease and diabetes, and also decreasing quality of life, as measured by lower self-esteem, and poor emotional well-being (Friedlander, Larkin,
Rosen, et al., 2003). Individuals and society feel the impact of adolescent obesity. Healthcare expenditures for obese patients, in particular children, are dramatically higher than for normal weight patients (Hampl, Carroll, Simon, et al., 2007). Also, high television/ videogame viewing has been linked to increasing rates of adolescent risk behaviors, such as truancy, cigarette smoking, sexual activity, and others (Nelson & Gordon-Larsen, 2006). It is therefore important that health care providers should recognize ways to assess time spent with electronic media and encourage that adolescents decrease the amount of time spent with these media, thus positively impacting the rates of adolescent obesity.
Purpose Statement

A significant number of research studies have been performed in an attempt to define the relationship between screen time and adolescent overweight and obesity. Varying study designs and limitations of these designs have led to inconsistent results. Part of the inconsistency is due to the different tools used to measure screen time in adolescence, and the fact that tools used have varying degrees of reliability and validity. For example, some research studies have utilized subjective data from interviews and questionnaires in order to measure screen time. Others have utilized objective data gathered from devices such as the accelerometer. Researchers can easily reach different conclusions based on how the data is gathered, and this has been a significant obstacle in providing strong evidence for the relationship between screen time and obesity.

The purpose of this literature review is to explore reports about the relationship between screen time and rates of adolescent obesity. Literature is reviewed based on data collection techniques and study design.

Conceptual Framework

The conceptual framework utilized is Bronfenbrenner’s Bioecologic Systems Theory (Bronfenbrenner, 2005). This theory recognizes that an adolescent’s development is influenced by a mutual interaction of the individual with the layers of relationships that form the surrounding environment. Each “layer” plays a complex role in the adolescent’s development. The interaction between these factors and the adolescent influences the development and maturation of the individual. These layers of interaction include the child’s perception of self, immediate family, community environment and societal influences that direct his development.
They consist of the microsystem, mesosystem, exosystem, and macrosystem, as demonstrated in Figure 1.

![Bronfenbrenner's Ecology Model](http://www.issafrica.org/pubs/monographs/No136/M136Chap4Fig1.gif)

Source: http://www.issafrica.org/pubs/monographs/No136/M136Chap4Fig1.gif.

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The microsystem includes the adolescent’s immediate surroundings, with which there is nearly daily contact, such as parents, siblings, and the school. This level is often thought of as the most influential on behavior since adult modeling behaviors and peer behaviors are reinforced through daily exposure. The microsystem influences an adolescent’s choices of leisure time activities and tendency toward obesity in many ways. For example, the average
household has four televisions, often one in each bedroom, videogame consoles and personal computers. This microsystem pattern promotes increased screen time and associated decrease in physical activity.

As defined by Brofenbrenner (2005), the mesosystem encompasses connections between Microsystems, including home, school and neighborhoods. Parents, educators, healthcare providers and others, positively or negatively influence this layer as they interact with one another. As an example, researchers have tried to determine the effect of unsafe neighborhoods on choices in leisure time activity, including media use. Romero et al. (2001) hypothesized that children’s perceptions of more neighborhood hazards would be associated with higher body mass index (BMI) as a result of less physical activity and more screen time. If the mesosystem (interaction of home and school) is not supportive of physical activity and instead leads children to pursue indoor, sedentary behaviors, an increase in obesity in these children would be anticipated.

The exosystem is composed of social settings where the child is not usually present, but which influence the child. Examples include community health settings, parent workplace, and extended family. An increased percentage of two-parent working families have paralleled the increase in television and other media use in the home. Parents are often not present to monitor screen time, or have too many responsibilities to focus on the child’s use of screen activities.

The macrosystem includes cultural values, beliefs and behaviors. The media plays an important role in the macrosystem. Cultural influences drawn from different ethnic groups and settings can influence amounts of screen time and cultural norms.

The Bioecologic Model provides insights that allow us to focus simultaneously on the characteristics of the adolescent, the home setting, and the greater environment in examining
screen time. Research reviewed in this paper discusses this interplay of these systems. The home can be viewed as the “intersection between the microsystem and the macrosystem” (Jordan, 2004, p. 196). Deficiencies in relationships between these systems can be reflected in lack of self-discipline, anti-social behavior and inability to provide self-direction. Some of these behaviors may contribute to increased screen time and to a decrease in physical activity and behaviors that promote a sense of well-being.

Definition of Terms

For the purpose of this literature review, “adolescence” is defined as the ages from 9 to 15 years. Research collected for this review was limited to this age group.

“Obesity” and “overweight” in adolescence are defined by measurements of body mass index or BMI. BMI is expressed as weight/height$^2$ (kg/m$^2$) and is recommended to identify children who are overweight or at risk for becoming overweight. Children who are at or above the 85$^{th}$ percentile on standardized growth charts are classified as “overweight”, while those at or above the 95$^{th}$ percentile are considered “obese”. Criteria are based on 2000 CDC BMI percentile charts (Appendix B).

“Screen time” is defined as leisure time utilization of electronic media such as television, computer, videogames or cell phones. Computer use for school purposes was not included as “screen time” for the research articles reviewed in this paper.

The “accelerometer” is a small device worn around the waist or wrist of study participants. It stores data as 1-minute means for a 7-day period. Accelerometers have been shown to be a valid measure for quantifying activity levels in adolescents (Patrick et al., 2004).
CHAPTER TWO

Review of the Literature

In conducting this literature review, the search engines of Google, Yahoo, and databases of CINAHL, PUBMED, PROQUEST, and the Cochrane database were utilized. Search terms included “adolescent obesity”, “childhood obesity”, “screen time and obesity”, “television”, “videogame use”, and “computers and obesity”. Research selected for inclusion in this review was specific to the adolescent age group, from age 9 to 15 years. Data were collected from year 1995 to present.

When studying the relationship between adolescent obesity and screen time, a prediction of correlation may seem self-evident. Researchers have tried to relate the increased use of television, video games, and computers to the increase in adolescent obesity for decades. Many different methods of data collection and comparison have been utilized to examine the correlation between increasing rates of obesity, physical inactivity and television viewing in adolescents. The different methods of data collection have included interviews, self-report questionnaires, and direct measurement of activity with tools such as accelerometers, pedometers, and calorimeters. Study designs have included longitudinal studies, cross-sectional studies and randomized control trials. Tools used to collect data for any type of study design can skew results based on the reliability of the tool, and therefore it has been difficult to solidify the correlation between screen time and adiposity. Beginning in earnest in the mid 1980s, researchers have attempted to identify this link. Dietz and Gortmaker (1985) were the first researchers who provided major evidence supporting a relationship, and study designs over the following 20 years have been selected to fortify that evidence and support the need for practitioners and policy makers to apply the results in the clinical setting.
Data Collection by Interview

Several studies on the connection of screen time to adolescent overweight and obesity have depended on the accuracy of interviews of either study participants or their parents. Data from the National Health and Nutrition Examination Survey III, which encompassed 1988 through 1994 (NHANES III), were used to examine the relationships between screen time and “level of fatness” in children. Interviews were conducted on 4063 children that comprised a “nationally representative” sample. The results concluded, “boys and girls who watch greater than four hours of television per day had the highest BMIs, and children who watched less than one hour of television per day had the lowest” (Andersen, Crespo, Bartlett, et al., 1998, p. 938).

Significant differences between ethnic groups were seen, with non-Hispanic Black children having the highest rates of television watching; 42% of them watched greater than four hours per day. However, the authors did not find that children with greater screen time had higher rates of obesity. Vandewater, Shim, and Caplovitz (2004) studied 2831 participants, ages 1-12 years. The sample included 49% girls and 51% boys. The primary caregiver of each child reported activities in which the child participated in for two 24-hour periods. One of these periods was a weekday, the other a weekend day. It was assumed that this would give a much more accurate account of actual screen time than previous studies had been able to do. After data were collected, three measures of activity participation were created to categorize the various levels of activity. A series of OLS (ordinary least squares) multiple regressions was performed, with media use and activity as predictors and BMI percentile as the dependent variable. The conclusion of this analysis was that there was no relationship between children’s weight status
and television viewing, but that there was in fact a positive linear relationship between electronic
game use and weight, as well as BMI.

Mota, Ribeiro, Santos, et al. (2006) reported a similarly designed study. Logistic
regression analysis was used to examine the correlations between obesity and screen time. The
sample for this study was a group of 550 Portugese students, with a mean age of 14.6 years.
Mota identified a significant positive relationship between computer use and obesity.

A positive correlation between computer and cell phone use with body mass index has
been reported as well (Lajunen et al., 2007). A cross-sectional study of 4098 Finnish
adolescents (average age 17 years) identified a higher risk of overweight and obesity in those
who reported greater amounts of time on the home computer. A positive linear trend of
increasing monthly cell phone bill with BMI was also found, although the investigators noted
that this association was weak.

Positive correlations between screen time and obesity have been linked with increased
soft drink consumption as well (Giammattei, Blix, Marshak, et al., 2003). In a school-based
screening study, 319 6th and 7th grade students completed a questionnaire, and had measurements
of height and weight recorded. The findings indicated that the mean BMI was lower for those
that reported watching less than two hours of television and drinking less than three soft drinks
per day. A weakness of this study is that the participants were self-selected and there were no
data available on those that did not choose to participate.

A limitation of these cross-sectional studies is that they do not allow for inferences to be
made about a causal relationship between screen time and obesity. In fact, the causal
relationship could be that obesity may cause children to engage in more sedentary and isolated
activities such as television viewing or computer use. Also, as behaviors were self-reported, data may have been reported inaccurately.

It is important to note that the reliability of self-report or parent report on amounts of screen time can lead to inconsistency in the results of these studies. As a result, researchers have recently made attempts to improve accuracies in measurement by utilizing tools that do not allow for inaccurate reporting of data. These measurement tools include the accelerometer, direct measurement calorimeter and metabolic rate measurement.

Results of longitudinal studies have varied as well. The Framingham Children's Study tracked preschoolers through early adolescence (Proctor et al, 2003). In this study 102 children were tracked from age 4 years to age 11 years. The parents of the participants completed a questionnaire about the child's use of screen time and leisure activities. Objective measurements of BMI, skin-fold thickness and body fat percentage were taken at the beginning and the end of the study. A positive correlation was found between media use and body weight in this study. Results showed that by the time the child reached early adolescence, BMIs were highest for those that had the greatest reported screen time.

Direct Measurement of Activity

Hager (2006) utilized an electronic accelerometer to provide an objective measurement of time spent in activity and sedentary behavior; the accelerometer has been shown to be a valid measure of activity in children (Epstein, Paluch, Kalakanis, et al., 2001). In this study, Hager identified a significant inverse correlation for boys when considering activity and television viewing, but found a non-significant correlation in the girls in the study sample. The males' relationship continued to be significant when controlling for BMI. The difference between
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Genders may be largely due to the fact that girls do not have as much opportunity to engage in organized physical activity as boys, or that they may choose other sedentary activities (talking on the phone, reading, etc.). A strength of this study was that it provided a comparison of differences between genders, in addition to using an objective measurement of activity (the accelerometer).

Another study of 878 adolescents examined the relationship of physical activity and sedentary behavior (i.e. screen time) to overweight status (Patrick et al., 2004). This cross-sectional study utilized data from the Patent-Centered Assessment and Counseling for Exercise plus Nutrition Project (PACE+). Once again, the accelerometer was utilized to measure activity versus sedentary behavior in the participants. The effects of a seven different physical and dietary variables on increased risk for overweight and obesity in youth aged 11 years to 15 years was investigated by multiple regression analysis. The researchers concluded that insufficient physical activity was the only risk factor for higher body mass index for adolescent boys and girls, and further recommended prospective studies to clarify this relationship.

Lanningham-Foster, Jensen, Foster, et al. (2006) directly measured calorie expenditure during sedentary screen time and compared it with calorie expenditure during active screen time. The hypothesis was that energy expenditure would be higher when children were engaged in activity-promoting video games as compared to sedentary video games. Energy expenditure was measured by indirect calorimeter designed specifically for use with children. By direct measurement the inconsistency of data collection by self-report is eliminated. The researchers concluded that in fact more energy was consumed during “active play” videogames, and least was consumed during passive television viewing. They further acknowledged the difficulty in weaning children from screen-based activities, and that children are resistant to giving them up.
Development of activity promoting video games provides opportunities for children to indulge in screen-based activities, and also provides a potential tool for reversing sedentary activity and promoting weight loss (Lanningham-Foster et al.).

**Randomized-Control Trials**

The development of a randomized controlled trial (RCT), which assesses the effects of reducing screen time on changes in adolescent adiposity, was necessary to observe a direct effect of changes in adolescent behavior on health. Experimental trials are considered the best way to support a relationship between screen time and overweight/obesity. Of the studies reviewed, very few randomized controlled trials were found, showing a gap in the research. Robinson (1999) conducted a RCT at Stanford University. This study measured the BMI of 198 elementary school students, with a mean age of 8.9 years, and the relationship of changes in TV viewing and video game use to BMI. The intervention was an 18-part, 6-month classroom curriculum, which presented ways to decrease screen time during leisure hours. The intervention for this study was a “turn-off” period of 10 days, followed by limiting TV time to 7 hours per week for the duration of the study. Robinson found a statistically significant relative decrease in BMI in the intervention group. A significant decrease in self-reported television viewing and consumption of foods while watching television was also reported. The findings demonstrated the plausibility of decreasing body weight by reducing the amount of screen time and snacking in youth.

A study by Epstein et al. (2002) identified a significant relationship of sedentary behavior to energy expenditure. Thirteen children from 9 to 13 years participated in a 3-week clinical trial which consisted of three parts. The investigators utilized activity logs, accelerometers and
24-hour dietary recall to determine the relationships between sedentary behavior and energy consumption. The researchers concluded that sedentary behaviors such as screen time impacted rates of obesity by encouraging increased caloric consumption. Children showed significant increases of 50% in physical activity and decreases of 53% in targeted sedentary behaviors during the study period. There was a corresponding significant increase (p=.05) in energy balance of >350 kcals, as a result of increasing caloric intake by 250.9 kcals and decreasing calorie expenditure by 99.8 kcals. The researchers concluded that TV is a threat in that it decreases physical activity, exposes children to numerous food commercials, and encourages consumption of greater quantities of calorie dense foods (Epstein et al., 2002).

A family-based intervention found that decreasing sedentary behaviors is a viable alternative to increasing physical activity in the treatment of obesity in adolescents (Epstein et al., 1995). Families with children 8-12 years that fit the definition of obesity were randomly assigned to four groups. These groups were offered information on dietary and behavior change, but differed in the implementation of actual changes in dietary intake, physical behavior, or both. Results of this study indicated that by decreasing the amounts of sedentary behavior such as television watching or video game use there was a significant decrease in body weight and body fat percentage.

**Meta-Analysis**

A review of empirical evidence relating overweight and obesity in children and media identified a strong positive correlation between media use and adiposity (Marshall, Biddle, Gorely, et al., 2004). This meta-analysis included data from over 44,000 children, and 33 studies
presented a measure of association between physical activity and screen time. The results indicated a positive correlation between TV viewing/videogame play and adolescent adiposity.

The Kaiser Family Foundation has also examined the relationship between technology and increasing rates of adolescent overweight and obesity. The foundation reviewed current research and concluded that increasing exposure to media has had an impact on increasing rates of obesity and secondary health consequences such as type 2 diabetes and hypertension in youth (Kaiser Family Foundation, 2004). The foundation examined how media use contributes to childhood overweight and obesity by several different mechanisms.

- Time spent using media displaces time that could be spent in physical activity
- Food advertisements children are exposed to on television cause poor food choices
- Advertisements that link popular TV/game characters and unhealthy foods promote increase consumption of these foods
- Children have increase caloric intake while using media through excessive snacking
- Watching TV and videos lowers metabolic rate in children

The Kaiser Foundation report further summarized findings of the NHANES II and III, which concluded that television watching was positively associated with obesity among girls, even after controlling for age, race/ethnicity, family income, and energy intake. Also, among 8- to 16-year olds, those who watched the most television had more body fat and greater BMIs than those who watched less than 2 hours a day (Kaiser Family Foundation).

Mark and Janssen (2008) add further support to this relationship with their analysis of results from 1999-2004 NHANES. The sample included 1803 adolescents aged 12-19 years.
They concluded that there is a dose response relationship between screen time and risk for metabolic syndrome in children. Metabolic syndrome represents a presence of multiple risk factors for cardiovascular disease and type 2 diabetes. These factors include abdominal adiposity, low HDL cholesterol, high fasting glucose and high blood pressure. The researchers concluded that the likelihood of having metabolic syndrome in these adolescents increased in a dose response manner as daily screen time increased. Screen times in excess of 3 hours per day resulted in approximately two- to threefold increase in metabolic syndrome than those with screen time levels less than one hour per day.

Figure 2

Source: Mark & Janssen (2008)
Summary

Retrospective studies have provided inconsistent data about the potential link between screen-time and obesity. This may be due to inadequate reporting of television/computer use, and inappropriate measurements of adiposity in children. There is a need for more prospective, well-defined studies with multiple levels of intervention to promote success in decreasing screen time and therefore decreasing levels of adolescent obesity. Levels of intervention should include individual, family and environmental (i.e. school).

There is ongoing research to determine the most effective approach, recognizing that the age group is a difficult one. Interventions have been based on individual, family, or community changes. Research is needed to better understand the environmental interplay that contributes to the development of overweight and obesity in this age group. Prospective studies are needed to uncover the relationships.
CHAPTER THREE

Implications for Health Care Providers

The United States has experienced an alarming increase in the rates of adolescent overweight and obesity over the past three decades (Appendix A). Data from two NHANES surveys (1976-1980 and 2003-2004) show that the prevalence of obesity in children has increased from 6.5% to 18.8% for those aged 6 to 11 years, and from 5.0% to 17.4% for adolescents and teens from age 12-19 years (Centers for Disease Control and Prevention [CDC], 2007). The economic burden of obesity-related diagnosis has increased substantially in both adult and pediatric populations. It is speculated that poor diet and physical activity resulting in obesity may soon surpass tobacco as the leading cause of death in the 21st century (Agras, Hammer, McNicholas, et al., 2004). In fact, for the first time in modern history it is speculated that children may have a shorter lifespan than their parents (Daniels, 2006). Effective prevention strategies and treatment interventions will become necessary.

Interventions aimed at treating obesity in children have shown only modest effect; therefore the focus should be shifted to prevention (Institute of Medicine, 2005). Obesity and overweight during adolescence are predictors of obesity continuing in adulthood. Thirty percent of girls and 10% of boys that are obese children become obese adults (Mota et al., 2000). Furthermore, obesity contributes to other chronic medical conditions such as cardiovascular disease, diabetes, and psychosocial effects such as shame, self-blame and low self-esteem (Schwartz & Puhl, 2003). There are many contributors to adolescent obesity, one of which is sedentary behavior. Excessive amounts of screen time has been shown repeatedly to be a predictor of increasing overweight and obesity in children regardless of the amounts of physical
activity in which a child is involved (Andersen, Crespo, & Bartlett, 1998). This suggests that health interventions should target behaviors in adolescents that specifically involve amounts of screen time.

Health care providers can apply findings from studies regarding the prevalence of adolescent overweight and obesity and its relationship to screen time. With a focus on preventative care and health promoting activities, a practitioner can ask the following questions:

1. How can consistency in measuring and assessing for adolescents at risk for overweight and obesity be ensured?

2. How can a message of health promotion be framed, including decreasing screen time and increasing physical activity, in a way in which adolescents will be motivated to make change?

3. How can interventions to measure the outcomes of teaching be evaluated?

4. In what macrosystem changes can the nurse practitioner be involved?

According to the Institute of Medicine (IOM), in 2002, 74.5% of children had seen a health care professional in the past six months. This highlights that here are multiple opportunities for health care providers to measure and track height, weight, and BMI, and to appropriately counsel children, as well as their parents or caregivers, about proper nutrition, physical activity, and screen time. Only by paying attention to these opportunities will there be measurable change in adolescents’ perception of health and willingness to make change to improve their health. We must include interventions for the family as well as community
approaches (including schools). The literature shows that a multi-disciplinary approach that values the adolescent’s increasing autonomy is most successful.

Practitioners should take advantage of opportunities to assess adolescents for overweight and obesity whenever possible. Accurate measurement of BMI should be performed at every well-child visit and at other encounters where there is perceived risk. Newer growth charts published by the CDC generally provide accurate weight standards for ages 2 through 19 years. These charts set standards that are age and gender specific (Appendix 2). The Expert Committee on Evaluation and Treatment of Obesity recommends the use of these charts to properly assess and identify overweight and obese children (Hagerty, Schmidt, Bernaix, et al, 2004).

It is important also to assess for amounts of screen time during health care visits. There are multiple tools available to utilize in the primary care setting that will evaluate amounts of screen time (Appendix 3a). Simple questionnaires are the easiest to administer in the office setting. More advanced tools such as a Previous Day Physical Activity Recall (PDPAR), activity diaries or similar can be utilized for the adolescent to take home and return at a follow up visit for review.

Prevention of obesity should be a primary goal for practitioners. Appropriate screening of adolescents can assist in recognizing those at risk for overweight, as well as those that are already overweight or obese. Intervention strategies can be applied to assist the child and his family in preventing further weight increases and associated co-morbidities. Recommendation of activities that increase physical activity and decrease the amount of screen time is essential. Stressing the importance of limiting screen time to two hours or less per day is crucial. There are multiple devices available to assist parents in monitoring and limiting screen time in the home. (Appendix 3b) It is imperative to talk to families about limiting access to screen time in the
adolescent's bedroom. Removing televisions, personal computers, and cell phones from the bedroom can have a significant impact on amounts of screen time. It is emphasized that this must be a plan that involves the entire family. As Brofenbrenner's model suggests, an intervention will not be successful if the interacting systems do not support the changes being made.

Nurse practitioners can play a vital role in combating adolescent obesity because of their close contact and ability to give advice to patients and families. The National Association of Pediatric Nurse Practitioners (NAPNAP) has developed an initiative called "Healthy Eating and Activity Together" or "HEAT" (NAPNAP, 2008). The goals of this initiative, first established in 2003, is to increase physical activity and therefore reduce the proportion of children ages 6-19 years that are obese from the current rate of almost 20% to less than 6% by 2010. Several other programs to help combat childhood obesity have been established by the CDC. One example is a program titled "VERB". This program stresses the importance of being physically active and limiting sedentary behaviors. The campaign was in place from 2002-2006, and combined paid advertising, marketing strategies, and partnership efforts to reach the audiences of adolescents. Other important audiences were parents and adult influencers, including health professionals, teachers, and youth leaders (Centers for Disease Control and Prevention [CDC], 2007).

Practitioners need to continually assess the efficacy of interventions to prevent or treat adolescent obesity. Frequent follow-up is necessary to evaluate interventions and continue to monitor compliance with recommended lifestyle changes. The nurse practitioner must provide continuing support to the patient and the family in order to establish permanent change in behaviors and thus reduce risk of the complications associated with obesity. Providing the patient and family with literature that will help evaluate success is helpful.
Community involvement is also essential to combat the prevalence of adolescent obesity. Nurse practitioners can act as advocates and help direct policy changes that will overcome barriers to increasing physical activity and decreasing sedentary behaviors such as screen time. By advocating for school-based programs and safe neighborhoods we can get children off of the couch and becoming more physically active.

Nurse practitioners recognize the necessity of a collaborative approach to combating the prevalence of overweight and obesity in our children because the causes are multidimensional. The Bioecologic Model substantiates the importance of applying a multi-level approach to this public health problem. Improving the health of our children will take the effort of the individual child, but also families, schools, communities and industry. Influencing policy makers to provide funding for safe activities for children to engage in, and encouraging media to promote healthy messages to this age group may help put an end to the pandemic of adolescent on obesity and decrease the corresponded economic burden.
References


Retrieved September 1, 2007, from the CINAHL database


Appendix A

Trends in Child and Adolescent Overweight

Note: Overweight is defined as BMI ≥ 85th percentile for height and age. BMI calculated from 1960 CDC growth charts.

# Appendix B: BMI for age

## 2 to 20 years: Girls

### Body mass index-for-age percentiles

<table>
<thead>
<tr>
<th>Name</th>
<th>Record #</th>
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<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>Weight</th>
<th>Statue</th>
<th>BMI</th>
<th>Comments</th>
</tr>
</thead>
</table>

*To Calculate BMI: Weight (kg) / [Stature (cm) * Stature (cm)] x 10,000

![BMI for age graph](image-url)
2 to 20 years: Boys
Body mass index-for-age percentiles

<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>Weight</th>
<th>Height</th>
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</table>

*BMI = Weight (kg) + Height (cm) + Height (cm) x 10,000

For Weight (kg) + Height (cm) + Height (cm) x 700

Published May 2000, Revised Oct 2008
S O U R C E : Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion, 2000;
http://www.cdc.gov/growthcharts
Appendix 3b

Screen Time/Activity Measurement Tools

<table>
<thead>
<tr>
<th>Tool Name</th>
<th>Age Group</th>
<th>Measurement</th>
<th>Website</th>
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</thead>
<tbody>
<tr>
<td>CATCH</td>
<td>6-19 years</td>
<td>dietary, activity</td>
<td><a href="http://www.rohan.sdsu.edu/faculty/sallis/catchphysicalactivitychecklistinterviewpaciprotocol.pdf">www.rohan.sdsu.edu/faculty/sallis/catchphysicalactivitychecklistinterviewpaciprotocol.pdf</a></td>
</tr>
<tr>
<td>MSPAN</td>
<td>middle-school</td>
<td>physical activity</td>
<td><a href="http://www.rohan.sdsu.edu/faculty/sallis/mspanstudentparentsurvey.pdf">www.rohan.sdsu.edu/faculty/sallis/mspanstudentparentsurvey.pdf</a></td>
</tr>
<tr>
<td>PACE project</td>
<td>adolescents</td>
<td>Phys. activity, sedentary behaviors</td>
<td><a href="http://www.rohan.sdsu.edu/faculty/sallis/PAmeasureinfo.pdf">www.rohan.sdsu.edu/faculty/sallis/PAmeasureinfo.pdf</a></td>
</tr>
<tr>
<td>SPARK survey</td>
<td>all children</td>
<td>Phys. activity, sedentary behaviors</td>
<td><a href="http://www.rohan.sdsu.edu/faculty/sallis/sparkstudentsurvev.pdf">www.rohan.sdsu.edu/faculty/sallis/sparkstudentsurvev.pdf</a></td>
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Appendix 3b:

Parent tools for monitoring/limiting screen time

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Price</th>
<th>Website</th>
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</thead>
<tbody>
<tr>
<td>Time Scout</td>
<td>Card Access Inc.</td>
<td>89.95 (basic unit)</td>
<td><a href="http://www.time-scout.com/index.php">www.time-scout.com/index.php</a></td>
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<tr>
<td>TV Timer BOB</td>
<td>FamilySafe Media</td>
<td>69.95 (basic unit)</td>
<td><a href="http://www.familiesafemedia.com/tv_timer_hopscotch_bob.html">www.familiesafemedia.com/tv_timer_hopscotch_bob.html</a></td>
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<tr>
<td>Time Machine</td>
<td>FamilySafe Media</td>
<td>49.95 (basic unit)</td>
<td><a href="http://www.familiesafemedia.com/tv_time_machine_tv_timer.html">www.familiesafemedia.com/tv_time_machine_tv_timer.html</a></td>
</tr>
<tr>
<td>Power Cop</td>
<td>FamilySafe Media</td>
<td>29.95</td>
<td><a href="http://www.familiesafemedia.com/power_cop_tv_time_manager_pare.html">www.familiesafemedia.com/power_cop_tv_time_manager_pare.html</a></td>
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<tr>
<td>PC Time Cop</td>
<td>FamilySafe Media</td>
<td>free 30-day trial</td>
<td><a href="http://www.familiesafemedia.com/pc_timecop_with_watchdog_compu.html">www.familiesafemedia.com/pc_timecop_with_watchdog_compu.html</a></td>
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