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The Relation between Perceived and Real Obesity in School Children from Georgia

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By

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EXPERIENCE

American Cancer Society, Atlanta, Georgia *February 2011-Present*
- Assist with all phases of research including research design, vendor management, questionnaire development, data analysis, report-writing and project management.

Division of Aging Services, DHS, Atlanta, Georgia *May 2010-December 2010*
- Examined geospatial mapping patterns and analyzed guardianship for 13 Area Agency on Aging in Georgia.
- Analyzed the elder abuse rate with respect to socio-economic status, education level and marital status.
- Strategic allocation of the resources increased field efficiency by 10% and made the program cost effective by 13.5%.

Georgia State University, Atlanta, Georgia *January 2009-December 2010*
- Evaluated as teaching assistant for undergraduate course in Principles of Biology Laboratory.
- Reviewed the weekly topic with the help of models and power point presentations. Assist students with lab activities.
- Graded exam papers and written assignments and provided constructive feedback to students.

International Rescue Committee, Atlanta, Georgia *December 2009 –May 2010*
- Developed public relations with the other NGO's.
- Created health communication tools for refugees resulting in fewer hospital visits and medical expenses.
- Advocated with the state department for the benefit of the refugees.

Department of Health and Community Welfare, Gujrat, India *June 2009-July 2009*

- Developed intervention strategy proposal and implementation for the AIDS awareness program.
- Intervention was successful in 5 districts out of 8.

Gujrat Cancer and Research Institute, Gujrat, India *December 2007–April 2008*

- Designed and analyzed the project "Expression of p53 in Head and Neck Carcinoma" in Immunohistochemistry Division of Gujarat Cancer and Research Institute.
- The result led to further epidemiologic study behind p53 expression and its role in cancer screening and prevention.

Intas Biotherapeutics, Gujrat, India *May 2007 –July 2007*

- Designed and carried out experiments in maintenance of cell lines, fermentation techniques, scale up and scale down processes.
- Batch production of erythropoietin protein was increased from 0.10gm/Liter to 0.25 gm/Liter.

Extracurricular Activities

- Cultural secretary of Indian Student Association at Georgia State University.
- Sports: Recognized Volleyball captain at college, state and national level.
- An active participant in HelpAge India (NGO), which works for the betterment of the senior citizens.
- Volunteer International Student Assistant (VISA) leader at Georgia State University for organizing the international student orientation and intake program.

ABSTRACT

TITLE OF THESIS: The relation between perceived and real obesity in school children from Georgia.

THESIS CHAIR: **Ike Okosun, MS, MPH, PhD, FRSPH**

Background: Physical activity and childhood obesity have been studied extensively across the globe, but only few studies have been done in children who are aware of their obesity, overweight status and among children who are taking measures to control their weight. The purpose of this study is to examine agreement between perceived weight and ideal weight differences across gender, grade level, race and levels of weight control.

METHODS: This study is based on the secondary analysis of the Youth Risk Behavior Surveillance System (YRBSS) conducted in the state of Georgia in 2009 (n=1882). The 2009 YRBS for each state that participated used a two-stage cluster sample design to produce a fairly representative sample of public school students in the grades of 9-12. Agreement between the perceived weight and the ideal weight differences across gender, grade level and race was measured using Kappa statistic.

RESULTS: In general, agreement between perceived weight and the ideal weight were better in females compared to males. A much higher degree of concordance between perceived weight and the ideal weight was observed in Whites compared to Blacks and Hispanics. The analysis by grade resulted in 12^{th} grade participants showing a high concordance value between their ideal weight and their perceived weight than the lower grade levels.

CONCLUSION: The results are in particular very insightful to the public health professionals who are in the process of promoting healthy behaviors. The study implies that minority groups such as Blacks and Hispanics may be more uninformed about their obesity status. Public health programs that are specifically designed to increase obesity awareness may help to alleviate obesity and its related consequences. Race and gender specific programs may help to increase perception about obesity in at-risk 9-12 children and adolescents.

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CHAPTER I

INTRODUCTION

1a. Background

The prevalence of obesity is increasing at an alarming rate across the developing countries of the world regardless of age, sex, race or ethnicity. Obesity is a major risk factor for many chronic conditions, including 4 of the 10 leading causes of death in the US: heart disease, stroke, diabetes & several forms of cancer. According to one study it is estimated that prevalence of obesity in US adults is (34%) twice than that observed in children and this figuratively is about 73 million men and women (Flegal, Carroll, Ogden, & Curtin, 2010). The global epidemic of obesity is impacting an increasing number of children, adolescents and adults with a common feature being low levels of physical activity (Andrew P. Hills, 2009). There are many studies done across the world ascertaining the importance of physical activity for health and growth and development of youngsters, but little is done to put the words into action. Physical activity opportunities for children is reduced because of urbanization, social factors and advancement of technology like television, laptop computers, video games, smart phones (Andrew P. Hills, 2009; Yeung, Wearing, & Hills, 2008). There has not been done much research on the multilevel intervention strategy involving family, school, and community setting (Pate & O'Neill, 2009). Studies have demonstrated health benefits associated with physical activity such as positive mental health (Scully, Kremer, Meade, Graham, & Dudgeon, 1998) and it also lowers the risk of chronic disease for example coronary heart

disease, diabetes certain types of cancer and osteoporosis (Penedo & Dahn, 2005). Numerous initiatives, national and international guidelines have stressed the important role of physical activity in maintaining good health and preventing disease; unfortunately these efforts have not translated into increased physical activity (Van Kleef, Shimizu, & Wansink, 2011).

According to the Physical Activity report published in 2006 for the state of Georgia only 59% of the high school students were vigorously active and it clearly did not meet the target of 85% and similar was the case with middle school students (68% vigorously active) and adults (42% vigorously active) (Falb M, 2006). The report adds that whites (45%) were more active than blacks (38%) and Hispanic (28%) and none of the racial group in Georgia met the Healthy people 2010 objective of 50% (Falb M, 2006). According to the 2003 Georgia Student Health Survey Report around 15% of the high school students are at risk of becoming overweight and in this subset African American students are at a higher risk as compared to white students. 11% students are already overweight and this consists of more males than females. African American students are more overweight than the white students (Georgia DHR, 2003).

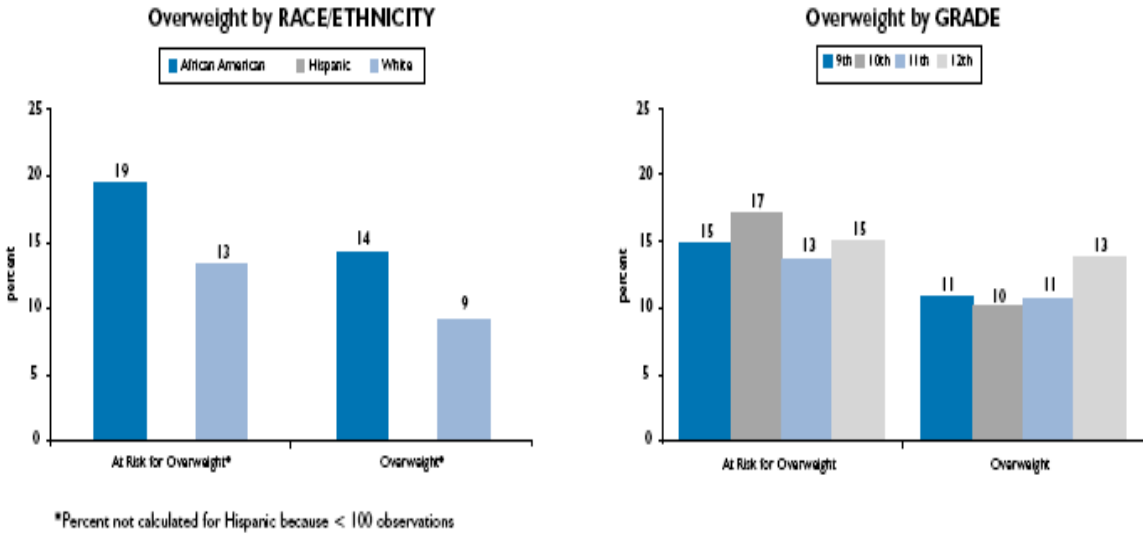

Figure 1: Overweight percentage by race and grade level in Georgia, 2003.

1b. Purpose of study

Systematic review of literature have given enough evidence that physical activity is important in the control of childhood obesity along with other factors like social environment, genetic composition (Andrew P. Hills, 2009). Obesity clearly is a precursor to many of the chronic conditions like hypertension, blood pressure, cardiovascular disease, diabetes and also it plays as a trigger for psychosocial problems in adulthood. Physical activity and childhood obesity are being studied extensively across the globe, but there has not been done enough research to determine the obesity awareness status of children The purpose of this study is to examine the relation between perceived and real obesity status across levels of physical activity, nutritional status and race/ethnicity in school children in the state of Georgia. This study will enrich the literature by factoring in

other variables such as gender, age, BMI, dietary patterns and physical activity level. The data from the study was obtained from Youth Risk Behavior Survey (YRBS) for Georgia from 2009 to examine the relations.

1c. Research question

Question 1- Is there an agreement between the perceived weight and right weight in the adolescent population of Georgia by gender, race/ethnicity and grade?

Null Hypothesis- There is no agreement between the perceived weight and the right weight.

Question 2- How does the agreement between perceived weight status and right weight status differ by levels of physical activity across gender, race and grade?

Null Hypothesis- There is no difference in agreement when the engagement in physical activity is observed and stratified across gender, race and grade.

Question 3- How is the agreement between perceived weight status and right weight status different by levels of weight control behavior across gender, race and grade?

Null Hypothesis- There is no difference in agreement when the engagement in weight control behavior is observed and stratified across gender, race and grade.

Question 4- How is the agreement between perceived weight status and right weight status different by nutritional status across gender, race and grade?

Null Hypothesis- There is no difference in agreement when the engagement in nutritional status is observed and stratified across gender, race and grade.

CHAPTER II

REVIEW OF THE LITERATURE

To get a deep understanding of the research question this section is dissected to understand the prevalence of physical activity, obesity and the effects of obesity. Furthermore, comprehensive review of effect of physical activity on childhood obesity, self perception, childhood obesity and its effect in adulthood, parental influence and genetic makeup are included.

2a. Weight perception

If individuals who are overweight, obese or underweight do not recognize their original weight status it becomes clear that they are unaware of the health risk and do not take any measure to lead a healthy life. Similar may be the case when healthy people perceive themselves as obese or overweight and engage in physical activity or weight control behavior which is not needed or unhealthy (Binkley, Fry, & Brown, 2009). Perception of overweight is related to depressed mood, lower self esteem and somatic complains in some ethnic and gender groups (Ge, Elder Jr, Regnerus, & Cox, 2001). It has been found that the perception of weight status is very much different in the males and the females and it also shows drastic variation across gender. Girls in most of the cases perceive themselves to be overweight to report more body dissatisfaction and to be concerned about their weight than boys (Pritchard, King, & Czajka-Narins, 1997). In one of the studies (Desmond, Price, Hallinan, & Smith, 1989) it was seen that about 43% of normal weight white girls considered themselves as heavy whereas mostly all thing and

right weight black females identified themselves correctly. 100% of heavy white girls identified themselves as heavy whereas only 40% of heavy black girls perceived themselves as heavy. Another study concluded that females in the age group of 11-16 years tend to underestimate their weight status and usually identify a too low number (Rierdan & Koff, 1997). But, when asked to be identified based on the weight status if they were overweight or normal weight they were more likely to report as being overweight even though if they would be about right weight(Rierdan & Koff, 1997; Strauss, 1999). A study also showed that African American students tend to underestimate their weight when compared to other race students and children who were at risk for overweight or who were overweight underestimated their weight more than the healthy students (Morrissey, Whetstone, Cummings, & Owen, 2006). Hispanic and white boys tend to perceive their bodies to be larger than the girls and girls perceived themselves to be larger than what they really were and additionally there is no difference in body perception in the two ethnic groups (Gardner, Friedman, Stark, & Jackson, 1999).

Weight perception is a very important driving force in determination of behavioral pattern of eating, weight management among adolescents (Brener, Eaton, Lowry, & McManus, 2004). Perceived body weight and weight gain concern have a direct influence on desire to change weight and in turn influence physical activity (Plotnikoff, Bercovitz, Rhodes, Loucaides, & Karunamuni, 2007). Perceived health status also drives the estimation of caloric intake and it has been shown that overweight adolescents and adults tent to underestimate their caloric intake as compared to right weight individuals (Roberts, 1995). For example as one of the literature mentioned behavioral attitude of fast food consumption was significantly and positively associated with perceived barrier of healthy eating, but there is not enough research done whether

the perceived barrier varies by weight status (French, Story, Neumark-Sztainer, Fulkerson, & Hannan, 2001). Negative perception also has detrimental effects on the health of the adolescents. Negative weight perception is related to extreme weight control behaviors like dieting, use of laxatives, diet pills and binge eating among over weight adolescents (Boutelle, Neumark-Sztainer, Story, & Resnick, 2002).

There has also been conflicting results when it comes to validating self reported height and weight. One study found that there was no difference in self reported and measured height and weight between African Americans and whites(Strauss, 1999). While another study found that white students were more likely to perceive themselves as taller than the children of other ethnic group (Brener, McManus, Galuska, Lowry, & Wechsler, 2003). One of the study showed that self reporting of their perception was misleading in middle school students when relied only on self reported data. The study further showed that on an average students underreported themselves by 1.5 kg and 1 out of 6 children would be misclassified if relied solely on the self reported data (Morrissey, et al., 2006).

2b. Childhood obesity

According to American Academy of Pediatrics, adolescents who are overweight have an estimated 80% chance of being obese as adults and if overweight begins before age the of 8 years adulthood is likely to see severe obesity (CDC, 2011b). Obesity kills more Americans each year than AIDS, cancer and injuries combined (Connecticut Department of Public Health, 2007). The growing prevalence of childhood obesity is alarming, given the long term and short term effects associated with obesity. A study done by Green and Patterson found that there has been an increase of 3.2% annually in Type I diabetes incidence in children in Europe from 1989 to 2000 (Green & Patterson,

2001). Although the suggestion that Type I diabetes is related to childhood weight gain was first reported in 1975 by Baum and his co-workers (Baum, Ounsted, & Smith, 1975). There has been no systematic review of association between childhood obesity and Type I diabetes but based on the literary evidence they both seem to be correlated and controlling childhood obesity would have an added advantage of reduction in Type I diabetes. (Verbeeten, Elks, Daneman, & Ong, 2011).. With the growing incidence in childhood obesity there has also been a stable rise in Type II diabetes in children and adolescents (Pinhas-Hamiel et al., 1996). And it is a well known fact that metabolic syndrome is strongly associated with type II diabetes, arterial hypertension and breathing difficulties leading to myocardial infarction. If not in all, in most of the cases the above mentioned disorders cause an early or premature death. Another effect of prevalence of these disorders is the increase in the consumption of the economic resources. The problem can prove to be more grave if we factor in the loss of quality of life and the dangers of psychosocial isolation (Lob-Corzilius, 2007). Obesity during childhood appears to be a precursor to other chronic diseases like cardiovascular disease, hypertension, dyslipidemias (Freedman, Dietz, Srinivasan, & Berenson, 1999). Although in one study it was seen that there was no association between BMI of children measured at 5 years of age and its relation to coronary disease in adult life, but the risk of having a stroke in adulthood doubled in children who were obese (Lawlor & Leon, 2005). Behavioral problems and low self esteem have been seen in girls in addition to psychological problems (Stewart, 2011). There has been seen long term consequence of social and economic effects in women achieving lower income (Reilly, 2005). Obesity contributes to the burden of chronic disease; but it has also been noted that the widespread and long term effect of obesity is psychosocial (Dietz, 1998). Obese children

tend to be at the receiving end of early and systematic discrimination. The children in school and in society tend to create a barrier with the obese children. According to one study, 10-11 year old boys and girls prefer being friendly with children with wide variety of handicap to obese children (Richardson, Goodman, Hastorf, & Dornbusch, 1961). As a result of such discrimination overweight children prefer to stay friends with younger children who would most likely not discriminate and would not be much judgmental about their weight.

2c. Effects of Childhood Obesity

Obesity is defined as an excess of body adiposity (Koplan, 2007). In just over one generation, US rates of obesity have approximately increased by three times among preschoolers and adolescents, and increased four times among children aged 6 to 11 years(Koplan, 2007). One study estimated that almost 9% of all medical expenditure in 2008 was obesity related and amounted to $147 billion, compared to $78.5 billion 10 years before (Finkelstein, Trogdon, Cohen, & Dietz, 2009). Epidemiologic data from German Children and Adolescent Health Survey resonated the same opinion (Rosario, Kurth, Stolzenberg, Ellert, & Neuhauser, 2010). The nationalized data showed that about 2 million children and adolescents (about 15%) between the ages 3-17 years are overweight and about 800,000 (about 6.5%) of these children and adolescents are obese. It is also true that a significant proportion of the children continue to be overweight for the rest of their life if not obese. Like adult obesity, childhood obesity and overweight is also defined by Body Mass Index (BMI). Percentiles are the most common way of measure of growth and size patterns in United States (CDC, 2011a). Although there remains some conflict in agreement with the definition of cut off points for childhood

obesity between USA and rest of the world, for the study purpose we will take into consideration the definition by CDC (Center for Disease Control and Prevention). If the percentile range is between 85^{th} and 95^{th} percentile the child is considered as overweight; if greater to or equal to 95^{th} percentile as obese. Obesity is an outcome that has many attributes to it apart from physical activity namely socioeconomic status, poverty, education, sedentary life style and neighborhood safety (Hu, 2008).

2d. Physical Activity

Physical activity is any type of body movement which requires spending of energy and includes aerobic and muscle strengthening activity (CDC, 2011b). But the intensity and the recommendation for the amount of physical activity differs between adults and children. CDC recommends that children and adolescents should do one hour of physical activity each day (CDC, 2011b). One of the reasons for childhood obesity being a global epidemic is due to substantial reduction in physical activity with continuous increase in childhood obesity rates (Wang & Lobstein, 2006). As a result of reduction in physical activity energy imbalance is created where energy intake is much more than the energy expenditure (Andrew P. Hills, 2009). The author further explains how dietary patterns have changed and now includes low-quality carbohydrates and fats and energy dense foods. Nature of present day environment makes the lifestyle sedentary and which in turn contributes to positive energy balance and childhood obesity (A. P. Hills, King, & Armstrong, 2007). Previous research has shown that only 12%-42% of 13 year olds and about 8%-37% of 15 year olds achieved physical activity recommendation (Biddle, Gorely, & Stensel, 2004). A research conducted by Malina found that appropriate nutrition in combination with physical activity is essential for normal growth

and development. Although lack of physical activity might still lead to growth and maturation (Malina, 2004). It is also suggested that people in their youth are more likely to display healthy patterns of physical maturation consistent with their genetic potential if they indulge in physical activity (Andrew P. Hills, Okely, & Baur, 2010). The concept of habitual physical activity is greatly declining in large proportion in young people and there is an overall reduction in energy expenditure (Andrew P. Hills, 2009). The author also explains that the concept of low levels of physical activity is becoming a "new normal" in the younger generation. A strategy which decreases the sedentary behavior, support participation in more lifestyle physical activity and challenges the minimum activity level of youngsters and their parents is definitely needed to fight against childhood obesity (Andrew P. Hills, 2009). Children spend most of their time away from home and to be precise in the school. So an intervention would be most effective if it is deliverable in the school setting which emphasis on physical education, activities during school day and the involvement of families (Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007). Another logical reason for reduction in physical activity that comes to mind from personal experience is the change in mode of transport to school. Not many school children bike or walk to school given longer commute distance. Active transport from to and from school is considered also considered a good enough opportunity to increase physical activity levels in children and adolescents (Yeung, et al., 2008). Modern technology and urbanization has contributed to a decrease in physical activity and a significant reduction in energy expenditure (Lob-Corzilius, 2007). And seeing from the perspective of children today television, x-box, laptop, mobile phones, notebook are his best friends, which makes the child physically undemanding and increases sedentary lifestyle. Some studies have also shown that increase in physical activity was not related

to eating healthier food options than their less physically active (Ottevaere et al., 2011). And another study which was conducted in a small subsample of 11-15 year old adolescents found that energy intake was higher in the group which participated more in physical activities but the results were statistically not significant (Cavadini, Decarli, Grin, Narring, & Michaud, 2000).

2e. Social environment

With consistent change in lifestyle given to globalization dietary patterns have been changing continuously. Men and women have taken to eat outside at restaurants and fast food joints reasoning as lack of time to cook at home (Kearney, Hulshof, & Gibney, 2001). There has been a substantial change among women, with a greater proportion now working out of home compared to a decade ago (Kearney, et al., 2001). Another study on observing the temporal eating patter among men and women concluded that there was more of outside eating as they neared the weekends (O'Dwyer, McCarthy, Burke, & Gibney, 2005). Conflicting with the busy schedule of the working parents the adolescents are the ones to suffer. A study concluded that adolescents who had meals at home were encouraged to bring food to school (Utter, Scragg, Schaaf, & Mhurchu, 2008), which again reduces the probability of outside eating which could have been a fast food joint. Problems of obesity and hypertension are quickly descending on the children due to increase in the consumption of soft drinks, fast food and food that are very high in energy (calories) [as a result of eating outside](Hejazi & Mazloom, 2009). Poor diet can also be a cause for increase in adiposity which in combination with sedentary lifestyle [which is also a factor for obesity] makes it all the more aggravating (Ludwig & Pollack, 2009). The problem of childhood obesity is aggravated when coupled with lack of

physical activity in children (Nicklas, Webber, Thompson, & Berenson, 1989) . A study established the fact that youngsters are greatly involved in eating fast food and snacks while on the go (Laska, Graham, Moe, & Van Riper, 2010). Adolescents are tomorrow's adults and they should have a choice of eating healthy meals at home which will influence their children in future and subsequently dictate the food pattern of the future generations (Nicklas, et al., 1989). After school it is home where they spend most of their time.

In the home environment, parents should be engaged in physical activities with their children which acts as a motivating factor to them. Like a study says parents will also need to be provided with education to strategies to better understand the consequences of obesity, making healthy food and activity choices and behavioral change strategies (Waters & Baur). Parents play a sensitive role in development of their children's food habits, dietary intake and activity patterns (Perusse et al., 1988). Parents in a way drive the feeding practices and the foods that they offer their children, shape their childs eating behaviors (Johnson & Birch, 1994). The same study also governed the fact that parents shape their children's eating behavior through direct modeling. Obesity status of the parents also has influence on the health of the child. A study concluded that obese mothers are likely to have obese children and the correlation has greater impact when taking into account the respective socio-economic status of the family (Langnase, Mast, & Muller, 2002). The same study further claimed that the lower the socio-economic status of the family, along with one or two obese parents, the higher the rate of obesity in children. Another risk factor for increasing obesity which has not been talked about much concerns the migrant population, especially the children of the immigrants (Lob-Corzilius, 2007), which might be due to socio-cultural change. Whitaker et al.

found that children's obesity status was influenced by parents obesity status up to 10 years of age, but after that child's weight was the dominant influence from adolescence to early adulthood (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). It has been proven that adverse lifestyle changes do enter into the families and early recognition can help prevent childhood obesity and also improve the risk of the other family members (Burke, 2006). Interestingly one of the study showed that breastfeeding has protective benefit for children, who consequently might be at reduced risk of developing childhood obesity (Harder, Bergmann, Kallischnigg, & Plagemann, 2005). In another study it was found that around 30% of the women do not breastfeed their child and only 40% of them breastfeed up to 6 months of age (CDC, 2010).

Chapter III

Methodology

3a. Data source and study population

This study is based on the secondary analysis of the data obtained from Youth Risk Behavior Surveillance System (YRBSS) conducted in 2009 (CDC, 2009). The YRBS, a component of the Youth Risk Behavior Surveillance System (YRBSS), is an instrument developed by the Centers for Disease Control and Prevention (CDC) to monitor the prevalence of youth health-risk behaviors; assess trends in these behaviors; assess the impact of youth prevention interventions across multiple population levels; and monitor progress toward achieving the Healthy People 2010 goals.

The YRBS monitors six categories of health risks among adolescents. They are 1) behavior towards injury/violence 2) alcohol and drug use 3) tobacco use 4) sexual behaviors leading to unplanned pregnancy and sexually transmitted diseases (STD's) 5) unhealthy dietary patterns and 6) physical inactivity (Eaton et al., 2010). YRBS is a national survey which is school based conducted by local education and health agencies. The 2009 national survey included 42 states and about 20 local surveys conducted among students in grades 9-12. The national Youth Risk Behavior Survey (YRBS) uses a three stage sampling method to produce a nationally representative sample of 9^{th} through 12^{th} grade students. All kinds of school-public, catholic, or private were taken into account. After the data was collected weighting factor was applied to each student record and adjusted to no-response and oversampling of one factor. Finally the sample was scaled up so as to match the population projection for each survey year. A nationally representative sample of students was obtained as a result of three-stage cluster sample design(Eaton, et

al., 2010). The school response rate was 81% having 158 schools participated out of 196 and the student response rate was 88% with n=16,410 out of total 18,573. Findings from the surveys will assist professionals in research to improve public welfare.

3b. Data Collection Procedures and Questionnaires

Survey procedures for the national, state, and local YRBS were designed to protect students' privacy by allowing for anonymous and voluntary participation. Before survey administration, local parental permission procedures were followed. Students completed the self-administered questionnaire during one class period and recorded their responses directly on a computer-scannable booklet or answer sheet. CDC's Institutional Review Board approved the protocol for the national YRBS. The 2009 standard questionnaire contained 87 questions. States and cities could add or delete questions from the standard questionnaire. For the national questionnaire, 11 questions were added to the standard questionnaire. Skip patterns were not included in any YRBS questionnaire to protect students' privacy by ensuring all students took about the same amount of time to complete the questionnaire. For state and local surveys, only data from standard questions are presented in this report. Information about the reliability of the standard questionnaire has been published elsewhere (Eaton, et al., 2010).

3c. State and Local Youth Risk Behavior Surveys

The 2009 YRBS for each state that participated used a two-stage cluster sample design to produce a fairly representative sample of public school students in the grades of 9-12. The Results are not available from every state because some states do not participate in the YRBS (in 2009, Minnesota, Oregon, and Washington did not participate) and some states that do participate did not achieve a high enough overall

response rate to receive weighted results(CDC, 2009). State and district data files and documentation are owned and controlled by the jurisdictions that conducted the survey. Many states and districts have given CDC permission to distribute their data files upon request. Other states and districts manage the distribution of their data files themselves. For this particular study the data files were requested from the YRBS coordinator for the state of Georgia.

3d. Study Measures

The study measures that were considered in the study were obtained from the demographic file. These included grade, race, sex, Body Mass Index (BMI) percentile, weight control behavior, nutritional behavior, physical activity behavior, weight status.

a. Grade

Grade was reported in four categories 9^{th}, 10^{th}, 11^{th} and 12^{th}. The students in the other grade were not included for the study.

b. Sex

Participants were characterized as males or females based on their responses.

c. Race

Race was categorized into the following group: African American/Black and White and Hispanic/. The results of the other races showed wide variation and it cannot be meaningfully interpreted.

d. BMI percentile

Percentiles are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. The percentile indicates the relative position of the child's BMI number among children of the same sex and age. BMI percentile was calculated from the self reported height and weight. It

was later categorized into underweight (<5th percentile), health weight (5^{th}-85^{th} percentile), overweight (85^{th}-95^{th} percentile) and obese (>95^{th} percentile).

e. Nutritional behavior

For assessing the nutritional behavior four questions were dichotomized into "meeting the nutritional goal" and "not meeting the nutritional goal". The questions that were included for the calculation of the variable were 1) how many times fruit juice 7 days? 2) How many times fruit 7 days 3) How many times other vegetables 7 days and 4) How many glass of milk 7 days. If the candidate did not indulge in any of the four behaviors for a minimum of three days in a week the result was taken to be "Not meeting the nutritional goal". This cut off is based on the guideline by CDC (CDC, 2011c).

f. Weight control behavior

For assessing the weight control behavior three questions were dichotomized into "engaged in weight control behavior" and "not engaged in weight control behavior" . The questions were 1) Did you eat less to lose weight 30 days 2) Did you fast to lose weight 30 days and 3) Did you take pill to lose weight 30 days. If the candidate did any of the above the result was coded as "engaged in weight control behavior".

g. Physical activity behavior

For assessing the weight control behavior three questions were dichotomized into "engaged in physical activity" and "not engaged in physical activity". The questions were 1) Days active 60 min plus past 7 days. 2) How many days went to PE class in the past week? 3) On how many sports team 12 months. If the respondents were active for more than three days for the first two questions and if

they were a part of sports team in past 12 months the respondent was characterized as “engaged in physical activity”.

h. Weight status

The categories were self reported and they were 1) underweight 2) about right weight 3) overweight 5) obese.

3e. Statistical Analysis

a. Sensitivity

Sensitivity for this study was defined as the probability that the test says a person is overweight when in fact they really were overweight.

b. Specificity

Specificity for this study was defined as the probability that the test says a person is not overweight when in fact they were not overweight.

c. Predictive value of a positive test

For this study it was defined as the proportion of participants who perceived themselves as overweight and who really were overweight.

d. Predictive value of a negative test

For this study it was defined as the proportion of participants who perceived themselves as overweight and who really were about right weight.

e. Overall agreement (Cohens kappa)

Cohen’s Kappa is an index of interrater reliability that is used to measure the level of agreement between two sets of dichotomous ratings or scores.

Kappa is interpreted as follows-

- Poor agreement = Less than 0.20
- Fair agreement = 0.20 to 0.40
- Moderate agreement = 0.40 to 0.60
- Good agreement = 0.60 to 0.80
- Very good agreement = 0.80 to 1.00

The Statistical Package for Social Sciences (SPSS v.18) was used for the analysis of the data. There were some individuals in the data set that did not answer to the questions and were hence considered as missing. To have an understanding of the study population frequency tables were produced to determine the representation of all variables like grade, gender, BMI. Cross tabulation were analyzed between perceived weight and right weight and the file was stratified by gender and engagement in physical activity, which was converted into a dichotomous variable where 0 was coded as no engagement in physical activity and 1 as engagement in physical activity. The same was done with nutritional status and weight control status. This whole process of analysis was repeated by stratifying the file according to grade level and race. The cross tabulation values available were then used to test for overall agreement by analyzing for sensitivity, specificity, predicted positive value, predicted negative value and overall agreement (kappa) using WinEpiscope 2.0. WinEpiscope is software for quantitative veterinary epidemiology. It is suitable for both the design and analysis of epidemiological studies, and as an aid to the teaching of quantitative epidemiology.

Chapter IV

Results

From the YRBS 2009 for the State of Georgia, 1882 respondents were gathered using two stage cluster sampling. Participant demographics are as mentioned in the table 1 below. The population was almost fairly evenly distributed for male and female with their respective percentages being 47.3% and 52.4%. The study population was equally distributed with 25.6% coming from 9^{th} grade, 26.2% from 10^{th} grade, 22.3% coming from 11^{th} grade and 12^{th} grade having a contribution of 25%. Whites made up almost 42% of the population followed closely by blacks at 39.2% and then followed after a big gap by Hispanic population at 12.9%. About 56.4% of the participants who self-reported their weight were as right weight and 22.6% participants perceived themselves to be overweight. When their BMI percentile was calculated 'Right weight' category still remained highest with about 66.8% and 'overweight' and 'obese' category followed by 15% and 11.6% and the last to follow is underweight with 2.8%.

Table 1: Demographic Profile of Participants from YRBS Georgia 2009 Sample (n=1882).

Variable	N	Percentage (%)
Sex		
Male	890	47.3
Female	987	52.4
Grade		
9th	482	25.6
10th	493	26.2
11th	419	22.3
12th	471	25
Race		
Black	738	39.2
White	789	41.9
Hispanic	242	12.9
Weight Status-Self Reported		
Underweight	314	16.7
Right Weight	1062	56.4
Overweight	426	22.6
Obese	67	3.6
Weight Status-Right		
Underweight	52	2.8
Right Weight	1258	66.8
Overweight	283	15
Obese	219	11.6

*Underweight <5th centile, Right Weight 5th- <85th centile, Overweight 85th-95th centile, Obese >95th centile.

Table 2: Overall agreement between perceived and right weight stratified across gender, race and grade.

		Overall agreement
Gender	Male	0.26 (0.17-0.34)
	Female	0.34 (0.27-0.41)
Race	Black	0.30 (0.21-0.38)
	White	0.36 (0.28-0.44)
	Hispanic	0.18 (0.03-0.33)
Grade	9th	0.24 (0.13-0.35)
	10th	0.19 (0.08-0.31)
	11th	0.26 (0.15-0.38)
	12th	0.48 (0.38-0.59)

*Kappa values with 95% CI

In Table 2 are shown the overall global agreement between perceived weight status and the right weight status which is stratified across gender, race and grade. Females are in better agreement than males in estimating their weight with kappa value of 0.34 as compared to that of 0.26. Whites have better agreement than blacks and Hispanics. As the grade increases the agreement becomes stronger and 12^{th} grade participants have a moderate agreement as compared to the 9^{th}, 10^{th} and 11^{th} grade students.

Table 3: Agreement between perceived weight and right weight by physical activity, weight control and nutrition intake stratified by gender.

	Male (95% CI)	Female (95% CI)
Not Physical Activity		
Sensitivity	86.92 (82.99-0.85)	77.34 (73.4-81.23)
Specificity	37.14 (25.82-8.46)	67.87 (59.20-6.50)
Predictive Value +	84.82 (80.69-8.95)	90.55 (87.61-3.48)
Predictive Value -	41.27 (29.11-3.42)	42.93 (35.64-0.23)
Overall Agreement	0.25 (0.14-0.35)	0.37 (0.29-0.45)
Engaging in Physical Activity		
Sensitivity	94.26 (90.63-7.90)	80.69 (74-67.54)
Specificity	28.88 (15.64-2.13)	42.30 (23.31-1.29)
Predictive Value +	82.22 (76.63-7.80)	87.50 (81.58-3.41)
Predictive Value -	59.09 (38.54-9.63)	30.55 (15.50-5.60)
Overall Agreement	0.28 (0.15-0.40)	0.20 (0.04-0.35)
No Weight control		
Sensitivity	95.44 (93.18-97.69)	88.19 (84.46-1.92)
Specificity	12.69 (4.47-20.92)	50.00 (35-64.14)
Predictive Value +	85.09 (81.46-88.72)	91.36 (88.06-94.66)
Predictive Value -	34.78 (15.31-54.24)	41.37 (28.70-54.05)
Overall Agreement	0.08 (0.00-0.16)	0.38 (0.23-0.52)
Weight control		
Sensitivity	68.05 (62.67-3.44)	68.05 (62.67-3.44)
Specificity	70 (60.53-79.46)	70.00 (60.53-79.46)
Predictive Value +	87.89 (83.61-2.17)	87.89 (83.61-2.17)
Predictive Value -	40.64 (32.91-8.37)	40.64 (32.91-8.37)
Overall Agreement	0.31 (0.14-0.45)	0.30 (0.21-0.39)
Not enough nutrition		
Sensitivity	89.15 (84.42-3.88)	78.24 (73.24-3.24)
Specificity	31.57 (16.80-6.35)	67.18 (55.68-8.69)
Predictive Value +	85.05 (79.76-0.35)	90.70 (86.92-4.49)
Predictive Value -	40.00 (22.46-57.53)	43.00 (33.29-52.70)
Overall Agreement	0.22 (0.09-0.36)	0.37 (0.21-0.47)
Taking enough nutrition		
Sensitivity	89.78 (86.19-3.36)	78.02 (73.44-2.60)
Specificity	35.06 (24.40-5.72)	59.45 (48.27-0.64)
Predictive Value +	83.10 (78.84-7.37)	89.09 (85.40-2.77)
Predictive Value -	49.09 (35.87-2.30)	38.93 (29.94-7.92)
Overall Agreement	0.27 (0.17-0.37)	0.31 (0.21-0.40)

The aim of the table 3 is to measure and understand the concordance across gender between perceived weight and right weight on physical activity, weight control and nutrition status. For this stratification it is seen that females in general have a better agreement as compared to that of males. For not engagement in physical activity there is fair agreement for females (0.37) as compared to males (0.25). And the same was also observed for not taking measures to control weight, where females (0.35) have fair agreement and males (0.10) have poor agreement. Not having a nutritious diet also had the similar agreement where females (0.37) are better than male (0.22). The females (0.31) seemed to have a better agreement when it came to engagement in having a nutritious diet when compared to males (0.27). Males (0.28) seemed to have a fair agreement when it came to engaging in physical activity than females (0.20) who showed poor overall agreement. Males (0.31) and females (0.30) showed almost same level of agreement when it came to taking measured to control weight.

The results for concordance across race between perceived weight and right weight by physical activity, weight control and nutrition intake is shown in table 4. Whites and they seemed to have a better agreement with their perceived weight status and the ideal weight status in all the subgroups. Whites (0.45) had moderate agreement; blacks (0.35) and the Hispanics (0.28) had fair agreement when seen for not engaging in physical activity. When analyzed for engagement in physical activity it was pretty much same as before with whites (0.45) showing moderate agreement and blacks (0.02) and Hispanics (0.10) showing poor agreement. Not engaging in weight control whites (0.28) showed fair agreement and blacks (0.19) and Hispanics (0.12) showed poor agreement between their right and perceived weight. For engagement in weight control once again

whites (0.49) were in moderate agreement as compared to blacks (0.28) who showed fair agreement and Hispanics (0.14) who showed poor agreement. For not taking enough nutrition whites (0.47) once again had moderate agreement and blacks (0.37) and Hispanics (0.24) showed fair agreement. Whites (0.45) showed moderate agreement and blacks (0.16) and Hispanics (0.21) showed poor agreement.

Concordance across grade level between perceived weight and right weight by physical activity, weight control and nutrition status is shown in table 4. It was observed 12^{th} grade participants showed a high concordance value between their right weight and their perceived weight. Not engaging in physical activity there was increase in the overall agreement with the increase in grade level. 9^{th} grade (0.24), 10^{th} grade (0.23), 11^{th} grade (0.33) showed fair agreement and 12^{th} grade (0.46) showed moderate agreement. For engagement in physical activity also 12^{th} grade was showed the highest moderate agreement with value of 0.58 and 11^{th} grade showed very poor agreement with 0.06. For weight control behavior 12^{th} grade participants showed good agreement for controlling weight (0.61) and fair agreement for not controlling weight (0.34). 9^{th} grade (0.14) and 10^{th} grade (0.12) showed poor agreement and 11^{th} grade (0.23) showed fair agreement for not controlling weight. For controlling weight 9^{th} grade (0.34) and 11^{th} grade (0.24) showed fair agreement and 10^{th} grade (0.16) showed poor agreement. Not enough nutritional balance, 12th grade (0.51) showed moderate agreement and 9^{th} grade (0.36) and 11^{th} grade (0.41) showed fair agreement as compared to 10^{th} grade (0.12) which showed poor agreement. For nutritional balance 9^{th} grade (0.19) and 11^{th} grade (0.16) showed poor agreement and 10^{th} grade (0.25) showed fair agreement between their perceived and right weight.

Table 4: Agreement between perceived weight and right weight by physical activity, weight control and nutrition intake stratified by race.

	Black (95% CI)	White (95% CI)	Hispanic (95% CI)
No Physical Activity			
Sensitivity	89.25 (85.56-92.95)	77.98(73.49-82.43)	72.04(62.92-81.16)
Specificity	46.42 (35.76-57.09)	67.16(55.91-78.40)	56.52(36.26-76.78)
Predictive Value +	84.26 (80.04-88.48)	92.05 (88.87-95.24)	87.01(79.50-94.52)
Predictive Value -	57.35 (45.59-69.10)	38.46 (29.64-47.27)	33.33 (18.53-48.12)
Overall Agreement	0.35 (0.24-0.46)	0.45(0.33-0.57)	0.28(0.06-0.50)
Physical Activity			
Sensitivity	92.24(87.37-97.11)	90.55 (85.36-95.63)	71.87 (56.29-87.45)
Specificity	10(0-20.73)	54.54 (33.73-75.35)	38.46 (12.01-64.90)
Predictive Value +	79.85(73.05-86.64)	92 (87.24-96.75)	74.19 (58.79-89.59)
Predictive Value -	25(0.5-49.50)	50 (29.99-70)	35.71 (10.61-60.81)
Overall Agreement	0.02(-0.09-0.14)	0.45 (0.23-0.66)	0.10 (0.00-0.41)
No Weight Control			
Sensitivity	95.23 (92.71-97.76)	90.94 (87.33-94.55)	87.32 (79.58-95.06)
Specificity	24.59 (13.78-35.39)	37.50 (20.72-54.27)	23 (0.50-49.50)
Predictive Value +	84.96 (80.96-88.97)	91.70 (88.21-95.18)	87.32 (79.58-95.06)
Predictive Value -	53.57 (35.09-72.04)	35.29 (19.23-51.35)	25.00 (0.50-49.50)
Overall Agreement	0.19 (0.08-0.30)	0.28 (0.11-0.45)	0.12 (0.00-0.38)
Weight Control			
Sensitivity	77.87 (70.22-85.52)	70.61 (64.47-76.76)	51.85 (38.52-65.17)
Specificity	50.94 (37.48-64.40)	78.94 (68.36-89.53)	62.50 (43.13-81.86)
Predictive Value +	77.19(69.49-84.89)	92.54 (88.49-96.60)	75.67 (61.85-89.50)
Predictive Value -	51.92 (38.34-65.50)	42.05 (32.70.51.41)	36.58 (21.84-51.32)
Overall Agreement	0.28(0.13-0.44)	0.49 (0.37-0.61)	0.14 (0.00-0.37)
No Nutrition			
Sensitivity	91.41 (87.10-95.71)	79.29 (73.64-84.93)	70 (57.29-82.70)
Specificity	46.42 (33.66-59.49)	67.74 (51.28-84.19)	54.54 (25.12-83.97)
Predictive Value +	83.24 (77.76-88.71)	94.01 (90.41-97.61)	87.50 (77.25-97.74)
Predictive Value -	65 (50.21-79.78)	33.87 (22.09-45.65)	28.57 (9.25-47.89)
Overall Agreement	0.37 (0.24-0.51)	0.47 (0.29-0.64)	0.24 (0.00-0.56)
Yes Nutrition			
Sensitivity	89.23 (85.17-93.30)	83.20 (78.62-87.78)	73.33 (63.32-83.34)
Specificity	27.58 (16.08-39.08)	62.06 (49.58-74.55)	48 (28.41-67.58)
Predictive Value +	82.57 (77.78-87.36)	90.63 (86.91-94.36)	80.88 (71.53-90.22)
Predictive Value -	40 (24.81-55.18)	45.57 (34.58-56.55)	37.50 (20.72-54.27)
Overall Agreement	0.16 (0.04-0.29)	0.45 (0.31-0.58)	0.21 (0.00-0.43)

Table 5: Agreement between perceived weight and right weight by physical activity, weight control and nutrition intake stratified by grade.

	9th Grade (95%CI)	10th Grade (95% CI)	11th Grade (95% CI)	12th Grade (95% CI)
No Physical Activity				
Sensitivity	78.06 (71.55-84.57)	81.81(76.29-87.34)	82.60(77.13-88.08)	81.50 (76.11-86.88)
Specificity	50 (34.50-65.49)	42.55(28.41-56.68)	55 (39.58-70.41)	72.22 (60.27-84.16)
Predictive Value +	85.81(80.05-91.57)	85(79.78-90.21)	89.41(84.78-94.03)	91.57 (87.49-5.65)
Predictive Value -	37.07(24.15-49.91)	37.03(24.15-49.91)	40.74 (27.63-53.84)	51.31 (40.07-62.55)
Overall Agreement	0.24(0.11-0.38)	0.23(0.10-0.08)	0.33(0.20-0.45)	0.46 (0.38-0.58)
Physical Activity				
Sensitivity	90.90 (84.53-95.64)	87.09(78.75-95.44)	78.43(67.14-89.72)	92.06 (85.38-98.73)
Specificity	30.43 (11.63-49.24)	22.22(3.01-41.42)	22.77 (7.08-48.47)	66.66 (39.99-93.33)
Predictive Value +	86.20(79.93-92.48)	79.41(69.80-89.02)	75.47(63.88-87.05)	93.54 (87.43-99.66)
Predictive Value -	38.88(16.36-61.41)	33.33(6.66-60.06)	31.25 (8.53-53.92)	61.53 (39.09-87.98)
Overall Agreement	0.22(0.05-0.39)	0.10(0.00-0.31)	0.06(0.00-0.29)	0.58 (0.31-0.96)
No Weight Control				
Sensitivity	89.44 (84.69-94.11)	94 (90.19-97.80)	92.46(88.18-96.74)	92.40 (88.27-96.53)
Specificity	25.00 (9.99-40.00)	18.51(2.86-33.17)	30.76(13.02-48.51)	42.30 (23.31-61.29)
Predictive Value +	85.71 (80.42-91.00)	86.50 (81.25-91.74)	88.23(83.13-93.34)	90.68 (86.19-95.17)
Predictive Value -	32.00 (13.71-50.28)	35.71 (10.61-60.81)	42.10 (19.90-64.30)	47.82 (27.41-68.24)
Overall Agreement	0.14 (0.00-0.30)	0.12(0.00-0.27)	0.23(0.04-0.41)	0.34 (0.15-0.54)
Weight Control				
Sensitivity	73.33 (64.87-81.79)	66.66 (57.38-75.95)	64.77 (54.79-74.75)	71.42(62.78-80.07)
Specificity	61.29 (44.14-78.43)	50(34.10-65.89)	59.37(42.35-76.39)	90.00 (80.70-99.29)
Predictive Value +	86.51 (79.42-93.61)	77.64 (68.79-86.50)	81.42 (72.31-90.53)	94.93 (90.10-99.77)
Predictive Value -	40.42 (26.39-54.45)	36.53 (23.45-49.62)	38 (24.54-51.45)	54.54 (42.53-66.55)
Overall Agreement	0.34 (0.15-0.53)	0.16(0.00-0.35)	0.24(0.04-0.43)	0.61 (0.48-0.74)
No Nutritional Balance				
Sensitivity	86.08 (79.76-92.41)	79.04(71.26-86.83)	78.88(70.73-86.84)	85.04 (78.29-91.80)
Specificity	50 (30-70)	33.33(14.47-52.19)	62.96(44.74-81.17)	66.66 (48.88-84.44)
Predictive Value +	89.18(83.42-94.96)	83.83 (76.58-91.08)	88.63(82-95.26)	91 (85.39-96.60)
Predictive Value -	42.85(24.52-61.18)	26.67 (10.84-42.49)	44.73 (28.92-6.54)	51.94 (36.16-69.71)
Overall Agreement	0.36(0.15-0.57)	0.12(0.00-0.32)	0.41(0.21-0.61)	0.51(0.32-0.70)
Nutritional Balance				
Sensitivity	80.79 (74.51-87.07)	86.11 (80.46-91.76)	88.44(78.33-90.55)	83.33 (77.48-89.18)
Specificity	38.46 (23.19-53.73)	39.02 (24.09-53.95)	32.25(15.80-48.71)	74.35(60.65-88.06)
Predictive Value +	83.56 (77.55-89.57)	83.22 (77.22-89.22)	84.44(78.33-90.55)	92.85 (88.59-97.12)
Predictive Value -	34.09 (0.02-0.35)	44.44 (28.21-60.67)	32.25 (15.80-48.71)	52.72 (39.53-65.92)
Overall Agreement	0.19 (0.02-0.35)	0.25(0.09-0.41)	0.16(0.00-0.36)	0.57 (0.42-0.72)

Chapter V

DISCUSSION AND CONCLUSION

5a. Discussion

The purpose of this study was to examine the relation between perceived and real obesity in school children from Georgia. This study found that there is fair agreement among males and females and they did not show difference when estimating their weight status. In particular females showed to have a fair agreement with kappa value of 0.37, in estimating their perceived weight as overweight, which is consistent with other studies. (Pritchard, et al., 1997). Fair agreement (kappa value between 0.20-0.40) between the perceived weight status and real weight gives an understanding that the students are unaware of their candidature for weight related disease and health problems such as type-II diabetes, high blood pressure, high cholesterol and other cardiovascular heart disease. A study found that overweight individuals who perceive their weight status as about the right weight are more likely to get involved in risky behavior and are at risk of becoming obese (Turner, Hamilton, Jacobs, Angood, & Dwyer, 1997). The risky behavior can be not engaging in physical activity (males=0.2; females=0.37), not taking measures to control weight (males=0.10; females=0.38) and not taking enough nutrition (male=0.22; female=0.37). This suggests that apart from the fitness professionals, students should also be educated in depth about the health implications for their specific weight category. This study also shows that females with fair agreement between their perceived weight and right weight are taking enough nutrition when compared to the males. This result is in fact in agreement with other studies where typically females are more likely to report

poor dieting behavior (Esch & Zullig, 2008). In one of the studies it was mentioned that females were at high risk of practicing unhealthy weight control behavior and report decreased life satisfaction (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006).

Results from this study are consistent with previous study where blacks are more content with their body size and as a result there is always less agreement between their perceived weight and right weight (Thompson & et al., 1996), although the study was based only on the female population. Black women in general are accepting to their overweight status than white females (Bowen, Tomoyasu, & Cauce, 1991). Being large and having extra amount of body weight is not viewed in a negative context by black adolescents which makes them feel normal about their weight (Kemper, Sargent, Drane, Valois, & Hussey, 1994). In this study it is seen that blacks and hispanics have fair agreement with their perceived body size and right weight when compared to whites who have moderate agreement. Whites are satisfied with smaller body sizes and prefer the expected female body size to be smaller than the black counterparts (Kemper, et al., 1994). Hispanic parents do not perceive their children to be overweight and are least concerned about the health risks (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). Although the study was based on the mothers of the preschool children, it can still be logically applied to the children themselves as majority of them learn from their parents about healthy behavior. Since, the parents themselves are not bothered about the weight status and health risks associated with it, it seems very unlikely that the children themselves would be well educated from their home environment. Additionally in Hispanic population perception of health is determined more by the actual problem and by the ability to function in day to day normal activities (Angel & Worobey, 1988). Thus, from the studies it can be logically concluded that in Hispanic good health status

essentially means living disease free and be able to perform everyday activities without assistance. The results in the current study are in total compliance with the literature and among the three racial ethnic groups into consideration Hispanics show the least agreement with their perceived and right weight status and they seem to be not taking any measures to control it by indulging in physical activity, better nutrition or weight control behavior.

This study is different from others in examining the perception of weight across the grades of students in 9^{th}, 10^{th}, 11^{th} and 12^{th}. With the increase in grade level there was increase in the agreement between the perceived weight and right weight. On an average there was moderate agreement in the 12^{th} grade participants and there was fair agreement to poor agreement in the other three grades. Some studies have shown that life dissatisfaction and unhealthy weight perception and poor dieting behavior starts at young age and continues through college years (Esch & Zullig, 2008; Zullig, Pun, & Huebner, 2007). This study is in agreement with the research as a pattern can be seen in the agreement and it becomes stronger as the grades increase. This logically implies that as the participants mature into adulthood their perception to weight status and healthy living changes but it is shown to have a bad effect early on in their life.

Overall it can be said that the study population does not perceive their weight status accurately. It is important that the children be educated to assess their body weight and check to see if its within healthy limits (Felts, Parrillo, Chenier, & Dunn, 1996).

5b. Limitation of the study

There are several limitations to the study which should be noted. First, this study focuses on the high school student population in the state of Georgia alone and should not be generalized to the national population and also to the non-high school students of Georgia. Second, the sample size of 1882 is not considered very strong and which may have limited the association between certain variables and overweight. Third, self-reported weight and height information was used to calculate BMI and their BMI status. Some agree on the high correlation between the self reported measurements and the actual measurements (Spencer, Appleby, Davey, & Key, 2002), while some argue it to be illogical to collect self-reported data from adolescents and especially the females as they misperceive their weight to be low and height to be more (Farre Rovira, Frasquet Pons, Martinez Martinez, & Roma Sanchez, 2002). The strength of this study includes the use of reliable and nationally tested questionnaire.

5c. Recommendation

With an increase in childhood overweight status and current budget cuts in physical education in school, children are at greater risk for developing poor body image. School children are very permeable audience and an intervention at school level can be highly successful. School setting is considered an excellent setting for overweight prevention and giving insight about body weight (Adams et al., 2000). Student culture should be understood and school nurses or health practitioner should provide intervention with childhood overweight status. They can train other staff members to teach about nutrition and body image education and can be an effective resource for teachers.

Media should be influenced to become more sensitive to how body shapes and sizes are portrayed and admired.

5d. Conclusion

This study is important because it gives an understanding of how the school children on the threshold of adulthood perceive about their weight status and what steps they take to remain under control in Georgia. The results are in particular very insightful to the public health professionals who are in the process of promoting healthy behaviors since early stages of childhood in order to have a disciplined lifestyle in adulthood. The study implies that the minority racial groups of Blacks and Hispanics are much less informed about their health and this may again be due to the cultural perception of being overweight as a symbol of being healthy.

Future research of weight perception could be enhanced by using actual weight measures of height and weight rather than self-reported data. Further exploration about the weight belief and factors associated with weight misperception would likely support the planning and development of intervention programs aimed at helping the children to achieve weight perceptions and weight control behavior.

References

Adams, K., Sargent, R. G., Thompson, S. H., Richter, D., Corwin, S. J., & Rogan, T. J. (2000). A study of body weight concerns and weight control practices of 4th and 7th grade adolescents. *Ethn Health, 5*(1), 79-94.

Angel, R. J., & Worobey, J. L. (1988). Acculturation and Maternal Reports of Children's Health: Evidence from the Hispanic Health and Nutrition Examination Survey. *Social Science Quarterly, 69*(3), 707-721.

Baughcum, A. E., Chamberlin, L. A., Deeks, C. M., Powers, S. W., & Whitaker, R. C. (2000). Maternal perceptions of overweight preschool children. *Pediatrics, 106*(6), 1380-1386.

Baum, J. D., Ounsted, M., & Smith, M. A. (1975). Letter: Weight gain in infancy and subsequent development of diabetes mellitus in childhood. *Lancet, 2*(7940), 866.

Biddle, S. J., Gorely, T., & Stensel, D. J. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *J Sports Sci, 22*(8), 679-701.

Binkley, S. E., Fry, M. D., & Brown, T. C. (2009). The Relationship of College Students' Perceptions of Their BMI and Weight Status to Their Physical Self-Concept. *American Journal of Health Education, 40*(3), 139-145.

Boutelle, K., Neumark-Sztainer, D., Story, M., & Resnick, M. (2002). Weight control behaviors among obese, overweight, and nonoverweight adolescents. *J Pediatr Psychol, 27*(6), 531-540.

Bowen, D. J., Tomoyasu, N., & Cauce, A. M. (1991). The triple threat: a discussion of gender, class, and race differences in weight. *Women Health, 17*(4), 123-143.

Brener, N. D., Eaton, D. K., Lowry, R., & McManus, T. (2004). The association between weight perception and BMI among high school students. *Obes Res, 12*(11), 1866-1874.

Brener, N. D., McManus, T., Galuska, D. A., Lowry, R., & Wechsler, H. (2003). Reliability and validity of self-reported height and weight among high school students. *J Adolesc Health, 32*(4), 281-287.

Burke, V. (2006). OBESITY IN CHILDHOOD AND CARDIOVASCULAR RISK. [Article]. *Clinical & Experimental Pharmacology & Physiology, 33*(9), 831-837.

Cavadini, C., Decarli, B., Grin, J., Narring, F., & Michaud, P. A. (2000). Food habits and sport activity during adolescence: differences between athletic and non-athletic teenagers in Switzerland. *Eur J Clin Nutr, 54 Suppl 1*, S16-20.

CDC. (2009). YRBSS: Youth Risk Behavior Surveillance System. Retrieved 02/25/2011, from http://www.cdc.gov/HealthyYouth/yrbs/index.htm

CDC. (2010). Racial and ethnic differences in breastfeeding initiation and duration, by state - National Immunization Survey, United States, 2004-2008. *MMWR Morb Mortal Wkly Rep, 59*(11), 327-334.

CDC. (2011a). How is BMI calculated and interpreted for children and teens? *About BMI for Children and Teens* Retrieved 02/03, 2011

CDC. (2011b). How much physical activity do children need? Retrieved 02/03, 2011

CDC. (2011c). Nutrition. Retrieved 02/27/2011, from http://www.cdc.gov/HealthyYouth/nutrition/

Connecticut Department of Public Health. (2007). Childhood Obesity in Connecticut, *Nutrition, Physical Activity & Obesity Prevention Program*.

Desmond, S. M., Price, J. H., Hallinan, C., & Smith, D. (1989). Black and white adolescents' perceptions of their weight. *J Sch Health, 59*(8), 353-358.
Dietz, W. H. (1998). Health consequences of obesity in youth: Childhood. [Article]. *Pediatrics, 101*(3), 518.
Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S., Ross, J., Hawkins, J., et al. (2010). Youth risk behavior surveillance - United States, 2009. *MMWR Surveill Summ, 59*(5), 1-142.
Esch, L., & Zullig, K. J. (2008). Middle School Students' Weight Perceptions, Dieting Behaviors, and Life Satisfaction. *American Journal of Health Education, 39*(6-), 345-352.
Falb M, K. D., Thompson S, Wu M, Powell, K. (2006). *2006 Georgia Physical Activity Surveillance*

Report: Georgia Department of Human Resources.
Farre Rovira, R., Frasquet Pons, I., Martinez Martinez, M. I., & Roma Sanchez, R. (2002). Self-reported versus measured height, weight and body mass index in Spanish Mediterranean teenagers: effects of gender, age and weight on perceptual measures of body image. *Ann Nutr Metab, 46*(2), 68-72.
Felts, W. M., Parrillo, A. V., Chenier, T., & Dunn, P. (1996). Adolescents' perceptions of relative weight and self-reported weight-loss activities: analysis of 1990 YRBS (Youth Risk behavior Survey) national data. *J Adolesc Health, 18*(1), 20-26.
Finkelstein, E. A., Trogdon, J. G., Cohen, J. W., & Dietz, W. (2009). Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health Aff, 28*(5), 27.
Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *Jama, 303*(3), 235-241.
Freedman, D. S., Dietz, W. H., Srinivasan, S. R., & Berenson, G. S. (1999). The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics, 103*(6 Pt 1), 1175-1182.
French, S. A., Story, M., Neumark-Sztainer, D., Fulkerson, J. A., & Hannan, P. (2001). Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *Int J Obes Relat Metab Disord, 25*(12), 1823-1833.
Gardner, R. M., Friedman, B. N., Stark, K., & Jackson, N. A. (1999). Body-size estimations in children six through fourteen: a longitudinal study. *Percept Mot Skills, 88*(2), 541-555.
Ge, X., Elder Jr, G. H., Regnerus, M., & Cox, C. (2001). Pubertal Transitions, Perceptions of Being Overweight, and Adolescents' Psychological Maladjustment: Gender and Ethnic Differences. *Social Psychology Quarterly, 64*(4), 363-375.
Georgia DHR. (2003). *Georgia Student Health Survey Report* (No. DPH03/144). Atlanta: Division of Public Health.
Green, A., & Patterson, C. C. (2001). Trends in the incidence of childhood-onset diabetes in Europe 1989-1998. *Diabetologia, 44*(3), B3-8.
Harder, T., Bergmann, R., Kallischnigg, G., & Plagemann, A. (2005). Duration of breastfeeding and risk of overweight: a meta-analysis. *Am J Epidemiol, 162*(5), 397-403.

Hejazi, N., & Mazloom, Z. (2009). Socioeconomic status, youth's eating patterns and meals consumed away from home. *Pak J Biol Sci, 12*(9), 730-733.
Hills, A. P. (2009). It's Time to be More Serious About Activating Youngsters: Lessons for Childhood Obesity. *Journal of Exercise Science & Fitness, 7*(2, Supplement 1), S28-S33.
Hills, A. P., King, N. A., & Armstrong, T. P. (2007). The contribution of physical activity and sedentary behaviours to the growth and development of children and adolescents: implications for overweight and obesity. *Sports Med, 37*(6), 533-545.
Hills, A. P., Okely, A. D., & Baur, L. A. (2010). Addressing childhood obesity through increased physical activity. [Article]. *Nature Reviews Endocrinology, 6*(10), 543-549.
Hu, F. (2008). *Obesity Epidemiology*. New York: Oxford University Press.
Johnson, S. L., & Birch, L. L. (1994). Parents' and Children's Adiposity and Eating Style. *Pediatrics, 94*(5), 653-661.
Kearney, J. M., Hulshof, K. F., & Gibney, M. J. (2001). Eating patterns--temporal distribution, converging and diverging foods, meals eaten inside and outside of the home--implications for developing FBDG. *Public Health Nutr, 4*(2B), 693-698.
Kemper, K. A., Sargent, R. G., Drane, J. W., Valois, R. F., & Hussey, J. R. (1994). Black and white females' perceptions of ideal body size and social norms. *Obes Res, 2*(2), 117-126.
Koplan, J. (2007). Progress in preventing childhood obesity : how do we measure up? / Committee on Progress in Preventing Childhood Obesity ; Jeffrey P. Koplan ... [et al.], editors: Washington, D.C. : National Academies Press, c2007.
Langnase, K., Mast, M., & Muller, M. J. (2002). Social class differences in overweight of prepubertal children in northwest Germany. *Int J Obes Relat Metab Disord, 26*(4), 566-572.
Laska, M. N., Graham, D. J., Moe, S. G., & Van Riper, D. (2010). Young adult eating and food-purchasing patterns food store location and residential proximity. *Am J Prev Med, 39*(5), 464-467.
Lawlor, D. A., & Leon, D. A. (2005). Association of body mass index and obesity measured in early childhood with risk of coronary heart disease and stroke in middle age: findings from the aberdeen children of the 1950s prospective cohort study. *Circulation, 111*(15), 1891-1896.
Lob-Corzilius, T. (2007). Overweight and obesity in childhood--a special challenge for public health. *Int J Hyg Environ Health, 210*(5), 585-589.
Ludwig, D. S., & Pollack, H. A. (2009). Obesity and the economy: from crisis to opportunity. *JAMA: The Journal Of The American Medical Association, 301*(5), 533-535.
Malina, R. (2004). *Growth and maturation: do regular physical activity and training for sport have a significant influence?* United States: Sheridan Books.
Morrissey, S. L., Whetstone, L. M., Cummings, D. M., & Owen, L. J. (2006). Comparison of Self-Reported and Measured Height and Weight in Eighth-Grade Students. *Journal of School Health, 76*(10), 512-515.
Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does body satisfaction matter? Five-year longitudinal associations between body

satisfaction and health behaviors in adolescent females and males. *J Adolesc Health, 39*(2), 244-251.
Nicklas, T. A., Webber, L. S., Thompson, B., & Berenson, G. S. (1989). A multivariate model for assessing eating patterns and their relationship to cardiovascular risk factors: the Bogalusa Heart Study. *Am J Clin Nutr, 49*(6), 1320-1327.
O'Dwyer, N. A., McCarthy, S. N., Burke, S. J., & Gibney, M. J. (2005). The temporal pattern of the contribution of fat to energy and of food groups to fat at various eating locations: implications for developing food-based dietary guidelines. *Public Health Nutr, 8*(3), 249-257.
Ottevaere, C., Huybrechts, I., Beghin, L., Cuenca-Garcia, M. M., De Bourdeaudhuij, I., Gottrand, F., et al. (2011). Relationship between self-reported dietary intake and physical activity levels among adolescents: The HELENA study. *Int J Behav Nutr Phys Act, 8*(1), 8.
Pate, R. R., & O'Neill, J. R. (2009). After-school interventions to increase physical activity among youth. *Br J Sports Med, 43*(1), 14-18.
Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry, 18*(2), 189-193.
Perusse, L., Tremblay, A., Leblanc, C., Cloninger, C. R., Reich, T., Rice, J., et al. (1988). Familial resemblance in energy intake: contribution of genetic and environmental factors. *Am J Clin Nutr, 47*(4), 629-635.
Pinhas-Hamiel, O., Dolan, L. M., Daniels, S. R., Standiford, D., Khoury, P. R., & Zeitler, P. (1996). Increased incidence of non-insulin-dependent diabetes mellitus among adolescents. *J Pediatr, 128*(5 Pt 1), 608-615.
Plotnikoff, R. C., Bercovitz, K., Rhodes, R. E., Loucaides, C. A., & Karunamuni, N. (2007). Testing a Conceptual Model Related to Weight Perceptions, Physical Activity and Smoking in Adolescents. *Health Education Research, 22*(2), 192-202.
Pritchard, M. E., King, S. L., & Czajka-Narins, D. M. (1997). Adolescent body mass indices and self-perception. *Adolescence, 32*(128), 863-880.
Reilly, J. J. (2005). Descriptive epidemiology and health consequences of childhood obesity. *Best Pract Res Clin Endocrinol Metab, 19*(3), 327-341.
Richardson, S. A., Goodman, N., Hastorf, A. H., & Dornbusch, S. M. (1961). Cultural Uniformity in Reaction to Physical Disabilities. *American Sociological Review, 26*(2), 241-247.
Rierdan, J., & Koff, E. (1997). Weight, weight-related aspects of body image, and depression in early adolescent girls. *Adolescence, 32*(127), 615-624.
Roberts, R. J. (1995). Can self-reported data accurately describe the prevalence of overweight? *Public Health, 109*(4), 275-284.
Rosario, A. S., Kurth, B. M., Stolzenberg, H., Ellert, U., & Neuhauser, H. (2010). Body mass index percentiles for children and adolescents in Germany based on a nationally representative sample (KiGGS 2003–2006). [Article]. *European Journal of Clinical Nutrition, 64*(4), 341-349.
Salmon, J., Booth, M. L., Phongsavan, P., Murphy, N., & Timperio, A. (2007). Promoting physical activity participation among children and adolescents. *Epidemiol Rev, 29*, 144-159.

Scully, D., Kremer, J., Meade, M. M., Graham, R., & Dudgeon, K. (1998). Physical exercise and psychological well being: a critical review. *British Journal of Sports Medicine, 32*(2), 111-120.

Spencer, E. A., Appleby, P. N., Davey, G. K., & Key, T. J. (2002). Validity of self-reported height and weight in 4808 EPIC-Oxford participants. *Public Health Nutr, 5*(4), 561-565.

Stewart, L. (2011). Childhood obesity. *39*(1), 42-44.

Strauss, R. S. (1999). Comparison of measured and self-reported weight and height in a cross-sectional sample of young adolescents. *Int J Obes Relat Metab Disord, 23*(8), 904-908.

Thompson, S. H., & et al. (1996). Black and White Adolescent Males' Perceptions of Ideal Body Size. *Sex Roles: A Journal of Research, 34*(5-6), 391-406.

Turner, S. L., Hamilton, H., Jacobs, M., Angood, L. M., & Dwyer, D. H. (1997). The influence of fashion magazines on the body image satisfaction of college women: an exploratory analysis. *Adolescence, 32*(127), 603-614.

Utter, J., Scragg, R., Schaaf, D., & Mhurchu, C. N. (2008). Relationships between frequency of family meals, BMI and nutritional aspects of the home food environment among New Zealand adolescents. *Int J Behav Nutr Phys Act, 5*, 50.

Van Kleef, E., Shimizu, M., & Wansink, B. (2011). Food compensation: do exercise ads change food intake? *Int J Behav Nutr Phys Act, 8*, 6.

Verbeeten, K. C., Elks, C. E., Daneman, D., & Ong, K. K. (2011). Association between childhood obesity and subsequent Type 1 diabetes: a systematic review and meta-analysis. *Diabet Med, 28*(1), 10-18.

Wang, Y., & Lobstein, T. (2006). Worldwide trends in childhood overweight and obesity. [Article]. *International Journal of Pediatric Obesity, 1*(1), 11-25.

Waters, E. B., & Baur, L. A. *Childhood obesity: modernity's scourge*: Med J Aust. 2003 May 5;178(9):422-3.

Whitaker, R. C., Wright, J. A., Pepe, M. S., Seidel, K. D., & Dietz, W. H. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med, 337*(13), 869-873.

Yeung, J., Wearing, S., & Hills, A. P. (2008). Child transport practices and perceived barriers in active commuting to school. *Transportation Research Part A: Policy and Practice, 42*(6), 895-900.

Zullig, K., Pun, S., & Huebner, E. (2007). Life Satisfaction, Dieting Behavior, and Weight Perceptions among College Students. *Applied Research in Quality of Life, 2*(1), 17-31.