

**Development of a Body Figure Scale and Assessment of Overweight in a  
Multi-Ethnic Pre-Adolescent Population**

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# Development of a Body Figure Scale and Assessment of Overweight in a Multi-Ethnic Pre-Adolescent Population

By

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(Abstract)

Overweight and obesity have been increasing dramatically in the United States. Certain ethnic and sociodemographic subsets of the population, including Latino children, tend to suffer proportionally higher rates of overweight.

The first body figure scale was published in 1983 by Stunkard, Sørensen, and Schulsinger, researchers delineating the influence of genetics. Body figure scales consist of a series of similar figures, ranging in appearance from emaciated to obese. Respondents circle the figure that resembles the person or ideal of interest.

Currently no figure scale targets multi-ethnic or minority pre-adolescent populations. This study sought to discern the favored design parameters, including format and stance, for the creation of an evidence-based body figure scale for use with mixed populations of youth.

Eighty-nine fourth and fifth-grade students from four ethnically diverse elementary schools in northern Virginia were surveyed using novel and standard body figure scales, and assessed for anthropometric measures. Approximately 37% of subjects were at-risk of overweight or overweight; levels varied between and within ethnic groups. Subjects identified best with photographic format scales with figures shown in a three-quarters stance with their arms at their sides. The choice of a “self” figure on both the novel and Collins (1991) figure scales was related to BMI-for-age percentile and body image. The novel scale allowed differentiation of mean self-identified figure choices between ethnic groups.

There is hope that body figure scales will one day provide rapid, inexpensive assessment of overweight and obesity.

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## **CHAPTER I**

### **Introduction**

#### **Introduction**

Levels of obesity and overweight are increasing at epidemic proportions among the American population (CDC/NCCDPHP). Although much attention has been paid to this health crisis by the media, there remains a dearth of effective mass-scale prevention and treatment strategies. As the continually rising prevalence rates will attest, steps taken to stem the tide have been met with little success.

Certain ethnic and sociodemographic subpopulations have a higher risk of overweight and obesity (Flegal et al., 2002; Wang, 2001). Research has found, among adults, that obesity is most common among middle-aged, black and Hispanic adults and those with less education and lower income (Schoenborn et al., 2002). Although it is clear that both genetic history and environmental factors play a role in the development of obesity, the exact causes and their corresponding weight of responsibility are not currently agreed upon.

Many health problems have been associated with overweight and obesity. Although some linked diseases, such as cardiovascular disease, certain cancers, and high blood pressure, have been known for a while, other health problems, such as slower wound healing times (Wilson & Clark, 2003) and childhood back pain and psychosocial problems (Kiehl et al., 2001), are only now coming to light.

Children are not immune to the problems of overweight. However, while we have very accurate state-by-state accounts of obesity in adults, some states do not participate in the annual prevalence evaluations designed for children. This leaves governmental and private agencies without the baseline information often necessary for obtaining grants or special programs designed to combat overweight. Without concrete evidence, it is difficult to even justify addressing the often controversial weight-related health problems within the school's own curriculum.

Collecting weights and heights from children can be difficult. Accurate measurement requires calibrated and reliable equipment, rigorous and standardized protocols, trained staff, significant time commitments, and consent of parents. Ideally, a rapid assessment would exist which would be capable of screening overweight and obesity among children. It would

be inexpensive, easy to use, and require little equipment and no specially trained administrators.

Body figure scales were developed more than two decades ago (Stunkard, Sørensen & Schulsinger, 1983) and have been used for a number of purposes. The scales consist of a series of similar figures, differing only in body weight, and ranging from thin to obese. Either the subject or a third-party observer circles a figure that appears most like the subject. Although the scales were originally intended to discern a familial history of obesity, they are often used as a test for body image disturbance. It may be possible to develop a body figure scale for use with children that can be used for rapid assessment of overweight and obesity.

Although a variety of body figure scales have been developed since their inception, there is no existing scale targeting Latino – or any other ethnic minority group – children. Additionally, there has never been systematic preference testing of the differences that regularly appear between scales in terms of format, stance of figures, or ethnicity-related body shape differences.

### **Goals of the Study**

This study represents only a section of a larger research project, aimed at delineating the prevalence levels and correlated behaviors of childhood overweight and obesity. The goal of this particular study was to lay a theoretical foundation for the construction of a body figure scale that could be used with multi-ethnic pre-adolescent populations in screening of overweight and obesity. Results from this study will give a basis for private and public institutions to better target their resources to combat any existing body weight-related health risks to elementary school children. Further, these results will give a basis for future scale development, hopefully leading to the creation of an empirically-grounded scale which can be used for inexpensive and rapid assessment of underweight, overweight, and obesity.

## **Objectives of the Study**

The main objectives of this study were to:

- A. Ascertain preference of a multi-ethnic population of pre-adolescents for body figure scale format (photograph, silhouette, and black-and-white and colored line-drawing).
- B. Determine preference of a multi-ethnic population of pre-adolescents for body figure scale stance of figures (profile, facing subject, three-quarters stance; arms close to or away from body).
- C. Assess the “self” figure choices of a diverse population of youth using a novel Latino-focused body figure scale.
- D. Compare the correlational accuracy of each scale (Collins and novel) to the actual percentile BMI-for-age ranking of individual subjects.
- E. Establish the correlational accuracy of the Latino-focused novel body figure scale in indicating disordered body image among elementary students.

## CHAPTER II

### Review of Literature

#### Introduction

Overweight and obesity are two similar yet unique terms. Although the definition for each could be stated as a high body weight stemming from an overabundance of body fat, the technical classification of the conditions vary widely. In adults, overweight and obesity are often defined using body mass index (BMI) (Hwang, Glass & Molter, 1999). BMI is calculated by dividing the weight (in kilograms) by the square of the height (in meters). In children, BMI is often used for defining overweight and obesity, but usually in association with other factor such as age and sex.

The point between acceptable and unacceptable BMI, as a proxy for good health, varies based on the characteristics of both the subjects and the researchers. In the United States, normal weight in adults is generally defined as a BMI of 19-24.9, overweight is assessed with a BMI of 25-29.9, and obesity is diagnosed with a BMI of 30 or above (Hwang, Glass & Molter, 1999). For American children, overweight (sometimes used interchangeably with the term “obesity”) is defined as a BMI for age and sex above the 95<sup>th</sup> percentile, as defined by the Centers for Disease Control and Prevention National Center for Health Statistics growth charts (Strauss & Pollack, 2001). At risk for overweight (confusingly sometimes denoted as “overweight”) is often assessed when the BMI for age and sex is above the 85<sup>th</sup> percentile (Strauss & Pollack, 2001). However, in Europe, the current operational definition of overweight is a BMI between the 90<sup>th</sup> and 97<sup>th</sup> percentile for age and gender; a child is classified as obese with a BMI greater than the 97<sup>th</sup> percentile (Kiess et al., 2001). Until international guidelines can be established, and tied via rigorous scientific documentation to various health indicators, the debate will likely continue.

Healthy People 2010, a vision statement for public health, announced that: “Maintenance of a healthy weight is a major goal in the effort to reduce the burden of illness and its consequent reduction in quality of life and life expectancy” (USDHHS, 2000). Targeting of overweight and obesity among children is imperative, as heavy children tend to become heavy adults, and suffer the concurrent health risks. In fact, objective 19-3 of Healthy People 2010 aims to reduce the proportion of children and adolescents who are

overweight and obese from the 1988-1994 baseline of 11% to the target goal of 5%. This goal is supported by the Centers for Disease Control and Prevention (CDC), which considers the increases in overweight among young people to be a “public health concern” (CDC/NHANES).

Certain ethnic (USDHHS, 2000; Schonfeld-Warden & Warden, 1997; Wang, 2001) and sociodemographic (Townsend et al., 2001; Schoenborn et al., 2002) subsets of the population tend to suffer higher levels of overweight and obesity. Studies have shown that in the United States, among adults, obesity is most common among middle-aged, black and Hispanic adults and those with less education and lower income and socioeconomic status (Schoenborn et al., 2002; Wang, 2001). The reasons for these differences remain unclear, but rates of overweight may be linked to culturally-based aesthetic values (Jain et al., 2001), biological variables, environmental factors, or economic or social variables (Flegal et al., 2002).

In a study of three nations’ (US, China, Russia) large scale health surveys (NHANES III, China Health and Nutrition Surveys, and Russian Longitudinal Monitoring Survey), Wang (2001) concluded that “ethnicity was a significant risk factor” for obesity among American adolescents. Black and Mexican-American children were at a higher risk for both obesity and overweight than white children. Wang qualified this finding by noting that the significance of ethnicity disappears when groups are matched for income and urban-rural residence, and that more research is needed to tease apart the influences of ethnicity and social environment.

Latinos, who constitute the United States’ largest minority group of children (16% of people under 18 are Latino), are one of the “at-risk” for overweight populations (Flores et al., 2002). Results of several studies, including the National Longitudinal Survey of Youth (NLSY) (Strauss & Pollack, 2001), the Hispanic Health and Nutritional Examination Survey (HHANES) (Pawson, Martorell, & Mendoza, 1991), and the Child and Adolescent Trial for Cardiovascular Health (CATCH) (Dwyer et al., 2000) have documented high, and increasing, levels of overweight and obesity among Latino children.

Strauss and Pollack (2001) found that between 1986 and 1998, overweight prevalence increased by 120%, to 21.8% among Hispanic children (compared to 21.5% for African-

American children, and 12.3% for white children). The researchers concluded that, for the same time period, “overweight increased fastest among minorities and southerners” and overweight children became heavier (Strauss & Pollack, 2001). Clearly Hispanic and Latino children are a vulnerable population to the threat of overweight and obesity.

The most current numbers continue to demonstrate this pattern. Ogden et al. (2002) reported that the 1999-2000 NHANES data show the prevalence of overweight (defined “at or above the 95<sup>th</sup> percentile of the sex-specific body mass index (BMI) for age growth charts”) has increased in all age categories, and especially among non-Hispanic black and Mexican-American adolescents. Prevalence of overweight or at-risk for overweight was the highest of all of the tested groups in Mexican Americans. Of Mexican American children between the ages of two and five years, 22.7% were overweight or at-risk; among 6-11 year-olds, 39.3%; and 43.8% of adolescents aged 12-19 were overweight or at-risk (Ogden et al., 2002).

### **Consequences of Overweight**

Overweight and obesity are associated with increased risk of a number of health problems including: coronary heart disease, insulin resistance and Type II diabetes mellitus (Sunyer & Xavier, 1999), osteoarthritis of the knees, hips, and lower back (Hwang et al., 1999), respiratory problems (USDHHS, 2000), gallbladder disease and gallstones (Hwang et al., 1999), and chronic conditions such as hypercholesterolemia, stroke, and heart disease (Flegal et al., 2002). Bergström et al. (2001) in a meta-analysis of European epidemiological findings estimated that overweight and obesity accounted for 5% of all cancers in the European Union, especially incidences of endometrial, colon, breast, kidney, and gallbladder cancer. Lattimore et al. (2003) concluded that obesity is “strongly linked” with obstructive sleep apnea (OSA), a type of sleep-disordered breathing. Furthermore, the severity of OSA can be reduced by weight loss. In their thorough review of current literature of the comorbidities of obesity, Sunyer and Xavier (1999) noted that not only is obesity a significant independent risk factor for hypertension, increased weight gain can further increase blood pressure.

Obesity can have health consequences during childhood as well, including a three-fold risk increase of hypertension (Sorof & Daniels, 2002), early menarche, hyperlipidemia, increased heart rate, and orthopedic problems (Schonfeld-Warden & Warden, 1997; Barlow & Dietz, 1998).

Research has shown that people of Latino ancestry are more likely to exhibit increased levels of those diseases linked with obesity (Pawson, Martorell, & Mendoza, 1991). For example, Type 2 diabetes (formerly known as non-insulin dependent diabetes) is on the rise among Latinos (Flores et al., 2002). Childhood obesity may exacerbate Mexican-American children's susceptibility to the disease (Neufeld et al., 1998). Results of a study on the association between elevated blood pressure and obesity in African-American and Hispanic children showed that obese Hispanic females had two times the prevalence of elevated blood pressure than non-obese females (Eissa et al., 2001). In studies of the rates and severity of childhood asthma among ethnic minorities (African-Americans and Hispanics), researchers found significant links between the occurrence of overweight or obesity and asthma (Luder, Melnick & DeMaio, 1998; Gennuso et al., 1998).

Beyond physical ill health and disease, overweight and obesity are associated with social and emotional issues as well. Kiess and colleagues (2001) found that the co-morbid psychosocial factors of obesity include poor self image, social isolation, bulimia, smoking, drug and alcohol addiction, and promiscuity. Ogden & Evans found that perception of overweight, even if the subjects were not actually overweight, is linked with depressed mood (1996).

Unfortunately, health consequences of overweight during adolescence can persist into adulthood. "Overweight in adolescents predicts a broad range of adverse health effects that are independent of adult weight after 55 years of follow-up" (Schonfeld-Warden & Warden, 1997). As a specific example, research has indicated that adolescents with BMIs above the 75<sup>th</sup> percentile have an increased risk of death from cardiovascular disease during adulthood (Kiess et al., 2001).

## **Current Assessment Methods**

Health professionals have long encountered impediments while attempting to gather data regarding weight and body fat. Particular difficulties have included the negative emotional impact of weight assessment (Ogden & Evans, 1995), the difficulty and expense in gathering accurate height and weight data, the problems of accepting self-report height and weight data (Crawley & Portides, 1995), and issues with body mass index (BMI) as a measure in children (Dwyer et al., 2000), BMI as a measure of fatness (Wells, 2001), and BMI as a predictor of body fat for individuals (Ellis, Abrams, & Wong, 1999).

A study by Ogden and Evans (1995) of the psychological effects of weight assessment (being measured and categorized as under-, normal-, or over-weight) found an association between being categorized as overweight, and increased depression and decreased self-esteem. Interestingly, it did not matter that the subject was not actually overweight (deliberately mislabeled weight charts were hung near the weighing station to make the normal weight subjects think that they were overweight), decreased mood still occurred. Similarly, they found that normal-weight subjects assessed as underweight (deceived by weight charts) demonstrated decreased self-esteem. The researchers concluded that weighing and comparing results against height and weight charts “may not be as benign as believed and may contribute to the negative psychological state of the individual” (Ogden & Evans, 1995).

The other option, simply relying on subjects to report their own height and weight data, offers its own challenges. Crawley & Portides (1995) found that self-reported data from teenagers was consistently incorrect. Tall and thin individuals tended to under-estimate their height, while shorter and heavier subjects over-estimated their height and under-estimated their weight. The researchers cautioned against using self-reported data, especially when computing BMI, as the calculations would under-estimate the number of overweight teens.

Although BMI is considered a gold standard for assessing overweight, it has come under some scrutiny, particularly when used in assessing certain populations (such as children) or characteristics. Dwyer et al. (2000) noted that, as children of moderate BMI enter puberty, “fat, muscle, and bone components of weight are all changing rapidly, the

interpretation of changes in fatness from changes in BMI alone is complicated.” The researchers felt that it was better to measure both BMI and skinfold data. Several researchers have concluded that it would be better to not use BMI as a proxy for assessment of fat mass in individuals. Ellis, Abrams, and Wong (1999) found that BMI was a poor predictor of adiposity in individual children, as the standard error for percent fat ranged from 4.7 to 7.3% of body weight. Wells (2001) agreed that BMI had “poor accuracy” as an absolute measure of fatness in individuals. Even Healthy People 2010 acknowledged that: “...BMI does not provide information concerning body fat distribution, which has been identified as an independent predictor of health risk” (USDHHS, 2000). Regardless of criticism, body mass index remains the gold standard.

### **Lack of Surveillance**

National statistics on adolescent overweight and obesity are gathered as part of the CDC-sponsored Youth Risk Behavior Surveillance System (YRBSS) (USDHHS, 2000). The YRBSS is a school-based test administered biennially since 1990 to high school students by professional administrators. It examines six categories of risk behaviors including injury, tobacco use, drug and alcohol use, sexual behavior, diet and nutrition, and physical activity (USDHHS, 2000). However, Virginia and a few other states, do not participate in the surveillance system (CDC-NCCDPHP, 2002).

The lack of reliable data on obesity and overweight leaves the un-surveyed states at a disadvantage; and they must either collect this information themselves, or do without (Forrester communication). Unfortunately, collecting BMI information for large, representative samples is often expensive, difficult, and time-consuming. Virginia does not currently have a state-wide program for collection of height and weight data, nor is every school staffed with a registered nurse or other administrator qualified to take anthropometric data (Forrester communication).

### **Background of Body Figure Scales**

A body figure scale is a paper-and-pencil tool used for assessment of body fatness. It consists of a series of pictures – either drawings, photographs, or silhouettes – of “standard”

bodies ranging from thin (underweight) to heavy (obese) (Stunkard, Sørensen, & Schulsinger, 1983). The test may either be self-administered or computed by an independent observer (Sherman, Iacono, & Donnelly, 1995). Either way, the assessor chooses a figure that looks most like the subject from the continuum of choices (the actual figure). The subject may also select a figure that most closely resembles the way they would like to look (their ideal figure), a figure that the subject believes the opposite sex would choose as their ideal figure (opposite-sex ideal), or other diagnostic choices.

Body image has been defined as “the perception of one’s own body size, shape, and appearance, with attendant emotional and sociocultural responses to this perception” (Patt et al., 2002). Awareness and assessment of body image disturbance is important in the prediction of disordered eating habits (Littleton & Ollendick, 2003) and the creation of healthy eating patterns (Stice & Shaw, 2002). Body image dissatisfaction may be apparent when the body figure scales show that a subject’s choice of “actual figure” is far from actual size, or when there is a large discrepancy between actual and ideal sizes (Williamson et al., 1993). This aspect may be important as research has shown that among American ethnic groups, Caucasians and Hispanic-Americans displayed more “weight-related body image disturbance than African-Americans or Asian-Americans” (Altabe, 1996).

The first published body figure scale was developed by Stunkard, Sørensen, and Schulsinger (1983) when they were attempting to parse out the influence of genetics versus environment on obesity, using Danish adoptees living in Copenhagen. The adoptees were, at the time of the Stunkard study, 34-57 years old. The scale was developed so that the adoptees could give information about the approximate adult-aged body size (under, normal, or overweight) of their (often deceased) biological and adoptive parents. The researchers creatively assessed the accuracy of their scale by using the children of the subjects of an unrelated American study. The adult children were asked to rate their parents’s figures in a manner similar to the Danish adoptees. The childrens’ figure ratings were compared to the height and weight data collected years before from their parents, who had been subjects of the Tecumseh study administered by the University of Michigan. The researchers found the silhouette method of classification “surprisingly accurate,” noting monotonic increases in percent overweight between the increasing silhouettes.

Since the original 1983 version, body figure scales have grown in number, type, popularity, and application. Scales have been developed for different age groups, including children (Truby & Paxton, 2002; Collins, 1991), adolescents (Sherman et al., 1995), and adults (Anderson et al., 1997); weight classes (Williamson et al., 2000); and ethnic/racial categories including Caucasian (Stunkard et al., 1983) and African-American (Patt et al., 2002). The specificity of the scales to the group they assess seems important as different groups, especially at different ages, have different body characteristics.

Williamson et al. (1993) tested the heart of the body image issue by comparing the effectiveness of various body image assessments with groups of normal, obese, and bulimic women. They found that the discrepancy between self and ideal body size (such as is assessed by the body figure scale) correlated most highly with other measures of body dissatisfaction.

Since those findings, there has been a veritable explosion of use of body figure scales in body image-related projects. Various scales have been used in recent studies to assess body image in adults (Altabe, 1998; McElhone et al., 1999), adolescent females (Sherman, Iacono, & Donnelly; 1995), children and preadolescents (Veron-Guidry & Williamson, 1996), body dissatisfaction in children (Williamson & Delin, 2000) and obese adults (Williamson et al., 2000), and differences in gender preferences of ideal body size (Fallon & Rozin, 1985; Cohn et al., 1987; Collins, 1991).

Veron-Guidry and Williamson (1996) worked with 257 children, aged 8-13 years, to evaluate the validity and reliability of their own child- and adolescent-targeted body figure scales in assessing disordered body image. Using a card-sorting version of the body figure scale protocol, subjects were asked to choose “self” and “ideal” figures from gender-specific child and adolescent figure scales. In test-retest comparisons, the scales were found to be reliable. By comparing the discrepancy scores (as a measure of dysphoria) to the subjects’ scores on another body image indicator, the researchers established the validity of their scales. They also compared the “self” figure choices to the subjects’ BMIs and found significant correlations.

Williamson and Delin (2000) used a child-targeted five-figure body figure scale with 195 Australian children aged 5-10 years to determine their ability to accurately select a figure

resembling their current body size, and determine gender-related levels of body dissatisfaction. Accuracy of selection was determined by subtracting each subject's BMI scale score (1=underweight through 5=overweight) from their figural selection (also numbered 1-5 based on size). They found that children were able to make accurate "self" figure selections, and that the accuracy of selection was not influenced by age or gender. They also found that girls, but not boys, had "ideal" figure selections that were significantly smaller than their "self" figure choices.

Altabe (1998) studied body image and ethnic-based preference differences among 335 college-aged, self-identified Africans, Asians, Caucasians, and Hispanic-Americans. This study made use of multiple methods of diagnosing body image dissatisfaction, including the Figure Rating Scale developed by Stunkard, Sørensen, and Schulsinger in 1983. Altabe found that Caucasians and Hispanics demonstrated the greatest disturbance for weight-related body image; African and Asian-Americans, the least. Interestingly, "African-Americans had the most positive self-view. Asian-Americans placed the least importance on physical appearance."

Research findings have been more mixed regarding the applicability and reliability of scales for assessment of BMI and/or nutritional status. Some studies seem to suggest that self-assessment of weight status using these scales correlates significantly with BMI (Patt et al., 2002; Bulik et al., 2001; Williamson & Delin, 2001; Anderson et al., 1997; Veron-Guidry & Williamson, 1996; Sherman, Iacono, & Donnelly, 1994), while others have found that only certain populations (underweight women and normal-weight men) were able to match the figures to their own BMIs (Sanchez-Villegas et al., 2001).

Anderson et al. (1997) developed and evaluated a silhouette-style figure scale for use with African-American adults with diabetes. Working with 370 clinic-based subjects, the researchers found, controlling for sex and weight category, perceived current body size was significantly related to BMI. Correlations between the current body size and BMI were  $r=.76$  ( $p<.0001$ ) for women and  $r=.77$  ( $p<.0001$ ) for men.

Results are somewhat contradictory on the issue of subjects' abilities to assess their own body size. One study showed that Australian children as young as five years are able to accurately judge their own body size and pick a correlating figure (Williamson & Delin,

2000). Another Australian study, this one with children aged 7 to 12 years, found that accuracy of body size perception developed with age, and was fully realized by age 12, with girls being ahead of boys (Truby & Paxton, 2002). In contrast, the study by Leonhard and Barry (1998) using Midwestern university volunteers (all adults) found that the subjects, especially women in the normal BMI group, had trouble correctly choosing a corresponding “self” figure. Using gender-specific nine-figure scales, the researchers noted that not even the heaviest subjects, with BMIs up to 51, chose a figure above 7.5 in a nine-figure scale (Leonhard & Barry, 1998).

It may be a while before these issues are settled. Two of the most recent studies found nearly diametric results. Bulik et al. (2001) concluded that “the [figure rating] scale appears to be highly robust, to be significantly and highly correlated with measured percentage [of] overweight ( $r=0.79$ ), and to be a reliable predictor of obesity both alone and in combination with self-reported height and weight.” These researchers went so far as to quantify the silhouette numbers (based on the Stunkard scale) that corresponded with obesity and “thinness”. Sanchez-Villegas and co-workers (2001) concluded that “Perceived body image as an estimate of nutritional status [overweight versus underweight] has a limited individualized application”.

### **Effects of Scale Design Elements**

The effects of the format of the scale itself have never been explored. Scales have been developed depicting figures as darkened silhouettes with little apparent detail (Anderson et al., 1997; Patt et al., 2002), line drawings with varying levels of facial and body detail (Stunkard et al., 1983; Sherman et al., 1995; Collins, 1991), and life-like photographs (Truby & Paxton, 2002). Additionally, because previous researchers have not documented specific details, such as whether the scales were presented in black-and-white or in color, within the published methodologies, the effects of color on figure choice are unknown. In each of the previously noted studies, significant correlations between “self” figure choice and BMI or weight were found. However, it is impossible to know if the strength of correlation may be affected by the ability of the subjects to relate to the design elements.

Similarly, no study reports were found in the literature on the pose of the figures – whether or not they are facing the subject directly, whether or not the arms of the figures are held close to or far from the body. Each scale is created with figures holding a specific stance, but there is no data as to whether stance of the figure will affect the usability or likeability of the scale. Finally, although studies with adults have found strong group preferences for certain ethnic or physical characteristics of a scale, no research has ever been conducted for these characteristics with children.

Studies of Type 2 diabetes in urban African-American women (Anderson et al., 1997; Patt et al., 2002) found that test subjects disliked the existing figure rating scales. Patt and colleagues (2002) worked with middle-aged women from urban Black churches. The participants' review of the current figure scales during the pilot phase led the researcher to develop their own population-targeted scale. The Anderson figures, darkened silhouettes of undetermined ethnicity, were considered lacking in ethnically-appropriate morphological detail. The Williamson scale, which depicts more anatomy using very stylized silhouettes in a three-quarter stance, was called “too nude.” The Stunkard scale, using the traditional Caucasian-targeted line-drawing format, was deemed representative of white women, not the study's subjects (Patt et al., 2002). Researchers in each of the studies went on to create their own, culturally-appropriate body figure scales. Subjects demonstrated their preferences (via comments or cultural identification questions) for the newer, specially-designed scales.

Additional research evidence has indicated a physical basis for this apparent need for ethnically-appropriate figures. Casas et al. (2001) compared two groups (n=54, 56 respectively) of healthy Hispanic and white adult women to discover whether Hispanic ethnicity is associated with differential levels of adiposity and fat-free mass. These researchers found that BMI, percent body fat, and total fat mass were higher in the Hispanic women, and that the additional fat was located in the trunk and arms (with greater abdominal and subscapular skinfold readings). These findings would point to a need for figures that adequately display the age- and ethnically-appropriate deposition of body fat.

## **Summary and Recommendations**

With the possibility of so many negative health effects, it is important to know exactly when and how problems of overweight begin to develop. Regular assessment of childhood incidence and prevalence rates will allow refined targeting of resources, interventions and health education. The weight assessment techniques and tools must be socially, financially, and practically feasible to use. They must also be sensitive to the special needs of children and be able to discern problems without alarming or disturbing the assessed youngsters.

Despite the somewhat mixed research findings of the predictive accuracy of body figure scales, the promise they hold as future screening tools of over- and under-weight warrants further research. Although overweight and obesity are serious problems among Latino youths, there is no specifically-designed figure rating scale for this key population. Existing scales are varied and geared mainly towards adult and Caucasian populations. As a result, there is a need for a scale for children – especially high-risk Latino children – to be developed.

In the literature, the current collection of body figure scales include a mix of figure types, stances, and characteristics. Few if any of the current scales have accompanying documentation of the rationale behind the particular choices made during scale development. One can only assume that researcher preference was the basis for the decisions. A more objective and scientific rationale must be the basis for any future scales.

The purpose of this study was to provide target-audience information essential for the continuing development of a full, functioning body figure scale for use with Latino and non-Latino adolescent populations. Before such a scale can be developed in a cost- and time-efficient manner, a number of variables, such as type of scale (photographic, figural drawing, or silhouette), stance of figure (frontal or three-quarters stance), and body and facial characteristics (age, fitness, ethnic characteristics), must be determined. In this study each of the major factors (type, stance, and other characteristics) were examined with subjects of the target audience, rated for preference, and related statistically to objective measures such as actual BMI, waist circumference, and ethnicity.

## CHAPTER III

### Methodology

#### Introduction

Although overweight and obesity are serious problems among Latino pre-adolescents, there is no specifically designed figure rating scale for this key population. Existing scales are varied and geared mainly towards adult and Caucasian populations. As a result, there is a strong need for a scale to be developed which targets high-risk Latino youth populations.

The main objectives of this study were to: (1) develop a novel body scale for use with Latino pre-adolescents between the ages of 8 and 12 years; (2) test the scale's various attributes for cultural appropriateness through statistical analysis. This study was conducted in three phases: (I) creation of survey and scale instruments, (II) collection of assessment data from Virginia elementary schools, (III) data management and statistical analysis.

The first two phases of the project required the use of human subjects. Both protocols were reviewed, as required, by the Institutional Review Board of Virginia Polytechnic Institute and State University. Approval was granted for both sections, IRB #02-504, #02-564 (see Appendix A, B).

#### Phase I. Creation of Assessment Tools

The assessment tools of this study consisted of a 35-question scantron-based survey and an accompanying "picture page" containing a series of figural choices from which subjects could make their preference choices. Both tools were developed specifically for use with this project. The development of an age-, gender-, and ethnically-appropriate "picture page" was especially important, as there were no existing photographs upon which a Latino pre-adolescent figure scale could be based. The two tools were developed simultaneously, but the creation of the "picture page" scales will be addressed first as this is the more novel piece of the project.

##### *A. Creation of the "Picture Page" Scales*

Body figure scales consist of a pictorial array of similar human figures, ranging from very underweight to very overweight. They are created with a target population in mind, and

the figures are visibly similar (sex, age, race) to the subjects being tested. For the creation of a pre-adolescent, Latino scale, it was necessary to start with Latino figures of the correct age and gender.

*i. Recruitment*

Initial recruiting goals for this phase were three male and three female Latino children ages 8-12. Ideally, the six children would have mapped to the three categories of underweight, normal weight, and overweight. However, recruiting proved more difficult than expected and only one male and one female of the correct demographics were ever located. The remaining protocol was adjusted to account for the lack of participants.

Recruitment of subjects occurred via personal meetings and professional contacts (WIC, SCNEP), advertising at area elementary schools (especially through English as a Second Language teachers) and local Mexican restaurants, and door-to-door solicitation in multi-cultural neighborhoods in Roanoke and Blacksburg, Virginia. Please see Appendix C and D for English and Spanish-language examples of recruitment posters.

*ii. Informed Consent*

Interested participants were asked to sign an English- or Spanish-language version of the “Child’s Assent Form” (see Appendix E and F). For greater legal and ethical protection of the subjects, at least one parent or guardian was required to be present during the time of testing. Parents were also required to sign either an English- or Spanish-language version of the “Parental Permission Form for Research Involving Human Subjects” (see Appendix G and H).

*iii. Testing Protocol*

On the day of testing, researchers arrived at the home of the subject. Consent forms were signed and filed, and the research project was explained in detail. Subjects were asked to answer demographic questions, including age, gender, date and place of birth, and ethnicity. They were then assessed for height, weight, and waist circumference. All data was recorded on the Subject Data Form A (see Appendix I).

Height was assessed using a standing method. Subjects were asked to stand against a measuring tape with feet shoulder width apart, and take a deep breath. Height was assessed,

to the nearest one-half centimeter, at the point at which the base of a right triangle, placed atop the head of the subject, touched the tape.

Mass (hereafter termed “weight”) was assessed using a Health-o-Meter balance beam scale, re-calibrated at each individual testing location. Children were asked to remove shoes and bulky clothing, such as coats and heavy sweaters, before weighing. Weight was measured to the nearest one-half pound.

Height and weight data were used to calculate a body mass index score (BMI = weight in kilograms divided the square of height in meters;  $\text{kg} / \text{m}^2$ ).

Waist circumference was assessed using a modified version of the NHLBI standards (NHLBI, 2000) and a seca Corporation anthropometric tape. Clothed subjects were asked to identify their navel or “belly button”; the tape was placed snugly around the body, perpendicular to the floor. Circumference was measured to the nearest one-quarter inch.

#### *iv. Participating Subjects*

The female subject was a 10-year-old of Mexican descent, residing in Roanoke, Virginia. At 55.5 inches tall and 77 pounds, her BMI was estimated at 17.9. The male subject, at seven years old, was slightly younger than the target age group. Consequently, he was also slightly shorter and lighter than ideal. [Anthropometric data for the male subject has subsequently been misplaced.]

#### *v. Photographic Protocol*

Once anthropometric and demographic data was gathered, the subjects were prepared for the photographic portion of the assessment. To allow for maximum body shape definition, it was previously decided that all subjects would be asked to wear a standardized outfit. The female subject was photographed in a plain black dance-style leotard. It was hypothesized that male subjects would strongly object to being photographed in similar outfits. Visible body definition was sacrificed for convenience in recruiting, and the male was photographed wearing soccer shorts and a t-shirt.

Subjects were photographed against a plain white background (bed sheet), using a Nikon N65 SLR camera with 28-200 mm zoom lens and Kodachrome slide film. Lighting for the female subject was reflected (from the ceiling) incandescent light provided by two

stand-alone utility-style lights with 500 watt bulbs. The male subject was photographed in natural light.

Subjects were asked to pose in five stances (averaging no more than six photographs per child): facing forward with arms at side; facing forward with arms held slightly from body (allowing greater definition of arms); at three-quarters stance (facing slightly away from the camera) with arms at side; at three-quarters stance with arms held slightly from body; and at profile (side view).

At the completion of the photo session, the subjects were thanked and provided \$10 gift certificates to Walmart for their cooperation.

#### *vi. Photographic Scale Development*

The exposed film was developed into slides at the Virginia Tech Digital Imaging Center using Kodak processing. The resulting slides were submitted to Christopher Vann Cox, Graphic Designer in the Department of Agriculture and Extension Communications, Virginia Cooperative Extension.

Throughout the scale development process, the graphic designer and researchers held periodic discussions. The outcomes of these meetings were small changes in the styles and formats of the figures scales, such as removal of any potentially identifying characteristics of the models and possibly controversial sex-related details of the line drawings.

To create the male and female scales and format them pleasingly on single pages, a number of steps were required. The original slides were scanned into a computer. They were then “cleaned up”, digitally altered to remove background effects and identifying facial, body, and clothing characteristics, in Adobe Photoshop.

The photographs were used to create three additional format versions: a line drawing, a silhouette, and a colored line drawing. To create the initial line-drawing versions, vellum tracing paper was laid over large-scale printouts atop a light box. The drawings were then scanned again, into Photoshop, and then run through Adobe Streamline to turn them into vector line art. The vector versions were then opened in Macromedia Freehand and manually manipulated. The silhouette version was blackened completely; the colored line version had pigments added.

The initial slides showed the subjects standing in a variety of stances (profile, facing camera with arms in various positions, etc.). To create a scale for stance-preference, the slides were scanned into the computer and manually created in Photoshop.

Two novel body figure scales, male and female, were created based on the Latino subject photographs. To create the novel scales, the initial vellum tracings were used as templates. The differently-sized pictures of the subjects were created by doing further hand tracings (again on vellum, using a light box), making the subject slightly thinner or thicker as needed. The Collins figure scale (1991) was used as a reference.

The female subject, very average in size and appearance, became the center figure for the female scale. From the original form, three figures were drawn as increasingly heavy, and three figures were drawn as increasingly light. The male figure, somewhat smaller than average, became the third thinnest figure (rather than the middle figure). From his form, two smaller and four larger figures were drawn.

#### *vii. Development of Final Scale Presentation*

The final presentation, showing the four scales (one for format, one for stance, the novel body figure scale, and the Collins figure scale), was created by bringing the various scales together with labeling text in the page layout program, QuarkXpress. See Appendix J and K for the final male and female “picture pages”.

In each scale, the ordering of the figures was randomized using an online random-number service (True Random Number Service, 2003). Each item of a scale was assigned a number, the generator created a randomized sequence of the numbers, and the items were placed according to the scheme created.

#### *viii. Scale Description*

For the interest of space and materials, all of the scales (A-D, again please see Appendix J and K) were printed on a single sheet of paper. Pages were laminated so they could be re-used between subject groups.

Scale A was created to test for preference of image format. A single photo was used to create four images: photographic, silhouette, line drawing, and colored line drawing. The final option was added because the photographs were printed in color, but the silhouette and

line drawings were (by necessity), not. It was believed that this option would tease out bias for color from actual interest in photographic-type image.

Scale B was created to test for preference of image stance. It consisted of photographic images of either a male or female subject standing in one of five stances: profile, facing forward with arms at side, facing forward with arms slightly away from body, facing three-quarters towards the camera with arms at sides, and facing three-quarters with arms slightly away from body.

Scale C consisted of 14 line drawing figures, the front and profile views of seven figures. The seven sets of figures depict different “weights”. This is the novel scale created specifically for pre-adolescent Latino and non-Latino populations.

Scale D consists of the figural scale developed by Elizabeth Collins, and published in 1991. The seven figure, line drawing-type scales depicts Caucasian or non-ethnic pre-adolescent male and female figures of increasing weights. These scales have been reviewed and assessed for test-retest reliability and criterion-related reliability (Collins, 1991). This scale, known hereafter as the Collins scale, is the standard against which the success of the novel scale (Scale C) may be compared.

### *B. Survey Development*

In order to gather further demographic data and information on the acculturation status and body image of the target population, it was necessary to create and administer a short survey instrument. To ensure validity and reliability, as many questions as possible were extracted from tested instruments.

The following is an overview of the survey instrument. Please see Appendix L and M for English and Spanish-language versions of the final questionnaire. The complete survey instrument consisted of 35 multiple-choice questions and was created to fulfill goals beyond the scope of the study discussed in this paper. Only 24 of the questions will be considered in this work. The questionnaire was formatted to allow the use of scantron answer cards (Mark Reflex by NCS EM-207132-3:654).

Demographic questions, including those for age, gender, ethnicity, and year in school, were based on the 2003 Youth Risk Behavioral Surveillance Survey (YRBSS) (YRBSS website). These questions provided baseline descriptive data regarding the testing group.

Acculturation, the population and individual-level changes that occur when two cultures co-exist, was assessed using four of the twelve questions comprising the Short Acculturation Scale for Hispanic Youth (SASH-Y) (Barona & Miller, 1994). Serrano and Anderson (2003) recently evaluated Barona and Miller's acculturation scale using factor analysis and found that language preference and usage by the preteen subjects accounted for 82.6% of the variance. Due to this finding, and concerns about using the rather lengthy 12-question original SASH-Y scale with a largely non-Hispanic audience of children, this study opted to use only the language questions in the survey instrument. Additionally, one of the original five SASH-Y language questions was eliminated after independent reviewers argued that the question: "What language(s) do you read and speak?" might elicit too many multi-lingual responses. They reasoned that some children are very proud of their knowledge of a few foreign words or phrases, and may confuse this for true bi-lingualism. Children speaking neither English nor Spanish as their dominant language were asked to omit the entire suite of questions.

Questions assessing body image were based on those used by the McKnight Risk Factor Survey-III (MRFS-III) (Shisslak et al., 1999). The MRFS-III was designed to assess disordered eating risk factors in adolescent girls; it consisted of 103 questions on topics such as body image, eating disorders, sexual activity, and physical activity. From the original 103 questions, eight were culled which focused on two areas, "overconcern with weight and shape" and "body appearance/appraisal". These two topics were selected as they best assessed the core qualities which define body image, and because the corresponding questions had the highest levels of test-retest reliability and internal consistency (Cronbach Alpha). The test-retest reliability for the combined five questions on overconcern with weight and shape was 0.79 among elementary school children; the Cronbach Alpha for the same questions and group was 0.82. The test-retest reliability for the combined three questions on body appearance/appraisal was 0.63 among elementary school children; the Cronbach Alpha for the same questions and group was 0.68 (Shisslak et al., 1999).

It was necessary to develop novel questions regarding the body figure scales. The survey questions were based on the standard queries asked to participants in the card-sorting versions of the body figure scales. With regards to each scale (A tests format preference, B tests stance preference, C is the novel scale, D is the Collins (1991) scale), subjects were asked to choose which figure they liked best, and which figure they thought “looks most like you”.

These distinct questions were developed to discern preference for the style or form of a particular figure from ability to identify with a figure. For scales A and B, the preference question was merely a test of actual preference. Previous scales have neither identified nor commented upon inter-scale style and format differences. For scales C and D, the preference question acts in conjunction with the identification question to test for body image discrepancies.

The survey instrument was examined for form and content by several independent reviewers before being presented to subjects. The entire questionnaire was also translated into Spanish by two bilingual individuals, and then reviewed for accuracy and appropriateness by a native Spanish speaker. Children were given the option of choosing English or Spanish-language surveys at each testing session. It was estimated that the survey would require 15-20 minutes to be completed.

## **Phase II. Data Collection**

Data collection occurred in two phases, first, the recruitment of subjects and, second, the testing of subjects. Recruitment consisted of applying for permission at various institutional and government levels, solicitation of individual schools and administrators, and actual recruitment of subjects. Testing consisted of one-time questionnaire and anthropometric assessment sessions with students.

### *A. Recruitment of Subjects*

Subjects consisted of 90 fourth- and fifth-grade public elementary school children residing in a small geographical area of northern Virginia, and attending one of four different schools in two counties.

Fourth- and fifth-grade students were selected as these grades are the most senior ones still tending to be found in the same schools (rather than spread between elementary and middle schools), and because previous research shows that this age group is capable of performing the comparisons required in this study.

The ideal population for a study such as this is one of early adolescents at approximately age 12. Truby and Paxton (2002) found in their research with 7 to 12 year olds, of the Children's Body Image Scale, that the older children (10-12 years) were the strongest performers. Younger boys (<8 years) were "clearly unable to do the task at all". Also, this delicate stage of maturation is a cross-roads for the development of eating disorders and non-ideal exercise habits, and a critical time in the development of life-long healthy eating habits. By adolescence, the path to adult obesity may already be laid, and 80% of obese adolescents become obese adults (Schonfeld-Warden & Warden, 1997).

Initial subject selection criteria attempted to locate the populations most vulnerable to overweight and obesity, limited-resource and multi-ethnic or Latino audiences. In order to officially delineate our target population, the search criteria were set to: Virginia school districts with 5% or more of the population under the age of 18 being Latino (NCES); public elementary schools in which 50% or more of the children qualifying for the free or reduced price lunch program (F&RPLP Eligibility Report, 2001-2002). There were 36 elementary schools, found in six Virginia school districts, which possessed both the percent-Latino and percent-free and reduced lunch criteria. (Please see Appendix N for initial possible subject pool.)

Once the initial possible subject pool was identified, it became clear that the study would need further geographical restriction to be feasible within time and budgetary constraints. Rather than attempt recruiting from schools with lower levels of Latinos (such as those in Virginia Beach City, Fredericksburg City, and Northampton County), active recruiting was pursued only within counties with consistently high levels of the target population (Arlington County, Fairfax County, and Harrisonburg City).

State-level permission for this study was gained through a cooperative venture with the Virginia Departments of Health and Education in the "Fourth Grade Study". Please

see Appendix O for a copy of the letter of permission signed by Dr. Robert Stroube, State Health Commissioner, and Dr. Jo Lynne DeMary, Superintendent of Public Instruction.

Each of the Virginia school districts and/or counties had its own research evaluation protocol, and review board or specialist. Each county required individual applications, letters of reference, proposals, and protocol changes. Officially mandated approval was gained in Fairfax County; Arlington County and Harrisonburg City officially declined to participate.

Geographic, time, and budgetary constraints mandated that data collection cease after four schools in two northern Virginia counties were tested. The data gathered from students of those schools constitute the findings of this project.

Once a county agreed to participate in the project, individual schools were solicited for interest. Within the major participating county, individual schools were contacted via email to gauge their interest in participating in this study. Follow-up messages and phone calls completed the screening methods. Any schools expressing interest, and a few which did not reply, were visited in person by the researchers.

There were 15 elementary schools within the participating county that fit the initial selection criteria for percent-Latino and percent-free and reduced lunch. Of the 15, only one agreed to participate in the study.

One additional school, in a neighboring county, volunteered to participate in the study, as the principal had expressed concerns over the health of her students.

With so few schools positively responding to the initial participation requests, the evaluation criteria were expanded to include all heavily multi-ethnic elementary schools within the participating county. The new search criteria yielded an additional 18 elementary schools of interest, of which two agreed to participate.

Principals of schools expressing interest in participating were given free reign to schedule testing sessions. Testing sessions were conducted during regularly scheduled physical education classes so as not to interfere with classroom instruction. Testing occurred on one or two days during a specified week, allowing (1) the maximum number of classes to be tested, (2) any children who forgot to bring signed consent forms the first day a second chance to participate.

## *B. Testing of Subjects*

Testing of subjects was guided by a strict protocol, with only small deviations required for convenience by each school. Researchers were trained for accuracy and sensitivity in collection prior to participation (see Appendix P for written protocol that was given to all anthropometric assessors). Training was refreshed prior to each testing instance, and brief measurement protocols (see Appendix Q for an example) were posted on the measurement equipment as a reminder. The protocol, and accompanying test information, is described below.

Testing of all four schools occurred between April and June of 2003.

One week prior to testing, parent consent forms (“Informed Consent for Parents of Participants in Research Projects Involving Human Subjects”, English and Spanish versions, Appendix R and S) and child assent forms (“Child’s Assent Form”, English and Spanish, Appendix T and U) were sent to schools, along with letters to teachers (for examples, see Appendix V and W) and a poster (Appendix X) for teachers to hang in the classrooms to remind students to return their consent forms.

Letters from the schools to parents asked that parents review the materials with their children to determine interest in participation. Families wishing to have their children participate were to return signed parental and child consent forms to the schools a few days prior to testing.

Due to administrator concern over whether or not children should or would be told their anthropometric data (height, weight, waist circumference), an active consent, or “check the box”, form was created to identify families interested in having the assessed anthropometric data shared with the child. (Please see Appendix Y for an example.) If a child returned a “checked” form, they were told their measurements; if they did not, the data was not released.

To protect the identities of the participating children, a system of identification numbering was created for this study. Unique nine-digit numbers, with columns identifying county, school, teacher, and child, were used. To allow for easy identification of clerical errors, the first two digits consisted only of 0 or 1, the second two digits consisted only of 2, 3, 4, or 5, the third two digits were even numbers, and the last three digits were odd numbers.

To ensure that neither researchers nor subjects misnumbered the identifying instruments, pre-printed labels were affixed to the subjects' check-in sheet, subject data form, and scantron answer sheet. Only the lead researchers had access to the coding key or the raw data.

On the day of testing, researchers arrived at the specified location and time. Two researchers (the same for all test instances) were assigned to measure weight, height, and waist circumference of students. The remaining researchers conducted the survey testing and distributed the incentives.

### *C. Testing Protocol*

On the day of testing, researchers would arrive prior to the start of school, confer with administrative contacts, set up equipment, and begin pre-registering subjects who returned signed permission forms. Pertinent school and class information was recorded on the Researcher Information Form (see Appendix Z).

Testing occurred synchronously with regularly scheduled physical education classes. An introductory speech was given by the lead researcher to the entire class, explaining what research is, why this project was being conducted, and what would take place.

Children with signed permission forms were invited to join the researchers in an adjoining section of the gymnasium. Researchers then helped children to register for the study, double-checking that every child had two signed permission forms (parent and child) and confirming whether or not the parents wished that their child be told their weight and height information. (See Appendix AA for an example of the sign-in page.) Subjects were seated in rows, equally and as distantly spaced as was possible within the testing area.

Subjects were provided with a #2 pencil, a scantron answer form, a copy of the questionnaire (English or Spanish), and a gender-appropriate copy of the picture page (male or female). Every child was given the choice of an English- or Spanish-language questionnaire, and a male or female picture page. No prompting was given with either choice.

Once supplies were dispersed, subjects were asked to complete the questionnaires to the best of their abilities, not to share answers, and to give one, but only one, answer to every question. Subjects were encouraged to let a researcher know if they had any questions or did

not understand what a specific question was asking. Responses to subjects' questions were kept as neutral as possible, and often included repeating the question verbally to the subject, assuring the subject that there is "no right or wrong answer", or substituting approved synonyms (such as "picture" for "scale").

While the group of subjects completed the survey, individuals were assessed anthropometrically. Subjects either volunteered or were asked to accompany the researcher to a semi-private area for assessment.

At every location, privacy of the subjects was of an utmost concern. Opaque, portable privacy screens were set up around each testing area. The privacy screens, measuring approximately 60 inches tall and 54 inches wide, were free-standing tri-paneled folding structures consisting of wood and heavy cloth. Where possible, the screened testing areas were located in adjacent rooms to the main gymnasium. To further ensure privacy, researchers were careful to locate the testing areas as far apart as possible, to obscure all completed data forms, and to speak in a soft voice that could not be heard outside of the screened area.

With each subject, the researchers explained the assessments prior to testing. The pre-labeled subject data form (see Appendix AB) was collected from the subject. Subjects were then asked to remove their shoes, had they not already done so, and remove any loose or bulky clothing they wished. All anthropometric measures were recorded on the subject data form.

Height was assessed using the standing method described by Ikeda and Crawford (2000) and a factory-calibrated stadiometer, which was affixed to a portable beam balance. Subjects were asked to stand tall with their feet flat against the back of the scale, hands at their sides, facing away from the scale. Subjects' heads were adjusted, as needed, to align in the Frankfort Plane (imaginary line from the lower margin of the eye socket to the notch above the flap of skin that extends over the opening of the ear) (Ikeda & Crawford, 2000). Children were then asked to draw a deep breath and hold it while the researcher gently moved the swinging bar of the stadiometer into measurement position. Height was assessed, to the nearest one-quarter inch. Where complicated hairstyles possibly interfered with accurate measurement, appropriate notations were made on the subject data forms.

Mass (hereafter termed “weight”) was assessed using a Health-o-Meter or seca Corporation scientific-quality balance beam scale, re-calibrated at each testing location. Subjects were asked to stand quietly in the center of the weighing pad, with their arms at their sides, facing away from the scale. Weight was measured to the nearest one-quarter pound. Weights were noted and the scale re-zeroed before the subject was asked to step off the scale. If a subject did not wish to remove articles of clothing that may have interfered with testing (for example, light jackets, heavy sweaters, or other articles beyond regular street clothes), the subject was assured that this was fine. Notations of such irregularities were recorded on the subject data forms, with testing continued regularly.

Waist circumference was assessed using a modified version of the NHLBI standards (NHLBI, 2000) and a seca Corporation anthropometric tape. Clothed subjects were asked to identify their navel or “belly button”. The tape was then placed snugly around the body, perpendicular to the floor. Circumference was measured to the nearest one-quarter inch. Subjects who preferred not to remove excess clothing were noted, but not omitted from testing.

Subjects were then thanked and asked to replace any clothing or footwear removed for testing. Subject data forms were not returned to the subjects. Only those students with parental permission to be told their personal measurements were given this data. As instructed, researchers never made any comments, approving or otherwise, regarding the assessed measurements. Once anthropometric testing was complete, subjects were asked to rejoin the other subject participants and complete their questionnaires.

Subjects were given as much time as was available to complete their questionnaires. On average it took subjects 20-25 minutes to complete the questionnaire. Few subjects had difficulty completing the survey within the time allotted. Subjects were asked to return their testing supplies to the researchers. At that time, researchers briefly reviewed the scantrons for obvious errors (too many or too few questions answered, more than one response given for a single question), and often double-checked a few of the students’ responses via verbal query. For example, the researcher might ask the subject “Which of the figures did you like best?” and the subject would point to a figure. The researcher would compare the subject’s verbal choice to the one indicated on the scantron. This allowed greater confidence that a

single skipped or misnumbered answer would not corrupt the rest of the answers on the scantron sheet.

Upon returning their completed surveys to the researchers, subjects rejoined their regularly scheduled classes. All participants were given a beaded jump rope, worth approximately \$2.25, as an incentive either immediately following testing or at the end of the day (by the classroom teacher), depending on the school's preference.

At the conclusion of testing, the school's designated on-site observer was asked to complete the On-Site Observer form (see Appendix AC), a legal formality protecting all parties. Participating administrators and teachers were thanked for their assistance and given small gift bags of apples. All equipment and supplies were dismantled and returned to Virginia Tech.

All gathered raw data, including school names, subject names, identification numbers, and personal information, were kept strictly confidential. Only the researchers, their necessary colleagues, and any funding or authenticating agencies were reserved full access. Any subject deciding after testing to withdraw from the study was accommodated. Subject information sheets were returned to the requesting parent, and subject data was purged from the electronic files.

### **Phase III. Data Management and Statistical Analysis**

Scantron data forms were returned to the Virginia Tech Department of Testing Services for scanning and initial evaluation. Results were returned to the researchers electronically and formatted in Excel. The data were "cleaned" by hand-searching the original answer forms for poorly shaded choices and adding these responses to the spreadsheets. Where answers could not be easily determined (multiple responses were given to a single question, forms were indistinctly marked, etc.) or where the answers given were clearly erroneous (marking the 5<sup>th</sup> response when there were only 1-3 were options), the responses for those specific questions were omitted from the data pool. Additionally, it was decided that the single self-reported male subject who chose to complete the questionnaire using a self-selected female picture page should be eliminated from the data pool as that

subject's responses for preference of figures would be answering innately different questions than those posed by a self-sex survey.

Height, weight, and waist circumference data were also tallied and entered into Excel spreadsheets. Where inconsistencies in measurement were unavoidable (subjects refused to remove light jackets, complicated hairstyles interfered with clear measurement of height, etc.), these were noted.

All data were then entered into Statistical Package for Social Sciences, Version 11.5 for Windows (SPSS)®, a statistical manipulation software package. Where needed, variables were recoded for easier manipulation.

Single variables were created to reflect answers given in an array of questions. The four questions addressing acculturation were assessed using principal component analysis. This set of questions was found to have high internal consistency, as measured by the proportion of variance explained by the first principal component, with 83% of variability attributable to a single question. Responses to these questions were consolidated into a single continuous variable to create a score known as “Acculturation Factor (AccFact)” in further analyses. Since the acculturation score was designed to test levels of acculturation only within Spanish-speaking and presumably Latino populations, within the data analyses the AccFact score was used only with self-identified Latino populations.

Similar analyses were run on the body image questions. Two questions were dismissed from the original pool of seven questions. One question had a vital word omitted during the first printing of the questionnaire. As nearly half of the subjects came from the first school, it was decided that it was best to simply drop that question from all of the analysis. Another question, “In the past year, how often have you felt pretty?”, was also removed from the body image scoring process after initial analysis revealed that it was the least similar of the body image questions. The remaining five associated questions were transformed using principal component analysis to become the “Body Image Factor (BIFactor)” score in further analyses.

The questionnaire allows for the distinction of six ethnic groups: American Indian/Alaskan, Asian, Black/African American, Latino/Hispanic, White/Caucasian, and Other. Within the subject pool, response rates for American Indian/Alaskan, Asian, and

Other were all very low. It was decided to create only four larger ethnic groups for the purposes of data evaluation. The final ethnic groups were: Black/African American, Latino/Hispanic, White/Caucasian, and All Others.

A classic use of the body figure scales is as an assessment of body image (Williamson et al., 1993; Veron-Guidry & Williamson, 1995; Leonhard & Barry, 1998; Bulik et al., 2001). This is accomplished by asking the subject to identify the figure most closely resembling themselves (usually called the “current” or “self” choice), and the figure most closely resembling how they would like to look (usually the “ideal” figure), and finding the amount of discrepancy between the two figures. Figure choices that are close together (or the coinciding) are associated with a more positive body image, figure choices that are largely disparate are considered indicative of a disordered body image (Williamson et al., 1993). To assess the efficacy of both the novel and Collins body figure scales in assessing body image, body image scores were created for each. For the novel scale, the numerical rank of the “ideal” figure choice was subtracted from the numerical rank of the “self” figure choice, creating a discrepancy score designated “Novel Body Image” score (NovelBI). A similar procedure was used with the Collins figure choices to create the “Collins Body Image” score (CollinsBI).

Designating a child as overweight or obese is accomplished differently than as one would for an adult. Although body mass index (BMI) is computed normally, by dividing the body weight in kilograms by the height in meters squared ( $\text{kg}/\text{m}^2$ ), it is not used as a stand-alone measurement. The Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS) publish growth charts for children (Kuczmarski, et al., 2000; <http://www.cdc.gov/growthcharts>). To use these growth charts, a child’s BMI and age are mapped to a percentile measure on the gender-specific BMI-for-age growth charts. Children scoring above the 85<sup>th</sup> percentile are considered at-risk for overweight, children scoring at the 95<sup>th</sup> percentile or above are considered overweight (Kuczmarski et al., 2000). Although there are currently no expert guidelines for low-end BMI-for-age cut-offs for classifying underweight (Kuczmarski et al., 2000), this study will follow the lead of the WHO Expert Committee (Wang, 2001) and CDC-developed training

module for BMI-for-age (Overview of the CDC Growth Charts) and adopt a standard for underweight at the 5<sup>th</sup> percentile or lower of BMI-for-age.

To simplify calculations, Mr. Clark Gaylord, statistical consultant at Virginia Tech, coded an Excel program which used the CDC/NCHS growth charts titled “BMIAGE” (CDC/NCHS) to compute a BMI-for-age percentile for each subject. The BMIAGE data file contained percentile values for the 3<sup>rd</sup>, 5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup>, and 97<sup>th</sup> percentiles by sex. Linear interpolation was used to determine the exact percentile for scores falling between the given figures. Similarly, data points falling below the 3<sup>rd</sup> percentile or above the 97<sup>th</sup> percentile were extrapolated using straight-line regression. Any scores computed to fall below the extrapolated “0” were scored at the 0<sup>th</sup> percentile, any scores computed to fall above the extrapolated “100” were scored at the 100<sup>th</sup> percentile.

The scale increments of the collected age data (in years) did not match that of the CDC growth charts (in months). Because the exact ages of the subjects were unknown, it was decided that all subjects should be assumed to be half way between ages, or (12 x reported age in years + 6.5) months. This means that all subjects with a self-reported age of 9 years were assumed to be 114.5 months of age; 10 year-old subjects were assumed to be 126.5 months; 11 year-old subjects were assumed to be 138.5 months; 12 year-old subjects were assumed to be 150.5 months. BMI-for-age percentile rank was computed for every subject.

The relationships between demographic (gender, age, ethnicity), anthropometric-based (waist circumference, BMI-for-age percentile), figure preference selection (format, stance, novel and Collins scales), and factors of body image and acculturation were assessed using a combination of  $\chi^2$  and general linear model analyses (ANOVA, ANCOVA, regression), depending on the variable(s) and factors.

## CHAPTER IV

### Results

A total of 91 boys and girls were assessed as part of this study; 89 data sets were used in the final analyses. One subject withdrew voluntarily; the data of another was excluded because the child chose to answer the questionnaire using the figures designed for the opposite gender.

The subjects were drawn from four public elementary schools within two counties in a small, urban geographical area of northern Virginia. Eighteen classes participated, including 8 fourth-grade classes, 9 fifth-grade classes, and 1 combined fourth- and fifth-grade class. The bulk of the subjects (74.2%) attended the first two tested schools. Please see Table 4.1.

Table 4.1. Participation by School

School	4th Grades	5th Grades	Comb. 4th/5 <sup>th</sup>	Total Classes	Total Students from each School	
1	4	3	0	7	35	39%
2	2	1	0	3	31	35%
3	2	2	1	5	15	17%
4	0	3	0	3	8	9%
Total	8	9	1	18	89	100%

### Demographic Information

The subject pool consisted of 41 females and 49 males. These students identified themselves as 39 fourth-graders and 48 fifth-graders (two unreported). Most children (96.6%) were nine, ten, or eleven years of age at the time of testing. Equal numbers of Black/African-American and Latino/Hispanic students participated (30.3% each). Whites or Caucasians represented the third largest group (18%). The other three ethnic categories, American Indian/Alaskan, Asian, and Other, accounted for 21.3% of the tested subjects. Because these groups were so under-represented, their data was grouped under a category known as “All Others” for the rest of the analyses. Please see Table 4.2 on the next page for further details.

Table 4.2. Demographic Characteristics

Variable	Response	n	%
Gender	Male	48	53.9%
	Female	41	46.1%
Age	9 Years	19	21.3%
	10 Years	35	39.3%
	11 Years	32	36.0%
	12 Years	3	3.4%
Grade	4th Grade	39	43.8%
	5th Grade	48	53.9%
Ethnicity	Amer. Indian/Alaskan	2	2.2%
	Asian	6	6.7%
	Black/African-Amer.	27	30.3%
	Latino/Hispanic	27	30.3%
	White/Caucasian	16	18.0%
	Other	11	12.4%

### Anthropometric Data

Anthropometric data, including height, weight, and waist circumference, were collected and analyzed for 89 subjects. The mean waist circumference was 27.72 inches, with an overall range of 22 to 42 inches. The mean BMI was 19.769 with a range from 13.995 to 33.655. The mean BMI-for-age percentile was 62.94, with a range from 3.60 to 100.00 percentiles.

Pearson correlation analyses showed that waist circumference, BMI, and BMI-for-age percentile were all significantly correlated ( $p < 0.001$  for all associations). Waist circumference and BMI were more strongly correlated ( $r = 0.884$ ) than were either waist circumference and BMI-for-age percentile ( $r = 0.716$ ) or BMI and BMI-for-age percentile ( $r = 0.865$ ).

The BMI-for-age percentile ranking (at or below the 5<sup>th</sup> percentile of BMI-for-age) of two subjects qualified them as underweight (representing 2% of the population). Fifty-four of 89 subjects (61%) were considered of normal weight (BMI-for-age above the 5<sup>th</sup> percentile and below the 85<sup>th</sup> percentile). At-risk of overweight (BMI-for-age at or above the 85<sup>th</sup>

percentile, but below the 95<sup>th</sup> percentile), was prevalent in 16 of the 89 subjects, or 18% of the population. Overweight (BMI-for-age percentile at or above the 95<sup>th</sup> percentile) occurred in 17 of the 89 subjects, or 19% of the population. For our survey sample, 37% of subjects were either overweight or at-risk of overweight. Please see Figure 4.1.

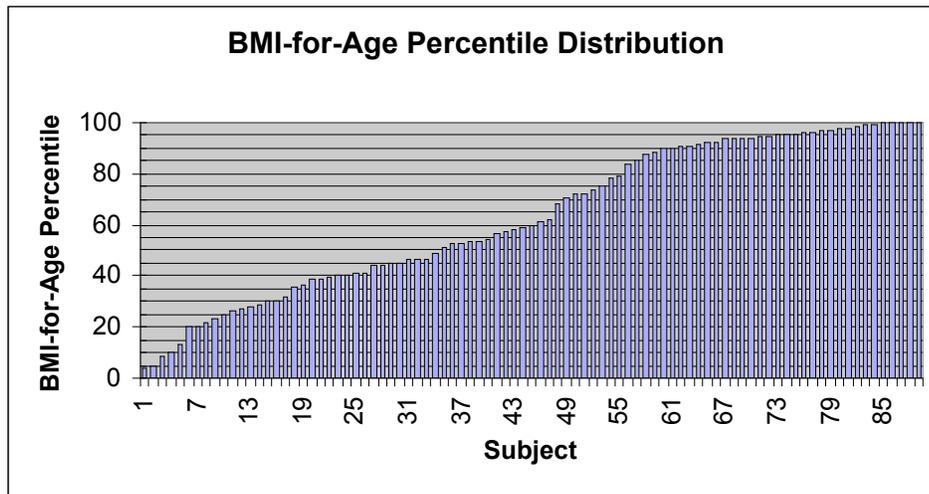


Figure 4.1. BMI-for-Age Percentile Distribution

One-way ANOVA tests revealed that gender was not a significant factor for BMI-for-age percentile ( $p > 0.05$ ), but ethnic group was a significant factor ( $p = 0.004$ ). Analysis using the general linear model showed that ethnic group had a larger impact than gender in predicting BMI-for-age percentile, with the corrected model significant at the  $p=0.029$  level.

Table 4.3, on the next page, illustrates the differences in distribution of underweight, normal weight, at-risk for overweight, and overweight among the different ethnic groups. The mean BMI-for-age percentiles of the Black/African-American (70.06) and Latino/Hispanic (72.63) groups are higher than those of the White/Caucasian (43.53) and Other (55.41) groups. More than half of the Black/African-American and Latino/Hispanic students were either at-risk for overweight or currently overweight. By contrast, only 15.79% of the Other group and 12.50% of the White/Caucasian group were at-risk or overweight.

Table 4.3. Weight Category and Mean BMI-for-Age Percentile by Ethnic Group

Ethnic Group	N	Under Weight	Normal Weight	At-Risk For Over Weight	Over Weight	Mean BMI-for-Age%	Percent At-Risk & Overweight
Black/African-Amer.	27	0	15	7	7	70.06	51.90%
Latino/Hispanic	27	0	12	8	7	72.63	55.56%
White/Caucasian	16	2	12	2	0	43.53	12.50%
All Others	19	0	15	1	3	55.41	15.79%

One-way ANOVA tests demonstrated that the mean BMI-for-age percentile differed significantly between the ethnic groups (Black/African-American, Latino, Caucasian, and Others),  $p = 0.004$ . Post-hoc analyses performed with Tukey's HSD showed that a significant difference existed only between the Black/African-American and Caucasian groups ( $p = 0.016$ ), and Latino and Caucasian groups ( $p = 0.007$ ). No significant differences were found between the Black/African-American and Latino/Hispanic groups ( $p = 0.986$ ), nor between any of the groups and the Others (Others and Blacks/African-Americans,  $p = 0.292$ , Others and Latinos/Hispanics,  $p = 0.165$ , Others and Whites/Caucasians,  $p = 0.584$ ). Please see Figure 4.2.

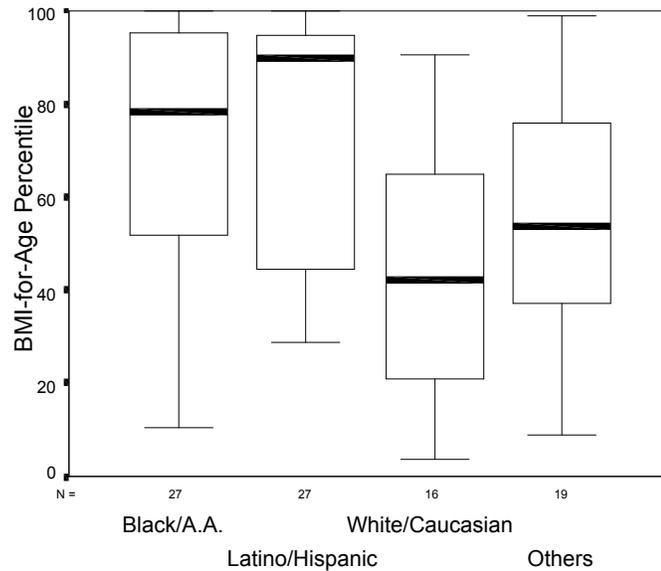


Figure 4.2. Mean BMI-for-Age Percentile by Ethnic Group

## Body Image

Respondents generally had a positive attitude towards their bodies and appearance, with the majority of respondents answering that they never or infrequently felt fat or ugly, or worried about gaining two pounds as shown in Table 4.4.

Table 4.4. Frequency of Response for Body Image Questions

	Never		A Little		Sometimes		A Lot		Always	
	n	%	n	%	n	%	n	%	n	%
<i>In the past year, how often have you:</i>										
Thought about having fat on your body?	30	33.7	23	25.8	22	24.7	11	12.4	2	2.2
Felt fat?	41	46.1	22	24.7	11	12.4	10	11.2	4	4.5
Thought about wanting to be thinner?	31	34.8	20	22.5	12	13.5	12	13.5	12	13.5
Worried about gaining 2 pounds?	45	50.6	16	18	14	15.7	8	9	5	5.6
Felt ugly?	41	46.1	16	18	18	20.2	6	6.7	7	7.9
Felt pretty?	16	18	21	23.6	20	22.5	7	7.9	24	27
Been happy with the way your body looks?	8	9	14	15.7	19	21.3	19	21.3	28	31.5
How much has your weight made a difference in how you feel about yourself?	31	34.8	18	20.2	25	28.1	7	7.9	5	5.6

Body Image Factor is the conglomerative score created using principal component analysis; it is used as the proxy for “body image.” Analysis using factorial ANOVA found that both gender and ethnic group contributed significantly to Body Image Factor ( $p=0.049$ ), with ethnic group ( $p = 0.008$ ) being the stronger contributor ( $p = 0.666$ ). Multiple regression analyses found that the independent variables waist circumference and BMI-for-age percentile had a significant impact on Body Image Factor,  $p < 0.001$ , with waist circumference being the more important contributor. A correlation of 0.363 was found between BMI-for-age percentile and the Body Image Factor,  $p = 0.001$ .

Pearson correlation analyses demonstrated significant associations between the Novel Body Image score and the Collins Body Image score ( $p=0.001$ ); the Novel Body Image score and the Body Image Factor score ( $p=0.002$ ); and the Collins Body Image score and the Body Image Factor score ( $p=0.001$ ).

### Scale Parameter Selections

When asked to select their favorite format, subjects were more likely to choose the colored line-drawing format (33.7%). Preference for a particular format was related to both gender ( $\chi^2(3, N=87) = 10.676, p=0.014$ ) and ethnic group ( $\chi^2(9, N=87) = 17.788, p = 0.038$ ). Please see Table 4.5.

Visual inspection of the data showed that, among male subjects, preferences leaned towards the uncolored line drawing and photograph formats (with approximately 35% and 33% of the males choosing each respectively). Among females, the colored line drawing was strongly preferred, with 49% of respondents choosing it as their favorite.

Among African-American or Black subjects, the photograph and colored line drawing formats were best preferred, with 37% and 33% of subjects choosing each, respectively. Among Latino or Hispanic respondents, the colored line drawing was, by far (56%), the favorite. The least favorite format among the Black and Latino subjects was the silhouette. Conversely, the silhouette was the most favored format of the White or Caucasian subjects (37.5% of subjects choose this). Among the Others group, no one format stood out as a definitive greatest or least favorite.

When asked to select the formatted figure that looks most like them, subjects were more likely to choose the photograph (39.3%). Self-identified format was also related to both gender ( $\chi^2(3, N=89) = 12.711, p = 0.005$ ) and ethnic group ( $\chi^2(9, N=89) = 20.264, p = 0.016$ ). Please see Table 4.5.

Visual inspection of the data revealed that the male subjects felt they could identify best with the colored line drawing format (33.3% of respondents chose this format). The majority of females (56%) felt they could identify best with the photograph format.

Among the ethnic groups, more than half (59%) of Black students felt they could best relate to the photograph format; results were similar among the Latino subjects (44% choose the photograph). As with preference, the Caucasians had very different results. The colored line drawing was chosen most often (37.5%) as the format with which students felt they could identify; the photographic format was the least popular. Only one white respondent felt she could identify best with this format. Among the Others group, nearly half (47%) felt they could identify best with the colored line drawing format.

Table 4.5. Format Selections by Ethnic Group and Gender

Question and Responses	Black/African-Amer.		Latino/Hispanic		White/Caucasian		All Others	
	Male	Female	Male	Female	Male	Female	Male	Female
<i>Scale which you like best.</i>								
Silhouette	0	2	0	1	3	3	2	1
Line drawing	5	1	5	1	2	2	4	1
Photograph	7	3	2	3	4	1	2	2
Colored line drawing	2	7	3	11	0	1	5	1
<i>Scale that looks most like you.</i>								
Silhouette	2	0	1	0	2	3	3	0
Line drawing	3	0	5	1	3	1	1	0
Photograph	6	10	3	9	0	1	3	3
Colored line drawing	3	3	2	6	4	2	7	2

For stance of figure, the results were not as definitive. Three-quarters stance with arms at sides and front view with arms at sides were the favorites, with 25.8% and 24.7% of respondents choosing each, respectively. When asked which stance-figure looked most like them, 30.3% of subjects favored the three-quarters stance with arms at sides. Difference in stance preference existed based on gender ( $\chi^2(4, N=88) = 11.125, p = 0.025$ ). Ability to identify with a stance was unrelated to any of the demographic factors. Please see Table 4.6.

Table 4.6. Stance Selections by Ethnic Group and Gender

Question and Responses	Black/African-American		Latino/Hispanic		White/Caucasian		All Others	
	Male	Female	Male	Female	Male	Female	Male	Female
<i>Scale which you like best.</i>								
3/4 stance; arms out	3	2	2	1	1	2	1	0
3/4 stance; arms at side profile	3	4	3	6	1	4	2	0
front view; arms at side	3	1	4	1	1	1	3	2
front view; arms out	5	1	1	4	4	0	6	1
	0	5	1	4	2	0	1	2
<i>Scale that looks most like you.</i>								
3/4 stance; arms out	0	0	0	1	1	3	1	0
3/4 stance; arms at side profile	3	2	4	3	1	3	2	1
front view; arms at side	5	2	3	1	1	1	3	3
front view; arms out	4	5	3	6	4	0	5	0
	2	4	1	5	1	0	3	1

As was predicted, grade level, the proxy for age, had no significant relationship to any of the figure choices (preference for or identification with format or stance, or with preference for a figure in either the novel or Collins scales). Please see Tables 4.7 and 4.8 for the Novel and Collins scale selections.

Table 4.7. Novel Scale Selections by Ethnic Group and Gender

Question and Responses	Black/African -Amer.		Latino/ Hispanic		White/ Caucasian		All Others	
	Male	Female	Male	Female	Male	Female	Male	Female
<i>Figure which you like best.</i>								
Thinnest	1	0	0	1	1	2	1	2
2 <sup>nd</sup> Thinnest	0	1	2	4	2	2	1	1
Thin-Normal	2	5	2	7	4	2	6	2
Normal	3	6	4	2	1	1	3	0
Heavy-Normal	6	1	1	1	0	0	2	0
2 <sup>nd</sup> Heaviest	2	0	0	0	1	0	1	0
Heaviest	0	0	2	1	0	0	0	0
<i>Figure that looks most like you.</i>								
Thinnest	1	1	0	1	0	2	0	0
2 <sup>nd</sup> Thinnest	1	1	0	3	0	3	1	1
Thin-Normal	2	1	1	5	4	1	6	1
Normal	1	6	1	3	0	1	2	1
Heavy-Normal	7	1	6	1	3	0	3	0
2 <sup>nd</sup> Heaviest	2	2	3	2	0	0	1	1
Heaviest	0	1	0	1	0	0	1	0

Using multiple regression analysis with the “self” figure choices from the novel scale as the dependent variable and BMI-for-age percentile and the Body Image Factor as the covariates, the corrected model shows significance ( $p < 0.001$ ). BMI-for-age percentile ( $p = 0.005$ ) was a better predictor of “self” figure choice within the novel scale than the Body Image Factor ( $p = 0.065$ ). Similar findings were demonstrated with the Collins figure scale ( $p = 0.001$ ). BMI-for-age percentile ( $p = 0.020$ ) was the better predictor of “self” figure than the Body Image Factor ( $p = 0.055$ ).

When asked to choose an “ideal” figure from both the novel scale and the Collins scale, the subject’s choice was unrelated to gender, age, or ethnic group.

Figure preference selections were heavily concentrated to just a few choices on the Collins scale, especially among males. Using the Collins scale, more than 60% of male subjects chose a single figure (the “normal”, or middle, selection) as their ideal. Four of the seven figures had one or fewer males select them as their ideal body shape. By contrast, using the novel scale, no category was chosen by fewer than two males as their favorite. The figure chosen most often as the “ideal” was selected by only 30% of the subjects. This greater variety of choice was also seen in the female selections, but was not as pronounced.

Table 4.8. Collins Scale Selections by Ethnic Group and Gender

Question and Responses	Black/African-Amer.		Latino/Hispanic		White/Caucasian		All Others	
	Male	Female	Male	Female	Male	Female	Male	Female
<i>Figure which you like best.</i>								
Thinnest	1	0	0	0	0	0	0	1
2nd Thinnest	0	2	0	0	1	0	0	0
Thin-Normal	1	4	2	6	2	3	1	2
Normal	5	2	7	7	5	4	10	1
Heavy-Normal	6	4	1	3	1	0	0	1
2nd Heaviest	1	1	0	0	0	0	0	0
Heaviest	0	0	0	0	0	0	0	0
<i>Figure that looks most like you.</i>								
Thinnest	0	2	0	0	0	0	0	1
2nd Thinnest	0	1	0	1	1	0	0	0
Thin-Normal	2	2	1	1	2	4	0	0
Normal	6	4	3	7	3	3	10	2
Heavy-Normal	5	2	5	5	3	0	4	2
2nd Heaviest	1	2	0	2	0	0	0	0
Heaviest	0	0	1	0	0	0	0	0

Choice of a figure that “looks most like you” provided different results. General linear model analysis showed that both gender and ethnic group had a significant impact on the “self” identified figure choice using the novel scale,  $p = 0.008$ . This was not the case with the Collins scale ( $p=.172$ ). In other words, using the novel scale we came to a consistent conclusion that mean self-identified figure choice was not equal between ethnic groups. However, the mean self-identified figure choice for the Collins scale was not shown to be dissimilar between the ethnic groups. Please see Tables 4.9 and 4.10.

Table 4.9. Impact of Gender and Ethnic Group on “Self” Figure Choice, Novel Scale

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	44.470(a)	7	6.353	2.959	.008
Intercept	1075.741	1	1075.741	501.029	.000
ETHGROUP	31.038	3	10.346	4.819	.004
SEX	12.273	1	12.273	5.716	.019
ETHGROUP * SEX	5.612	3	1.871	0.871	.460
Error	173.912	81	2.147		
Total	1548.000	89			
Corrected Total	218.382	88			

a R Squared = .204 (Adjusted R Squared = .135)

Table 4.10. Impact of Gender and Ethnic Group on “Self” Figure Choice, Collins Scale

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.270(a)	7	1.753	1.523	.172
Intercept	1265.230	1	1265.230	1099.079	.000
ETHGROUP	7.968	3	2.656	2.307	.083
SEX	4.481	1	4.481	3.893	.052
ETHGROUP * SEX	0.377	3	0.126	.109	.955
Error	92.094	80	1.151		
Total	1610.000	88			
Corrected Total	104.364	87			

a R Squared = .118 (Adjusted R Squared = .040)

### Acculturation

As the shortened SASH-Y acculturation scale was intended to impute the level of acculturation of the Latino and Hispanic populations alone, response to acculturation questions and the creation of the acculturation factor score was used only with self-identified Latinos and Hispanics (n = 27).

The majority of this subpopulation spoke both English and Spanish equally with their families and friends. While few respondents reported speaking exclusively in Spanish with their parents, even fewer reported speaking exclusively in English. Please see Table 4.11.

Table 4.11. Response to Acculturation Questions

	Only Spanish		Spanish Better than English		Both Equally		English Better than Spanish		Only English	
	N	%	N	%	N	%	N	%	N	%
What language(s) do you speak to your parents in?	4	14.8	2	7.4	14	51.9	6	22.2	1	3.7
What language(s) do you usually speak at home?	3	11.1	4	14.8	14	51.9	5	18.5	1	3.7
In which language(s) do you usually think?	0	0	2	7.4	10	37	9	33.3	6	22.2
What language(s) do you speak with your friends?	0	0	0	0	17	63	6	22.2	4	14.8

\* Only Latinos were included in these analyses.

One-way ANOVA, run with only the data from the Latino/Hispanic students, found that the Acculturation Factor was significantly associated with preference for a figure format ( $p = 0.020$ ). Only one student indicated a preference for the silhouette format. In order to perform post-hoc analyses, it was necessary to eliminate this category from further scrutiny. Subsequent Tukey's HSD post-hoc analysis showed that the average Acculturation Factor score was approximately one unit higher for those subjects selecting the photographic format as their favorite, than those favoring the uncolored line drawing format. Please see Table 4.12. Acculturation Factor was not significantly associated with stance preference.

Table 4.12. Comparison of Mean Acculturation Factor by Format Preference for Latinos

Dependent Variable: Acculturation Factor  
Tukey HSD

(I) FMTLIKE	(J) FMTLIKE	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-1.102(*)	0.360	0.015	-2.005	-0.198
	3	-0.479	0.290	0.246	-1.207	0.249
2	1	1.102(*)	0.360	0.015	0.198	2.005
	3	0.623	0.309	0.133	-0.154	1.400
3	1	0.479	0.290	0.246	-0.249	1.207
	2	-0.623	0.309	0.133	-1.400	0.154

- The mean difference is significant at the .05 level ( $p < 0.05$ ).
- 1 = Uncolored Line Drawing; 2 = Photograph; 3 = Colored Line Drawing

## CHAPTER V

### Discussion and Conclusions

#### Overview of Results

##### *Demographic Information*

Of the 89 subjects, 37% were at-risk for overweight or currently overweight. The prevalence rate was even higher among the Latino and Hispanic students, where 48.1% of subjects were at-risk for overweight or currently overweight. Although there is no way to know if these findings are representative of all Virginia school children or of these schools, they are a cause for concern. Researchers conducting a recently published study had found much lower rates of overweight and at-risk of overweight, 15.3% for the general population of 6-11 year-olds, 15.5% for the general population of 12-19 year-olds, 39.3% among Latino 6-11 year-olds and 43.8% among Latino 12-19 year-olds (Ogden, et al., 2002). The Ogden and associates study (2002) made use of a large (N=4722), cross-sectional and stratified nationwide sample. Perhaps the non-random and limited nature of the subject pool of this study is the source of the higher rates, but the situation is worthy of further attention.

##### *BMI-for-Age Percentile*

As was anticipated, gender had no bearing on the BMI-for-age percentile of subjects, but ethnicity did. Several studies of prevalence rates of overweight and obesity have reported that ethnic minorities tend to have greater rates of overweight than the majority population (Ogden et al., 2002; Strauss & Pollack, 2001, Dwyer et al., 2000; Wang, 2001). The finding that there were significant differences in levels of overweight only between the minority groups (Black/African-American and Latino) and the majority group (White/Caucasian), but not between the two minorities or between any of the groups and the “Other” category, is not surprising. Other researchers (Strauss & Pollack, 2001; Ogden et al., 2002) have found similar results for the split between minority and majority groups. The “Other” category for this study was too diverse, including self-identified American Indian/Alaskan, Asian, and Other students, to be delineated in terms of characteristic body weight in a meaningful way.

It is important to note that BMI-for-age percentiles do not take into account the stage of development of an individual. Puberty is a time of great change, both in terms of body size and body composition (Dwyer et al., 2000). In the United States, studies have shown that Black girls mature sexually at younger ages than white girls (Freedman et al., 2002). Additionally, researchers have found that this early development, usually signified by early menarche, is associated with increased risk of health problems, including obesity (Freedman et al., 2002). The ordering of these events, and the cause-and-effect relationships between ethnicity, body weight and size, and stage of pubertal development have not yet been delineated. Further research will be required before definite conclusions can be drawn.

### *Body Image*

The findings related to body image were also within expectation. Gender, ethnic group, waist circumference, and BMI-for-age percentile all contributed significantly to the Body Image Factor score. Leonhard & Barry (1998) and Collins (1991) found gender differences in the figure selections and discrepancy scores that were the basis of their body image tests. Collins (1991) found that females made thinner “ideal” figure selections than males. Altabe (1998) found differences in body image disturbances between ethnic groups, with Caucasian and Hispanic-American subjects demonstrating greater disturbance than the African-American and Asian-American subjects.

Within this study, waist circumference and BMI-for-age percentile were highly correlated with body image (0.716,  $p=0.000$ ). That the magnitude of either would affect body image is not surprising, as body image dissatisfaction is related to obesity (Duncan et al., 2002).

An interesting theoretical disjoint can be seen in the body image data: Although body weights were much higher than expected, body image scores were also fairly positive. The implications of these two findings are unknown, and beg the question of whether it is better or worse to maintain a positive body image while being overweight or obese.

The Collins (1991) figure scale had been selected for the standard against which the novel scale would be tested because it had been rigorously studied in previous research. The finding that the discrepancy score (Collins Body Image score) would associate with the Body

Image Factor score was expected. The finding that the discrepancy score of the novel scale was significantly associated with both the Collins Body Image score and the Body Image Factor score demonstrates that the scale holds promise as an operational tool.

Body image is an amorphous concept, difficult to either define or measure in concrete terms. Although both of the types of body image assessments used in this study (McKnight questions and discrepancy scores) purport to measure “body image”, it is difficult to distinguish the relative impacts of the emotional feelings one has regarding oneself physically, and a subject’s ability to accurately assess his or her body size.

### *Scale Design Parameters*

The survey instrument contained two similar yet distinct questions, both attempting to determine the optimum figure format and stance for future body figure scales: Which figure do you like best, and, which looks most like you. Although two questions were asked, only one is truly relevant: Which looks most like you? The first question was included mainly to force subjects to think about the difference between those two questions, and be clear in the distinction when answering the second.

One of the overarching goals of this project was to discern the design parameters necessary for the creation of a figure scale that provides optimal identification by the subject with one of the figures on the scale. Patt et al. (2002) found among urban black women that a lack of identification with the figures of a scale can cause some distress among the test subjects. Studying a similar audience, Anderson et al. (1997) found that a new scale needed to be devised for the subject participants to find relevance in their available choices. No similar study had been run among minority or multi-ethnic populations of pre-adolescents to determine their preferences for various scale characteristics.

Although researchers in this study were unable to assess the effects of design parameters (scale format, figure stance) on actual choice of figure, they were able to gather information on preference for, and identification with, the parameters. Overall, the colored line-drawing was the favorite format. However, the photographic format was picked as the one with which most subjects could identify. For stance, the figure shown at the three-

quarters stance with arms at side was both the favorite choice, and the stance with which most subjects could identify.

However, gender and ethnic group were significantly related to both the preference for, and identification with, the format, and preference for stance was related to gender. Visual examination of the tallied subject choices for preference and identification (by ethnic and gender groups), revealed mixed preferences among the groups. (Please refer to Table 4.3.) Females seemed to have a much stronger identification with the photographic format, then did males (who identified with the colored line-drawing format). Traditional ethnic minorities best related with the photographic format; the traditional majority group and the Others reported identifying with the colored line-drawing format. With regard to stance, the preferences were even less clear. Further study, especially with a larger and more ethnically diverse population, may be necessary before sub-population preferences can be defined with any certainty.

#### *“Ideal” and “Self” Figure Selections*

When asked to choose an “ideal” figure from each of the Collins and novel scales, most subjects picked one of the center three figures (86.5% for the Collins scale; 68.5% for the novel scale). However, the novel scale showed a greater diversity of answers. Using the Collins scale, no subject chose the heaviest figure as their ideal, two subjects selected the second-heaviest figure; conversely, two subjects chose the thinnest figure as their ideal, and three subjects indicated the second-thinnest. Using the novel scale, three subjects chose the heaviest figure, four chose the second-heaviest figure, eight chose the thinnest, and 13 picked the second-thinnest figure as their ideal. Although it is impossible to be certain, the greater diversity of choices may have resulted from the finer granularity between the scale figures in the novel scale. It is also possible that the format of the novel scale – depicting both front and side views of each figure – contributed to the more diverse range of selections.

Statistical analyses revealed that “ideal” figure choice for both scales was unrelated to gender, age, or ethnic group. This finding is interesting as Collins (1991) had previously found that black subjects chose significantly heavier ideal figures than whites. More study, especially with a larger and more diverse group of subjects, may be necessary.

When subjects were asked to choose the figure that “looks most like you”, again the center three choices were the most popular (85% for the Collins scale; 88% for the novel scale). For both the Collins and novel scales, “self” figure choice was associated with BMI-for-age percentile and Body Image Factor, the BMI-for-age percentile being the better predictor of figure choice. This finding lends credence to the idea of being able to use body figure scales for rapid, if rough, assessment of overweight and obesity.

Both gender and ethnic group significantly impacted the “self” figure choice using the novel scale, but not the Collins scale. This means that, using the novel scale it was possible to visualize a trend that the Collins scale could not show – an ethnic group-based difference in the mean self-identified figure choices. Without further study, especially into the factors that contribute to this finding, it is impossible to draw conclusions beyond what has already been stated. However, these findings strongly warrant further study.

### *Acculturation*

The original target audience of this study was Latino and Hispanic children. Though only 27 subjects identified themselves as being of this ethnic group, the subject pool was large enough to analyze the effects of acculturation. There was a significant relationship between the Acculturation Factor and BMI-for-age percentile. Also, post hoc analysis showed that acculturation had an impact on figure format preference. Greater acculturation (associated with a greater use of English when speaking with family and friends) was associated with a preference for photographic rather than uncolored line-drawing format. These differences, especially when combined with the high rate of overweight and obesity among minority populations, highlight the need for further research with Latino populations.

## **Limitations**

### *Recruiting Issues*

Selection bias was easily the most profound limitation of this study. Conducting the study within the public school system offered advantages and disadvantages. The majority of children attend public schools. Elementary schools are an excellent way to reach a cross-section of American children, as a captive audience. Unfortunately, operating through the

school system necessarily adds layers of bureaucracy. Each layer of bureaucracy adds another screening-point at which access to a group of subjects may be denied.

This study gained access to fewer subjects than expected. Several county and school administrators declined to participate outright. In some counties there was an extra layer of bureaucracy in the form of Research Approval Committees (evaluation and screening boards that reviewed all research projects before granting county-wide access) who could vote to make changes in, or deny access for, any study. Many schools within the accepting counties declined to participate in the study, citing a variety of reasons from an unusually busy spring schedule to sensitivity and liability concerns. The majority of subjects within participating schools did not, for one reason or another, return permission forms. In the end, only a small percent of the potential subject pool ended up participating. This small group may not accurately represent the entire population of interest.

Gaining school participation proved to be one of the most challenging segments of this project. A number of factors worked against the late-spring and early-summer scheduling of testing sessions including regularly scheduled, state-mandated Standards of Learning (SOL) exams, and an overbooked school calendar. The 2002-2003 school year was an especially difficult one as all of the outdoor activities normally held in the Fall had been rescheduled for Spring due to safety concerns surrounding the D.C. sniper incidents. Additionally complicating matters were the heavy snowfalls that closed Virginia schools for parts of the winter, forcing rescheduling of SOLs and other activities. Many schools simply felt that taking any time for testing would disrupt their precarious schedules.

Other factors may have played a role in the reluctance of both county and school administrators to participate in this study. Northern Virginia is more than 200 miles from the home university of the researchers. Although the researchers traveled frequently to the test areas and met repeatedly with the school administrators, the lack of local and well-known researchers and support staff may have had a negative impact on participation rates. Additionally, some larger studies have significant monetary incentives built into their funding structures. These incentives, paid to schools and school administrators, are designed to entice reluctant principals into participating – and are used to contractually guarantee the

participation of X% of the student body. Without such incentives, it may have been difficult for this study to compete for the attentions of schools.

The nature of this study makes it a sensitive one. Overweight and obesity, while certainly common, have strong social stigmas. Some school administrators expressed concern about the nature and sensitivity of the protocol. Likewise, some parents may have been reluctant to allow their children to be weighed or otherwise measured anthropometrically. Despite our assurances of anonymity of the schools and students, and the confidentiality of the data, some parents may still have been afraid that the results would eventually be made public and embarrass the child.

Because of these influences, our sample may have been biased against the extremes in weight (underweight or overweight) as these children may have been less likely to willingly participate in a study about weight. Also, with an incentive of free jump ropes – and at least one subject openly admitted that he participated only because he wanted a free rope – we may have attracted a more athletic portion of the population.

On the other hand, as this study was conducted during (in lieu of) the regularly scheduled gym classes, some of the less athletically inclined students may have found participating in this study to be the lesser of the two evils. Until government-authorized, mandatory surveys are conducted, it will be impossible to know the true biases found within this study's sample.

Ethical human research requires the stricter standard of active consent, rather than passive consent. Students who did not return a signed parental permission form were not allowed to participate. Elementary school children are notoriously forgetful when it comes to bringing notes home or to school, much less having to bring a single sheet of paper home and then back to school. Despite repeated reminders from teachers and administrators, notification posters that were hung in classrooms, and other efforts, the return rate for permission forms was very low. Our sample may have an unrepresentative number of responsible kids, or children with very involved parents.

Schools were recruited outside of the initial screening criteria after the “short list” of possibilities was exhausted. The initial screening pool was considered to be of sufficient size, until it became clear how many localities and schools declined participation. At that

point, it became necessary to cast the net wider within localities that would allow us access. Although all the tested school were highly multi-ethnic, had large Latino populations, and met the vulnerability criteria (with 50% or more of the students qualifying for the free or reduced price lunch program), not all of them were part of the initial culling.

### *Test Development Issues*

Due to difficulties in recruiting, picture pages were developed based on only one subject of each gender. Although both the male and female subjects were Latino, their individual body shapes (due to ethnicity, individual genetic make-up, or other physical uniqueness) may not represent the body conformations of other or different Latinos. Other nationalities or ethnicities may have difficulty in identifying with the body shapes of these subjects. Furthermore, the male subject was actually younger by one year than the target population. This may have an impact on the tested subjects' ability to choose an accurate representation of their own bodies.

Although the photographic subjects who became the basis of the picture page were from the Roanoke Valley area, preference testing was conducted in northern Virginia. It is possible that the subjects found in southwestern Virginia were dissimilar to the subjects of northern Virginia in terms of physical morphology or appearance, and that this had some level of impact. However, since only one Latino subject of each gender was the basis of each picture page, facial and identifying characteristics were obscured, the subject pool in the data collection phase was highly diverse, this is unlikely.

The picture page scales were created partially by computer and partially by hand. Although the different figures were created by drawing sequentially larger and smaller figures from the real subject's body outline, the variations between figures in the novel scale were non-standard and based on aesthetic value of the artist. Gardener, Friedman, and Jackson (1998) reviewed a number of methodological concerns of body figure scales. One of their major criticisms was the non-standard increase of figure size along the scale, and the lack of research-based evidence supporting the level and type of body-part size increase. Although the novel scale developed for this study has not attempted to overcome these criticisms, it is no worse than any of the other reviewed scales.

The color choices for the colorized figures were those of the artist. These choices may have had unexpected consequences when it came time for the subjects to choose a favorite format for the scale. At least one female subject chose the colorized format because “Purple is my favorite color”.

Due to constraints of printing space, the Collins (1991) and novel figure scales were printed much smaller than usual test figures. Typical body figure scales measure up to several inches tall (Leonhard & Barry, 1998; Williamson & Delin, 2000); the figures tested in this project were only between 3 and 7 centimeters tall. Additionally, the novel scale showed two views of each figure (frontal and profile) while the Collins scale had only single figures. The extra views, combined with printing issues that gave the illusion of the male figures being drawn with slightly thicker lines, may have contributed to both random and consistent errors in usage. Although these factors may have caused some difficulties in use of the scale, the size of the Collins and novel scale figures were identical in this test, and differences in their findings in this study should be due only to the scales themselves rather than their size or format. Additionally, no subject ever mentioned that the scale figures were difficult to see or distinguish from each other.

The questionnaire was created, where possible, using previously tested questions of known reliability and validity. However, not all questions came from pre-tested surveys, and those that did were removed from their original contexts. For the acculturation and body image questions, only a few of the original questions were selected for use, and they were, by necessity, not scored in the same manner. However, the gains of having a shorter questionnaire (and keeping subject’s attention), the use of principal component analysis, and careful selection of statistical tests should offset the negative aspects.

During the analysis phase of the project, it became clear that the CDC growth chart information was coded in months, but the survey instrument asked only for each subject’s age in years. For purposes of analysis, each subject was assumed to be (12 x reported age in years + 6.5) months. This formula was used on the assumption that there was an even distribution of ages (in months) throughout the year. However, since testing took place only at the end of a school year, this may not have been a valid assumption. It is possible that this

assumption played some role in the finding that age had no significant bearing on any of the tested variables.

The questionnaire required refinement after the initial round of testing. Mistakes in numbering and a missing word were discovered and corrected for the following testing sessions. It was later decided that the question with the missing word needed to be excluded from analysis because of the chance of misinterpretation and error.

The final set of test development concerns regard what was *not* included in the questionnaire. During final analysis, it became clear that several key questions had been neglected, including: Do you like the idea of a body figure scale?, which (novel or Collins) body figure scale do you like best?, and which body figure scale do you think looks most like you? A follow-up study of these issues might allow for greater preference determination.

### *Testing Issues*

As with all surveyed data, the findings of this study are dependent on the accuracy of self-report. It is possible that questions were misunderstood or not read clearly, that answers were accidentally or deliberately incorrect, or that mistakes were made in filling out the response sheets. In order to offset accidental replies, each data sheet was evaluated when the subject turned it in to the researchers. Researchers returned data sheets for corrections if: too many or too few questions were answered, more than one response was given for a question, or if the answers indicated by the scantron were different than those indicated by the subject when they were verbal queried on random choices.

Some children were unfamiliar with the testing format (scantron), word choice of the questionnaire (“ethnicity”, “scale”), and use of figural models. Literacy issues may have played a part in some of the difficulties. Although researchers were concerned about adding prejudice to any one answer, some subjects persistently claimed to not understand the questions and were able to complete the survey only when the researchers read the questions one by one and assisted them in finding which corresponding choice to “bubble” on the scantron.

All researchers had been trained to be sensitive to accidentally influencing the subjects. Standard responses and replies were developed for the most common questions and

concerns. For example, children concerned about giving a “wrong” answer were told, “There are no right or wrong answers to these questions.”

The use of the term “scale” was an issue. When subjects questioned its meaning, researchers re-defined the term as “picture” (i.e. “Which picture do you like best?”). Finally, some students did not like any of the available choices when asked to pick a favorite scale for format or stance. They needed verbal prompting to “Do the best you can”.

The term “ethnicity” was a stand-out problem. Several children, visibly of one ethnicity, chose an inappropriate answer because it was the ethnicity they wanted to be, or because they did not fully understand the options. One male subject indicated he was “Native American” because he was “1/12<sup>th</sup> Indian” (sic), rather than choosing to represent his majority heritage. One female subject explained her decision to mark the “Other” option by stating that she was a Virginian. Another student, perhaps a byproduct of these patriotic times, felt that, while her parents were “Spanish”, she was “American”.

Other researchers (Serrano & Anderson, 2003) have also noted similar difficulties. Perhaps these could be avoided in the future by following the protocol of Duncan and colleagues (2002) and gathering participants’ ethnicity data from school records.

Cross-contamination of subjects may have affected the results of this study. Despite verbal instructions from researchers to remain seated separately and answer questions individually, subjects routinely conversed with each other. The protocol was adjusted to better regulate the amount of room subjects spaced between themselves (papers were set out in lines on the floor of the gym, rather than allowing students to select workspace for themselves), but this was not enough to stop all of the conversational whispering between neighbors.

Two researchers were responsible for the collection of height, weight, and waist circumference data. Although the researchers were trained for accurate and consistent measurement, and although the equipment was as closely matched and maintained as possible, discrepancies may have occurred in testing secondary to human error.

## **Recommendations for Future Research**

The strongest conclusion that can be drawn from the results of this study is that further research is warranted. A number of small and large protocol changes, and new research directions, have been suggested by this study's findings, including administering the same protocol with different, larger, and more varied populations, testing an extended protocol with figure scales targeting different sub-populations, and creating a more research- and evidence-based figure scale.

The subject pool of this study was ethnically diverse, but from a small geographical location in an urban area. It was also too small. Follow-up studies with larger and more diverse populations, including subjects from rural and disparate areas, would greatly increase the relevance of the findings. Studies examining different age groups of subjects, ranging from children to teenagers and young adults, would also be important.

The protocol could be varied in a number of important ways. First, the preference questions (i.e. do you like body figure scales, which do you prefer) could be added on. Second, full scales (depicting all seven figures) could be developed in the different formats (photograph, silhouette, etc.) to see if subjects really can make more accurate "self" figure choices given their preferred format of scale. Finally, more figures could be added to the scales to increase the range of choices to nine.

This study followed the examples of Stunkard et al. (1983) and Collins (1991) in constructing a seven figure scale. Others have attempted to produce the fine granularity called for by Gardner and colleagues (1998) by adding additional figures. McElhone et al. (1999) and Sanchez-Villegas et al. (2001) each developed scales with nine figures. Williamson et al. (2000) developed an 18 figure scale. These large-number figures scales also beg a follow-up study as to the optimum number of figures a scale should have. What number would achieve adequately fine granularity without overwhelming the subject with figure options?

Even more important would be a research study that builds and tests a figure scale that assesses body fatness using a solid scientific foundation. There are a number of methodological strategies, used singularly or in concert, which could add a more rigorous basis to the scale figures. One, the scale could be based upon photographs of subjects of

known and ranked BMIs. Two, the photographic subjects could be assigned to a place in the scale based on body fatness (obtained via DXA scanning or underwater weighing of the subjects). Three, more than one subject of a certain BMI or body fatness could be used as the basis for a figure on the scale. For this option, the photographs of several subjects of a given BMI/body fatness category might be digitally summed, or “morphed” into a single figure that represents that category. This morphing of a number of similarly ranked subjects would eliminate the concerns that the inter-figure variations along the length of the scale were not realistic, or that the unique characteristics of one person might not be relevant to others. If a mix of persons with high BMIs due both high-fat and high-muscle were used in the morphing process, it might address the valid concerns of where athletic figures fit into these scales.

### **Study Benefits**

Despite the limitations discussed above, and the laundry list of future research considerations, the findings of this study still add important details to our incomplete understanding of figure rating scales, body image, and pre-adolescent health. A number of the research questions, including those of preference for format and stance, were previously untested with any population. The novel scale is, to our knowledge, the first developed for use with minority or multi-ethnic pre-adolescent populations. It is also, to our knowledge, the first scale developed using two views – frontal and side – of each figure. The finding that the novel scale is able to detect inter-ethnic group mean “self” figure differences should encourage further study and scale development, especially for the previously underserved yet vulnerable minority youth populations. The data collected on BMI, waist circumference, and BMI-for-age percentile will fill an informational void, and perhaps provide a basis for future funding, research, and educational outreach programs.

Although the protocol was far from flawless, this study was able to implement a few of the suggestions made by Gardner et al. (1998) in their critical review of the methodologies of body figure scale testing. Rather than lining the figures up across the page from heaviest to thinnest, the figures were placed in a random order. The figures of the Collins and novel scales were also deliberately placed in different orders, forcing the subjects to consider the figures themselves rather than simply noting their place within the line-up.

Care was also taken in constructing the figures to answer Gardner and colleagues' (1998) concerns of figure "coarseness". In two of the reviewed studies, Gardner and colleagues found that only a few (~3) of the figures accounted for the vast bulk of the selections (85% in one study). They purported that this narrow range of typical choices might inflate the reported test-retest reliability. The 85% estimate of figure choices grouping in the center three figures does hold true for both scales when the subjects were asked to select a "self" figure, but the novel scale had a smaller clustering of answers (68.5%) when subjects were asked to identify an "ideal" figure. Perhaps the finer granulation of the figures will indeed lead for more accurate findings of "self" and "ideal" figure selections.

## **Conclusions**

The last and best contribution of this study is that it may increase interest in, and research regarding, the use of body figure scales for rapid assessment of overweight and obesity. Rates of these conditions continue to rise. Consistent evaluation of incidence and prevalence rates of overweight and obesity across age and ethnic groups may be necessary to help identify a critical timeframe in development where resources and education can be targeted to keep childhood overweight from either developing or evolving into adult overweight and concurrent health problems.

Unfortunately, persistent evaluation of BMI is an expensive and time-consuming proposition. The least expensive scientific-caliber scale that this study could purchase cost approximately \$200. The equipment was cumbersome to carry from site to site, required recalibration at every location, and necessitated lengthy training of the weight-assessment staff. Subjects required individual time and attention for assessment. A myriad of privacy and sensitivity issues needed to be addressed within the protocol, and even then many people expressed liability concerns.

If there were an inexpensive, simple, and flexible method of assessment, government and school administrators might be more likely to endorse periodic screenings. A research-based, accurate and precise body figure scale developed for multi-ethnic populations might be a tremendous resource. Body figure scales require few supplies, little money, and far less training to use. This project used self-assessment techniques, but previous research has

demonstrated that third-party assessments, which could be performed by physical education teachers or nurses during the regularly scheduled gym classes, are more effective (Sherman, Iacono, & Donnelly, 1995). Even if the results gave rough estimates of overweight and obesity within a population – rather than allowing individual diagnosis – body figure scales might be able to provide critically needed information on childhood overweight and obesity.

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**Appendix A**  
**Virginia Tech Institutional Review Board Letter for #02-504**



**Institutional Review Board**

Dr. David M. Moore  
IRB (Human Subjects) Chair  
Assistant Vice Provost for Research Compliance  
CVM Phase II - Duckpond Dr., Blacksburg, VA 24061-0442  
Office: 540/231-4991; FAX: 540/231-6033  
e-mail: moored@vt.edu

18 October 2002

**MEMORANDUM**

**TO:** Elena Serrano HNFE 0430  
Kathryn Branstad HNFE 0430

**FROM:** David M. Moore 

**SUBJECT:** Expedited Approval – “Assessing the prevalence of childhood obesity among Latino and non-Latino Families in Virginia” – IRB # 02-504

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective October 17, 2002.

Approval of your research by the IRB provides the appropriate review as required by federal and state laws regarding human subject research. It is your responsibility to report to the IRB any adverse reactions that can be attributed to this study.

To continue the project past the 12 month approval period, a continuing review application must be submitted (30) days prior to the anniversary of the original approval date and a summary of the project to date must be provided. My office will send you a reminder of this (60) days prior to the anniversary date.

cc:File  
Department Reviewer: William G. Herbert HNFE 0351  
OSP 0170

**Appendix B**  
**Virginia Tech Institutional Review Board Letter for # 02-564**



**Institutional Review Board**

Dr. David M. Moore  
IRB (Human Subjects) Chair  
Assistant Vice Provost for Research Compliance  
CVM Phase II - Duckpond Dr., Blacksburg, VA 24061-0442  
Office: 540/231-4991; FAX: 540/231-6033  
e-mail: moored@vt.edu

13 November 2002

**MEMORANDUM**

**TO:** Elena Serrano HNFE 0430  
Kathryn Branstad HNFE 0430

**FROM:** David M. Moore 

**SUBJECT:** **Expedited Approval** – “Development of a Body Assessment Scale” –  
IRB # 02-564

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective November 13, 2002.

Approval of your research by the IRB provides the appropriate review as required by federal and state laws regarding human subject research. It is your responsibility to report to the IRB any adverse reactions that can be attributed to this study.

To continue the project past the 12 month approval period, a continuing review application must be submitted (30) days prior to the anniversary of the original approval date and a summary of the project to date must be provided. My office will send you a reminder of this (60) days prior to the anniversary date.

cc:File  
Department Reviewer: Robert Grange HNFE 0430  
OSP 0170

## Virginia Tech Research Study

We are looking for Latino girls and boys between 8 and 12 years old (born between 1990 and 1994) to be part of a research project. We are developing a scale to assess body image.

Children would receive a 10\$ gift certificate to Walmart and a leotard (for girls) or soccer shorts (for boys).

It will take about 20 minutes. For more information, please call Dr. Elena Serrano at the Virginia Tech Department of Human Nutrition, Foods, and Exercise at (540) 231-3464.

IRB Approval 02-564

## Proyecto de Investigaciones Virginia Tech

Buscamos a *niños y niñas Hispanos entre 8 y 12 años* (nacido entre 1990 y 1994) para participar en un proyecto de investigaciones. El objetivo del proyecto es desarrollar una escala para medir el tamaño de cuerpo.

Se requiere solamente 20 minutos. Si participe, su niño recibe un carta credito vale **\$10** por Wal-Mart y un traje de ejercicio.

Por más información, llame a Dra. Elena Serrano, Departamento de Nutrición Humana, Alimentos, y la Actividad Física, Virginia Tech, (540) 231-3464.

Gracias!

## CHILD'S ASSENT FORM

Title of Project: Development of a Body Assessment Scale (02-564)

**MY NAME IS ELENA SERRANO. I AM A TEACHER AT VIRGINIA TECH. I AM ASKING IF YOU WOULD BE WILLING TO PARTICIPATE IN A RESEARCH PROJECT. YOU WILL BE MEASURED FOR HEIGHT, WEIGHT, AND WAIST CIRCUMFERENCE. AFTER THAT, YOU WILL CHANGE INTO CLOTHES WE PROVIDE TO YOU. THEN YOU WILL HAVE PHOTOS TAKEN.**

**THE TESTING SESSION SHOULD TAKE ABOUT 10 MINUTES TO COMPLETE. YOU WILL RECEIVE A SMALL GIFT WORTH \$10 FOR PARTICIPATING IN THIS ASSESSMENT.**

**THERE SHOULD BE NO RISK FOR PARTICIPATING. THERE ARE ALSO NO BENEFITS. YOUR NAME WILL NOT BE ASSOCIATED WITH THE PHOTOS AT ALL. THEY WILL BE USED FOR RESEARCH PURPOSES ONLY.**

**IF YOU DON'T WANT TO, YOU DON'T HAVE TO PARTICIPATE. IF YOU WANT TO PARTICIPATE, PLEASE WRITE YOUR NAME BELOW ALONG WITH THE DATE. THANK YOU!**

**NAME:** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

Appendix F  
Child's Assent Form for Photographic Subject - Spanish

## CONSENTIMIENTO INFORMADO DEL HIJO

Titulo de Proyecto: Desarrollo de una Escala para Medir el Tamaño de  
Cuerpo (02-564)  
(Development of a Body Assessment Scale)

**MI NOMBRE ES ELENA SERRANO. SOY UNA PROFESORA EN VIRGINIA TECH. YOU ESTOY PREGUNTANDO, SI TÚ QUIERES PARTICIPAR EN UN PROYECTO DE INVESTIGACIONES. TU ALTURA, PESO Y CIRCUNFERENCIA DE LA CINTURA SERÁN MEDIDOS/TALLADOS. TAMBIEN TOMAMOS FOTOS DE TÍ.**

**SE DURA CERCA DE 10 MINUTOS PARA COMPLETAR TODO. TÚ RECIBIRÁS UN REGALO PEQUEÑO VALE \$10 PARA PARTICIPAR EN ESTA INVESTIGACIÓN.**

**NO DEBE SER RIESGO EN PARTICIPAR NI BENEFICIOS. TU NOMBRE NO HARÁ ASOCIADO CON LAS FOTOS. LAS FOTOS SERÁN UTILIZADOS SOLAMENTE PARA PROPOSITOS DE LA INVESTIGACIÓN.**

**SI TÚ NO QUIERES, NO TIENES QUE PARTICIPAR EN ESTA INVESTIGACIÓN. SI TÚ QUIERES PARTICIPAR, FAVOR DE ESCRIBIR TU NOMBRE Y LA FECHA ABAJO. ¡GRACIAS!**

**NOMBRE:** \_\_\_\_\_

**FIRMA:** \_\_\_\_\_

**FECHA:** \_\_\_\_\_

**Appendix G**  
**Parental Permission Form for Photographic Subjects – English**

**Parental Permission Form for  
Research Projects Involving Human Subjects**

Title of Project: Development of a Body Assessment Scale (02-564)

Investigator: Elena Serrano, Ph.D.

Co-PI: Kathryn Branstad, MS student

**I. Purpose of this Research/Project**

This study will help us determine the preferences of pre-adolescents for the design elements of a novel body assessment scale. The results will be used to assess under-weight and over-weight, as well as overall body image.

**II. Procedures**

A total of 25 children – boys and girls between the ages of 8 and 12 -- will participate in the study. Each child (pre-adolescent) will participate in a 10-minute single session assessment period. This will be conducted at a community agency or in your home. Each participant will be measured for height, weight, and waist circumference using appropriate techniques and technologies. Participants will then be asked to change into a gender-appropriate outfit (either a dance leotard or soccer shorts and t-shirts; provided by researchers) in a bathroom or private area. Afterwards, they will stand for several photographs against a neutral backdrop (provided by researchers). Photographs will include full body-length pictures including views at front, side, and three-quarters stance with arms at side and raised slightly (a total of no more than 6 photographs for each child). Two researchers will be present at all times to do the assessment. You, as the parent, are encouraged to be present when the assessments are conducted at a community agency or location (such as school). Your presence will be required, if the assessments are conducted at your home.

**III. Risks**

There are no known risks associated with this project.

**IV. Benefits**

There are no direct benefits for participating in this study. The results will help us develop body assessment scales that will be used to determine underweight and overweight, as well as potential disordered body images. Ultimately, the results will help us determine which design version of the scale to pursue into full development. No promise or guarantee of benefits has been made to your child to encourage him/her to participate.

**V. Extent of Anonymity and Confidentiality**

Every attempt will be made to ensure confidentiality and anonymity. We will assign a

user number to each child, which will take the place of their name for all data collected. The key relating names and identification numbers will be kept in a secure location to ensure confidentiality. Photographs will be developed professionally by the Digital Imaging Center at Virginia Tech campus. The resulting photographs will have identifying facial features deliberately obscured by a graphic artist before they are used for research purposes. The original photographs and negatives will be kept in a secure location. Only researchers will have access to the original photographs and negatives.

## **VI. Compensation**

Each child will receive a small gift certificate, worth \$10, as compensation.

## **VII. Freedom to Withdraw**

Your child is free to withdraw from the study at any time. If a child decides to withdraw they can also ask that their photo be destroyed.

## **VIII. Approval of Research**

As required, this research project has been approved by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, by the Department of Human Nutrition, Foods, and Exercise.

November 13, 2002  
IRB Approval Date

## **IX. Subject's Responsibilities**

I voluntarily agree to have my child participate in this study. My child has the following responsibilities:

- participate in assessment of height, weight, and waist circumference
- be photographed in an appropriate outfit against a neutral background

## **X. Parent's Permission**

I have read and understand the Informed Consent *Form* and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for my child:

\_\_\_\_\_  
Print child's name

\_\_\_\_\_  
Parent's name

\_\_\_\_\_  
Parent's signature

\_\_\_\_\_  
Date

Should I have any pertinent questions regarding this research or its conduct, the research subjects' rights, or whom to contact in the event of a research-related injury to the subject, I may contact:

Elena Serrano, Ph.D.  
Investigator

540.231.3464/serrano@vt.edu  
Telephone/e-mail

Michael Houston, Ph.D.  
Department Reviewer

540.231.4672  
Telephone/e-mail

David Moore  
Chair, IRB  
Office of Research Compliance, Research & Graduate Studies

540.231-4991/moored@vt.edu  
Telephone/e-mail

## Appendix H Parental Permission Form for Photographic Subjects – Spanish

### Consentimiento de Padres para una Investigación Usando Sujetos Humanos

Título de Proyecto: Desarrollo de una Escala para Medir el Tamaño de Cuerpo (02-564)  
(Development of a Body Assessment Scale)

Investigadora Principal: Elena Serrano, Ph.D.  
Co-Investigadora: Kathryn Branstad, MS estudiante



#### **I. Propósito del Proyecto**

Este estudio nos ayudará desarrollar una esacala para medir el tamaño de cuerpo.

#### **II. Procedimientos**

En total, 25 niños y niñas entre 8 y 12 años participarán en este studio. Se requiere 10 minutos participar en el estudio. Se puede hacerlo en una agencia, escuela, or en su casa. La altura, peso, y circunferencia de la cintura de su nino serán medidos/talladas. Despues, tiene que cambiar la ropa en un cuarto o area privado (sin las investigadoras). Le proveemos traje de ejercicio para llevar. Tomamos seis fotos en total de él/ella. Dos investigadoras están allí para hacer el examen. Cuando lo hace en una agencia o escuela, recomendamos que Ud. está allí. Si lo hace en su casa, Ud. tiene que ser a casa.

#### **III. Riesgos**

No hay riesgos reconocidos con este proyecto.

#### **IV. Beneficios**

No hay beneficios directos que se gana participando en este studio. Los resultados nos ayudarán desarrollar una escala para determinar bajo y sobre peso. No hay promiso ni garantía de beneficios para animarle a su niño(a) participar en este studio.

#### **V. Anonimidad y Confidencialidad**

Vamos a tratar de asegurar su confidencialidad. Todas respuestas y información serán guardadas anónimas y confidenciales. Le asignaremos un número de identificación. Este número será usado en el cuestionario. El número de identificación será guardado en un lugar seguro, asegurando la confidencialidad. Las fotos serán reveladas por la Universidad. No se puede reconocer su hijo(a) en las fotos finales en la escala. Los negativos tambien serán guardado en un lugar seguro. Solo las investigadores serán aceso a las fotos y negativos.

#### **VI. Compensación**

Cada niño recibe un regalo vale \$10 (por Wal-Mart) para participar en esta investigación.

## VII. Retirar de la Investigación

Su niño puede retirar del estudio a cualquier momento. Si quiere retirar, también puede pedir que las fotos sean destruídos.

## VIII. Aprobación del Estudio

Este estudio ha sido aprobado, como se requiere, por el Comite Institucional de Investigaciones con Sujetos Humanos (IRB) de la Universidad del Estado de Virginia y el Instituto Politecnico (Virginia Tech), y el Departamento de Nutrición Humana, Alimentos, y la Actividad Física (Dept. of Human Nutrition, Foods, and Exercise).

El 13 de Noviembre, 2002 \_\_\_\_\_  
IRB Fecha Approval Date

## IX. Permiso del Padre de Participante

Yo doy permiso a mi hijo participar en este studio. Mi hijo(a) tiene las responsabilides siguientes:

- El medir/tallar de su altura, peso y circunferencia de la cintura
- El tomar de fotos en traje de ejercicio

## X. Firma del Padre de Participante

Leí y entiendo el consentimiento y las condiciones de este proyecto. No tengo ninguna pregunta. Reconozco que he leído y entiendo la información exponida y firmo voluntariamente por mi hijo(a):

\_\_\_\_\_  
Nombre de Niño

\_\_\_\_\_  
Nombre de Padre

\_\_\_\_\_  
Firma de Padre

\_\_\_\_\_  
Fecha

Si tengo preguntas sobre el estudio, como retirar del estudio, los derechos de los participantes, y con quien se debe ponerse en contacto si hay herida a causa del estudio, puedo llamar a:

Elena Serrano, Ph.D.  
Investigadora

540.231.3464/serrano@vt.edu  
Teléfono/e-mail

Michael Houston, Ph.D.  
Director, Departamento

540.231.4672/houstonm@vt.edu  
Teléfono/e-mail

David Moore  
Director, IRB  
Oficina de Investigaciones (Office of Research Compliance),  
Research & Graduate Studies

540.231-4991/moored@vt.edu  
Teléfono/e-mail

**Appendix I**  
**Photographic Subject Data Sheet**

Identification #:

Child's Name: \_\_\_\_\_

Parent/Guardian's Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

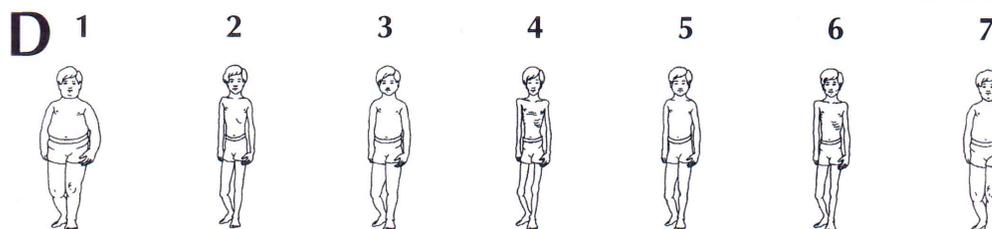
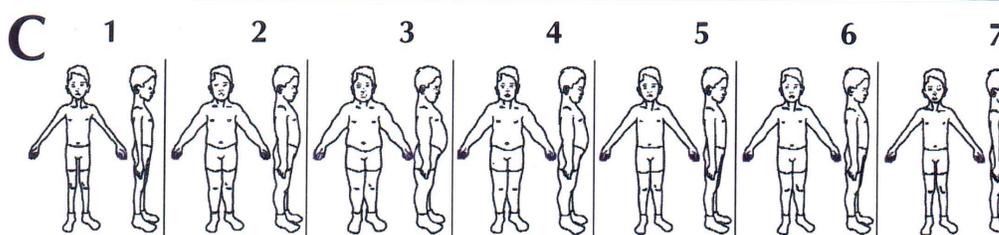
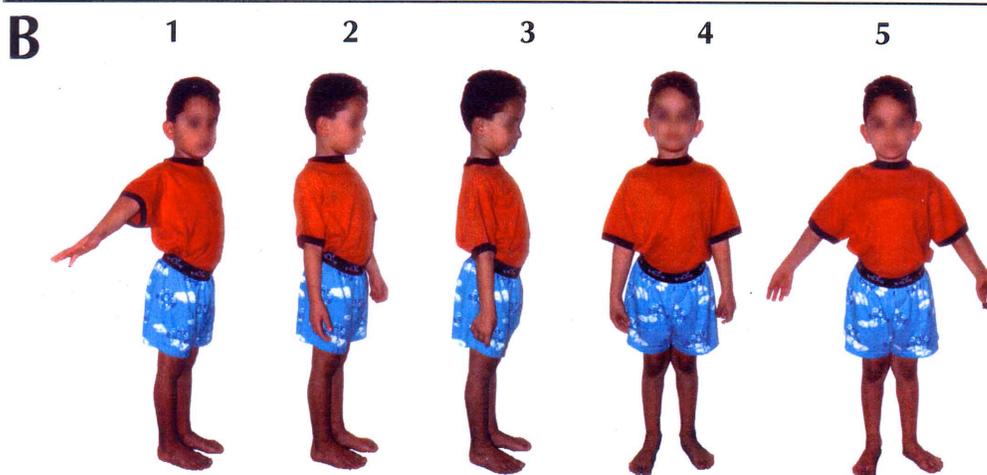
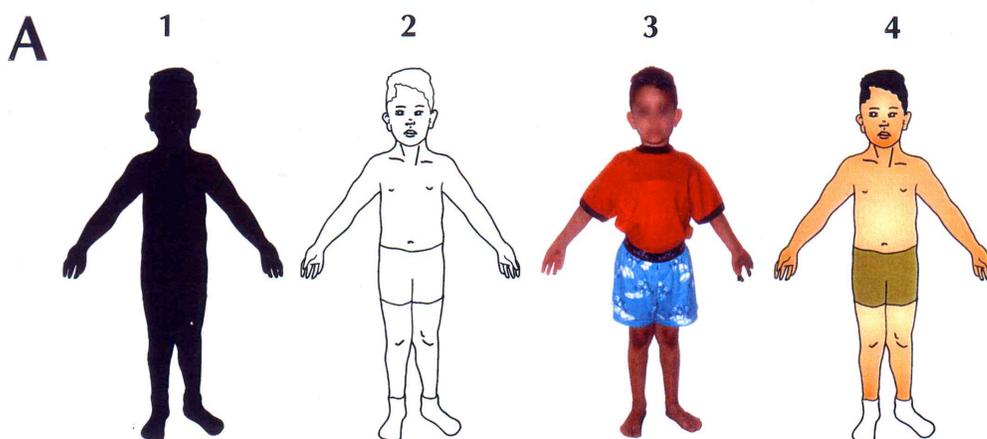
Telephone Number: \_\_\_\_\_

Child's Permission Form

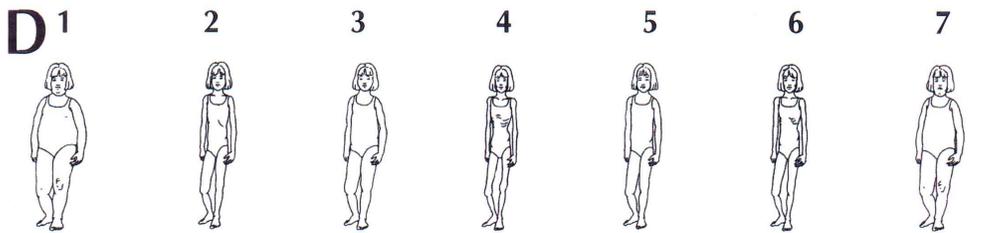
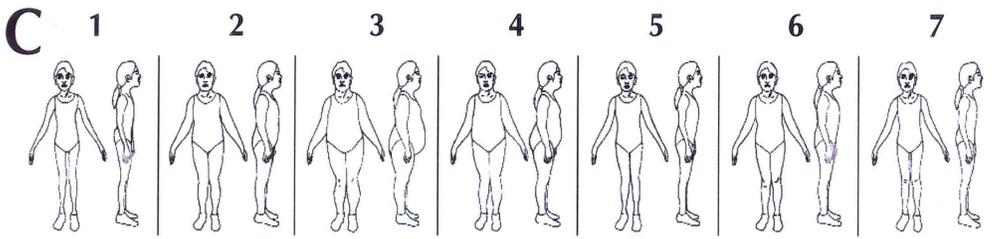
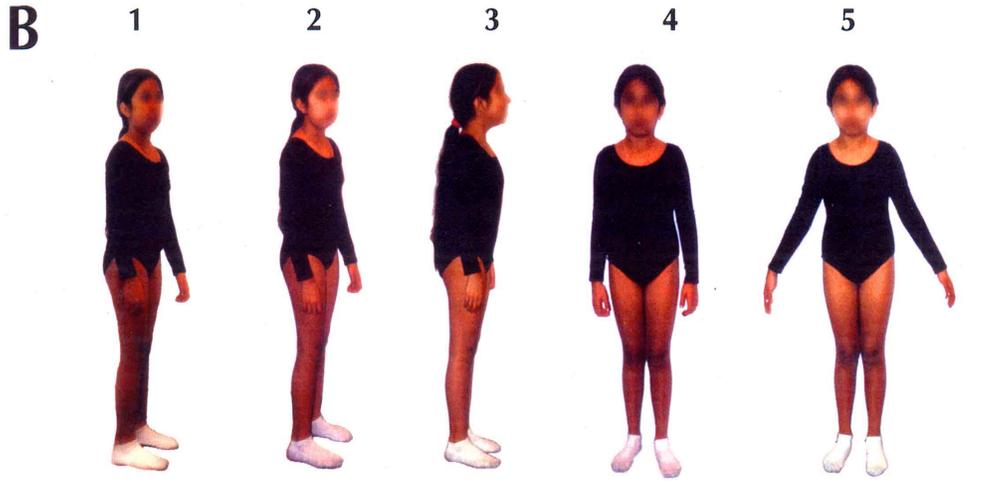
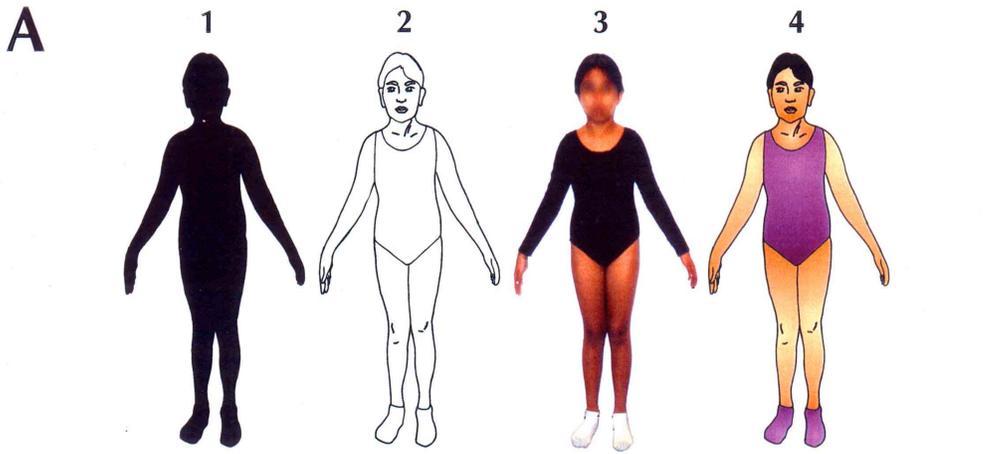
Parent's Permission Form



Appendix J  
"Picture Page" – Boy



Appendix K  
"Picture Page" – Girl



**Appendix L**  
**Questionnaire – English**

**Questionnaire**

Before completing the following questions, please be sure that you have:

1. Written in your name and identification number on the Scantron form.
2. Filled in the circles for your identification number.
3. Filled in the circle for the correct form number. The form number is found at the top of the picture page.

Be sure to use a #2 pencil, and completely darken each circle. Mark only one response for each question. If you have any questions about this survey, ask your teacher or the test administrator.

---

**1. I am \_\_\_\_\_ years old:**

1. 8                      2. 9                      3. 10                      4. 11                      5. 12                      6. 13

**2. I am a \_\_\_\_\_.**

1. Girl                      2. Boy

**3. I am of \_\_\_\_\_ ethnicity. (Please choose only one.)**

1. American Indian or Alaskan
2. Asian
3. Black or African-American
4. Latino or Hispanic
5. White or Caucasian
6. Other

**4. I am in \_\_\_\_\_ grade.**

1. Third (3<sup>rd</sup>)
2. Fourth (4<sup>th</sup>)
3. Fifth (5<sup>th</sup>)
4. Sixth (6<sup>th</sup>)

---

---

*If you usually speak a language other than English OR Spanish, please skip to question 9.*

**5. What language(s) do you speak to your parents in?**

1. Only Spanish
2. Spanish better than English
3. Both equally
4. English better than Spanish
5. Only English

**6. What language(s) do you usually speak at home?**

1. Only Spanish
2. Spanish better than English
3. Both equally
4. English better than Spanish
5. Only English

**7. In which language(s) do you usually think?**

1. Only Spanish
2. Spanish better than English
3. Both equally
4. English better than Spanish
5. Only English

**8. What language(s) do you speak with your friends?**

1. Only Spanish
2. Spanish better than English
3. Both equally
4. English better than Spanish
5. Only English

---

*For questions 9-10, please refer to the figures in Section A on the hand-out:*

**9. Fill in the number of the scale which you LIKE BEST.**

**10. Fill in the number of the scale that you think LOOKS MOST LIKE YOU.**

---

*For questions 11-12, please refer to the figures in Section B on the hand-out:*

**11. Fill in the number of the scale which you LIKE BEST.**

**12. Fill in the number of the scale that you think LOOKS MOST LIKE YOU.**

---

*For questions 13-14, please refer to the figures in Section C on the hand-out:*

**13. Fill in the number of the figure which you LIKE BEST.**

**14. Fill in the number of the figure that you think LOOKS MOST LIKE YOU.**

---

*For questions 15-16, please refer to the figures in Section D on the hand-out:*

**15. Fill in the number of the figure which you LIKE BEST.**

**16. Fill in the number of the figure that you think LOOKS MOST LIKE YOU.**

---

*This section asks questions about your usual eating habits.*

**17. How often do you eat breakfast?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**18. On school days, where do you usually eat breakfast?**

1. Always at home.
2. Mostly at home.
3. Mostly at school.
4. Always at school.
5. Mostly elsewhere (restaurant, etc.).
6. I never eat breakfast.

**19. Do you eat fresh fruit?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**20. Yesterday, how many glasses of milk did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half-pint of milk served a school as equal to one glass.)**

1. I did not drink milk yesterday, but I do drink milk.
2. Less than 1 glass
3. 1 glass
4. 2 glasses
5. 3 glasses
6. 4 or more glasses
7. I never drink milk.

**21. Yesterday, how many glasses of soda did you drink?**

1. I did not drink soda yesterday, but I do drink soda.
2. Less than 1 glass
3. 1 glass
4. 2 glasses
5. 3 glasses
6. 4 or more glasses
7. I never drink soda.

---

*This section asks questions about activities you do.*

**22. How many times per week do you play or exercise enough to make you sweat or breathe hard?**

1.  1
2. 2
3. 3
4. 4
5. 5
6. 6 or 7
7. 8 or more

**23. Do you participate in recess most days?**                      1. Yes                      2. No

**24. Do you agree with the following statement?**

**My friends and I have fun when we're physically active playing together.**

1. Never              2. A Little              3. Sometimes              4. A Lot              5. Always

**25. On an average school day, how many hours do you watch TV?**

1. I do not watch TV on an average school day.
2. Less than 1 hour per day.
3. 1 hour per day.
4. 2 hours per day.
5. 3 hours per day.
6. 4 hours per day.
7. 5 or more hours per day.

**26. On an average school day, how many hours do you play video games or computer games?**

1. I do not play video or computer games
2. Less than 1 hour per day
3. 1 hour per day
4. 2 hours per day
5. 3 hours per day
6. 4 hours per day
7. 5 or more hours per day

**27. During the past 12 months, how would you describe your grades in school?**

1. Mostly A's
2. Mostly B's
3. Mostly C's
4. Mostly D's
5. Mostly F's
6. None of these grades
7. Not sure

---

*This last section asks questions about your feelings. Please try to answer honestly.*

**In the past year, how often have you:**

**28. Thought about having fat on your body?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**29. Felt fat?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**30. Thought about wanting to be thinner?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**31. Worried about gaining 2 pounds?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**32. Felt ugly?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**33. Felt pretty?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**34. Been happy with the way your body looks?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**35. How much has your weight made a difference in how you feel about yourself?**

1. Never      2. A Little      3. Sometimes      4. A Lot      5. Always

**Appendix M**  
**Questionnaire – Spanish**

**Cuestionario**

Antes de contestar las preguntas siguientes, por favor, asegúrate que hayas:

1. escrito tu nombre y tu número de identificación
2. llenado los círculos correspondientes en el Scantron.
3. llenado los círculos con el número correcto de la forma. Se encuentra el número de la forma a la cabeza de la página.

Use un lápiz de mina #2 y que llenes cada círculo completamente. Si tienes alguna pregunta de esta encuesta, pregúntale a tu maestro(a) o el/la administrador(a) del examen.

---

**1. Tengo \_\_\_ años de edad:**

1. 8                      2. 9                      3. 10                      4. 11                      5. 12                      6. 13

**2. Soy \_\_\_\_\_.**

1. Muchacha    2. Muchacho

**3. Soy de origen \_\_\_\_\_ . (Por favor, elige solamente una respuesta.)**

1. idígena o nativo de Alaska
2. asiático(a)
3. negro(a) o afro-americano(a)
4. latino(a) o hispano(a)
5. blanco(a) o caucásico(a)
6. otro

**4. Estoy en el \_\_\_\_\_ grado.**

5. Tercero (3<sup>o</sup>)
6. Cuarto (4<sup>o</sup>)
7. Quinto (5<sup>o</sup>)
8. Sexto (6<sup>o</sup>)

---

---

*Si normalmente hablas un idioma aparte de inglés o español, por favor salta a la pregunta 9.*

**5. ¿A tus padres en cuál(es) idioma(s) les hablas?**

1. Solamente español
2. Español mejor que inglés
3. Ambos igualmente
4. Inglés mejor que español
5. Solamente inglés

**6. ¿Normalmente cuál(es) idioma(s) hablas en casa?**

1. Solamente español
2. Español mejor que inglés
3. Ambos igualmente
4. Inglés mejor que español
5. Solamente inglés

**7. ¿Normalmente en cuál(es) idioma(s) piensas?**

1. Solamente español
2. Español mejor que inglés
3. Ambos igualmente
4. Inglés mejor que español
5. Solamente inglés

**8. ¿Cuáles idioma(s) hablas con tus amigos(as)?**

1. Solamente español
2. Español mejor que inglés
3. Ambos igualmente
4. Inglés mejor que español
5. Solamente inglés

---

*Para preguntas 9-10, por favor vete las figuras de sección A del librito:*

**9. Llena el círculo del número de la escala que a ti TE GUSTA MÁS.**

**10. Llena el círculo de la escala que crees que MÁS SE TE PARECE.**

---

*Para preguntas 11-12, por favor vete las figuras de sección B del librito:*

**11. Llena el círculo del número de la escala que a ti TE GUSTA MÁS.**

**12. Llena el círculo de la escala que crees que MÁS SE TE PARECE.**

---

*Para preguntas 13-14, por favor vete las figuras de sección C del librito:*

**13. Llena el círculo del número de la escala que a ti TE GUSTA MÁS.**

**14. Llena el círculo de la escala que crees que MÁS SE TE PARECE.**

---

*Para preguntas 15-16, por favor vete las figuras de sección D del librito.:*

**15. Llena el círculo del número de la escala que a ti TE GUSTA MÁS.**

**16. Llena el círculo de la escala que crees que MÁS SE TE PARECE.**

---

*Esta sección te pregunta sobre tus hábitos de comer y beber.*

**17. ¿Que tanto comes desayuno?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**18. ¿En un día escolar, donde comes el desayuno?**

1. Siempre en la casa
2. Casi siempre en la casa
3. Casi siempre en la escuela
4. Siempre en la escuela
5. En una restaurante
6. No como el desayuno.

**19. ¿Comes fruta natural?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**20. Ayer, ¿Cuántos vasos de leche tomaste? (Incluye la leche que tomaste en un vaso o una taza, del cartón, o con cereal. La leche de media pinta que se sirve en la escuela es igual a un vaso.)**

1. No tomé leche ayer, pero normalmente bebo leche.
2. Menos de 1 vaso
3. 1 vaso
4. 2 vasos
5. 3 vasos
6. 4 o más
7. Nunca bebo leche

**21. Ayer, ¿Cuántos vasos de soda tomaste?**

1. No tomé soda ayer, pero normalmente bebo soda.
2. Menos de 1 vaso
3. 1 vaso
4. 2 vasos
5. 3 vasos
6. 4 o más
7. Nunca bebo soda

---

*Esta sección te pregunta de tus actividades.*

**22. ¿Cuantas veces cada semana juegas or haces actividades físicas que te hacen sudoso(a) o resollar?**

1. □ 1
2. 2
3. 3
4. 4
5. 5
6. 6 o 7
7. 8 o más

**23. ¿Participas en recreo la mayoría de los días?**      A. Sí              B. No

**24. ¿Estás de acuerdo con la declaración siguiente?**

**Mis amigos y yo lo pasamos bien cuando estamos activos físicamente jugando juntos.**

1. Nunca              2. Poco              3. A veces              4. Mucho              5. Siempre

**25. En un día escolar típico, ¿Cuántas horas miras la tele?**

1. No miro la tele en un día escolar típico.
2. Menos de una hora al día.
3. Una hora cada día.
4. 2 horas al día.
5. 3 horas al día.
6. 4 horas al día.
7. 5 o más de cinco horas al día.

**26. En un día escolar típico, ¿Cuántas horas juegas juegos de video o juegos de la computadora?**

1. No juego juegos de video ni juegos de la computadora.
2. Menos de una hora cada día.
3. Una hora cada día.
4. 2 horas al día.
5. 3 horas al día.
6. 4 horas al día.
7. 5 o más de cinco horas al día.

**27. Durante los últimos 12 meses, ¿Cómo describirías tus notas en la escuela?**

1. As en la mayor parte
  2. Bs en la mayor parte
  3. Cs en la mayor parte
  4. Ds en la mayor parte
  5. Fs en la mayor parte
  6. Ninguna de estas notas
  7. No estoy seguro(a)
-

*Esta ultima sección te pregunta sobre sus sentimientos. favor contesta honesto.*

**En el último año, ¿Cuántas veces ..**

**28. has pensado en tener gordo en tu cuerpo?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**29. has creído que eres gordo(a)?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**30. has pensado en ser más delgado(a)?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**31. te has preocupado por aumentar dos libras de peso?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**32. has creído que eres feo(a)?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**33. has creído que eres guapo o bonita?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**34. has estado contento(a) con la apariencia de tu cuerpo?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**35. ha hecho una diferencia tu peso en como sientes de tí mismo?**

1. Nunca      2. Poco      3. A veces      4. Mucho      5. Siempre

**Appendix N**  
**Qualifying Virginia Elementary Schools**

School District	School Name	Total#Kids	#Hispanic	%Hispanic	FreeLunch	RedLunch
<b>Arlington</b>						
	Abingdon E.	600	247	41.17%	255	80
	Barcroft E.	579	325	56.13%	266	106
	Barrett E.	462	328	70.99%	275	75
	Claremont Center	456	268	58.77%	219	101
	Drew Model E.	359	100	27.86%	157	24
	Francis Scott Key E.	603	334	55.39%	210	71
	Henry E.	498	235	47.19%	218	100
	Oakridge E.	470	225	47.87%	250	61
	Randolph E.	626	403	64.38%	356	121
<b>Harrisonburg City</b>						
	Spotswood E.	405	98	24.20%	244	45
<b>Fredericksburg City</b>						
	Walker-Grant Middle	704	38	5.40%	300	63
<b>Northampton County</b>						
	Kiptopeke E.	448	44	9.82%	320	33
	Occohannock E.	509	22	4.32%	317	46
<b>Fairfax</b>						
	Baileys E.	881	427	48.47%	381	101
	Bucknell E.	274	112	40.88%	N/A	N/A
	Cameron E.	645	199	30.85%	223	136
	Dogwood E.	544	166	30.51%	153	73
	Glen Forest E.	896	397	44.30%	433	110
	Graham Road E.	385	238	61.82%	223	50
	Hybla Valley E.	651	362	55.61%	378	138
	Mount Eagle E.	307	153	49.84%	207	45
	Mount Vernon Woods E.	531	183	34.46%	281	102
	Parklawn E.	734	347	47.28%	340	126
	Riverside E.	494	92	18.62%	190	55
	Timber Lane E.	517	214	41.39%	N/A	N/A
	Weyanoke E.	532	125	23.50%	255	68
<b>Virginia Beach City</b>						
	Birdneck E.	915	67	7.32%	442	250
	College Park E.	716	27	3.77%	259	128
	Holland E.	811	38	4.69%	370	168
	Lynnhaven E.	495	31	6.26%	225	92
	Newtown Road E.	801	31	3.87%	478	187
	Parkway E.	572	28	4.90%	246	70

	Seatack E.	420	18	4.29%	274	68
	Shelton Park E.	503	26	5.17%	149	157
	White Oaks E.	396	25	6.31%	141	102
	Williams E.	898	38	4.23%	578	187

**Appendix O**  
**State-Level Approval Letter**



**COMMONWEALTH of VIRGINIA**

*Department of Health*

ROBERT B. STROUBE, M.D., M.P.H.  
STATE HEALTH COMMISSIONER

P O BOX 2448  
RICHMOND, VA 23218

TTY 7-1-1 OR  
1-800-828-1120

January 17, 2003

Dear Superintendent:

Your school division has been selected to participate in a statewide nutrition and physical activity needs assessment. The Virginia Department of Health (VDH) and the Virginia Polytechnic Institute and State University (Virginia Tech) will conduct the assessment. The assessment will involve collecting information from fourth grade students regarding nutrition and physical activity habits and measuring the height and weight of each student. All students will remain anonymous and active consent forms will be sent to each student's parent or guardian prior to the assessment.

The information collected will be used to assess the nutritional status of children in Virginia and to determine the relative risks related to various chronic diseases such as obesity, heart disease and diabetes. Since eating habits are established at a young age and affect the health and quality of life during adulthood, it is imperative that children develop healthy habits at an early age. The information gathered from the children will help us target specific areas of need so appropriate nutrition education can occur and be reinforced through the school years.

The approximate classroom time required will be one hour and a nutritionist and/or school nurse will conduct all components of the process, including a short nutrition lesson. Due to funding deadlines, the assessment will be scheduled in February or March however; the nutritionist or school nurse will make scheduling arrangements at the convenience of the principals and/or teachers.

Upon completion of the project, each school will be offered the opportunity to participate in a nutrition and physical activity class tailored to meet the needs of their students as well as an executive summary report.

Any one of the following project investigators will be contacting you in the near future to confirm your decision to take advantage of this opportunity:

- Carol Pollock, School Age & Adolescent Health Nurse Consultant, Virginia Department of Health
- Elena Serrano, Assistant Professor in Division of Food Science and Technology, Virginia Tech
- Katherine Branstad, Graduate Student, Virginia Tech
- Mena Forrester, Nutrition Program Coordinator, Virginia Department of Health

Sincerely,

████████████████████  
Dr. Robert Stroube  
State Health Commissioner

████████████████████  
Dr. Jo Lynne DeMary  
Superintendent of Public Instruction

**VDH** VIRGINIA  
DEPARTMENT  
OF HEALTH  
*Protecting You and Your Environment*  
[www.vdh.state.va.us](http://www.vdh.state.va.us)

## Appendix P

### Handout: Protocol for Assessment of Weight, Height, and Waist Circumference

At the start of each day, and between groups of children, re-zero the scale. Use a screwdriver to adjust the screw at the side of the balance until the marker is in the middle of the “window”. Check the stadiometer (height bar) and seca tape (waist circumference) for signs of wear.

For all protocols, ask child to remove SHOES, COATS, HATS, PURSES or BAGS, or other bulky items. Before you begin, ask child for labeled \_ page record sheet.

#### Measuring weight:

- Before child steps on scale, check that it is set at “zero” position.
- Ask child to stand with back to the scale’s slide bar (i.e. facing away from scale), in the center of the platform.
- Record the measurement to the nearest \_ lb.
- Finish by saying “thank you”. Do not comment on the child’s measurement.

#### Measuring height:

- Locate the crown of the head. You may need to ask the child to remove hair accessories. If this would be difficult for the child, simply note the difficulty and do your best to locate the crown.
- Ask the child to stand with feet and shoulders touching the height bar. Hands should be at side, feet flat. The head, upper back, buttocks, and heels should ideally be touching the height bar.
- Adjust the level of the child’s head into the Frankfort Plane (draw an imaginary line from the lower margin of the eye socket to the notch above the flap of skin that extends over the opening of the ear. The back of the child’s head may no longer be touching the height bar.
- Ask the child to breathe in. Lower the moveable, horizontal measurement bar until it firmly touches the crown of the head.
- Record height to the nearest \_ inch.

#### Measuring waist circumference:

- Explain that you are going to measure the child’s waist circumference. Demonstrate how the tape works, that it goes around the child’s middle.
- Ask the child to locate his/her belly button.
- If the child is wearing a bulky sweater or jacket, you may ask that they remove it – ONLY if they have another shirt underneath. NEVER touch the bare skin of a child.
- Place the tape around the child, perpendicular to the floor and at the level of the belly button.
- Record waist circumference to the nearest \_ inch.
- If a child has difficulty with any part of this measurement, simply offer to skip this section. If a child is wearing oversized, heavy, or layered garments, please note this on the “comments” section of the record sheet.

Ask that the child replace any sweaters, coats, shoes, etc. Take the \_ slip record sheet and place it with the other completed forms. This often means turning the data sheet face down on the clipboard. Thank the child for their cooperation.

Release height and weight data only in accordance with the wishes of the school. This may mean that, in some schools, you must check the form to see if they are allowed this information. A star placed on the \_ page data sheet denotes a child that may be told his/her personal data. If there is no star, then the child may NOT be told this information.

**Appendix Q**  
**Protocol Reminder Posted on Measuring Equipment**

- Ask child to remove shoes, coats, hats, purses or bags, and any bulky or heavy clothing.
- Ask child for \_ page record sheet.
- Make sure scale is zeroed before taking weight; measure to the nearest \_ lb. Child should be facing away from the scale.
- When measuring height, head, upper back, buttocks, and heels should touch the height bar. Eyes should be the in Frankfurt plane. Child should be facing away from the scale.
- Ask child to breathe in and hold breath. Measure height to the nearest \_ inch.
- For waist circumference, child should identify location of belly button.
- Seca tape should be perpendicular to the floor. Measure to nearest \_ inch.
- If child has a problem with any part of this protocol, skip it. Please make a notation of the difficulty on the record sheet.

**Appendix R**  
**Parental Consent Form for Data Collection Subjects – English**

**Informed Consent for Parents of Participants  
in Research Projects Involving Human Subjects**

Title of Project: Assessment of Childhood Overweight in Schools

Investigator: Elena Serrano, Ph.D.

Co-PI: Kathryn Branstad, MS student

**I. Purpose of this Research/Project**

This study will help us determine the levels of underweight, overweight, and obesity among Virginia school children. It will also help us identify preferences related to a novel body assessment scale.

**II. Procedures**

A total of 200 children – boys and girls between the ages of 8 and 12 -- will participate in the study. Each adolescent will participate in a 15-minute single session assessment period. They will be measured for height, weight, and waist circumference. They will complete a short questionnaire regarding their demographic information and daily habits (soda consumption, hours spend watching television and playing video games). They will designate a favorite of the three versions of the body assessment scale.

**III. Risks**

There are no known risks associated with this project.

**IV. Benefits**

There are no direct benefits for participating in this study. The results will help us determine which design version of the scale to pursue into full development. No promise or guarantee of benefits has been made to your child to encourage him/her to participate.

**V. Extent of Anonymity and Confidentiality**

Each child's responses will be kept anonymous and confidential. We will assign a user number to each child, which will take the place of their name on the surveys. The key relating names and identification numbers will be kept in a secure location to ensure confidentiality.

**VI. Compensation**

Each child will receive a jump rope, worth about \$2.50, as compensation.

**VII. Freedom to Withdraw**

Your child is free to withdraw from the study at any time.

### VIII. Approval of Research

As required, this research project has been approved by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, by the Department of Human Nutrition, Foods, and Exercise.

January 20, 2003  
IRB Approval Date

January 19, 2004  
Approval Expiration Date

### IX. Subject's Responsibilities

I voluntarily agree to have my child participate in this study. My child has the following responsibilities:

- participate in assessment of height, weight, and waist circumference
- complete questionnaires on scale preference and basic demographic and daily habit information

### X. Parent's Permission

I have read and understand the Informed Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for my child:

\_\_\_\_\_  
Print child's name

\_\_\_\_\_  
Parent's name

\_\_\_\_\_  
Parent's signature

\_\_\_\_\_  
Date

Should I have any pertinent questions regarding this research or its conduct, the research subjects' rights, or whom to contact in the event of a research-related injury to the subject, I may contact:

Elena Serrano, Ph.D.  
Investigator

540.231.3464/serrano@vt.edu  
Telephone/e-mail

\_\_\_\_\_  
Department Reviewer

\_\_\_\_\_  
Telephone/e-mail

David Moore  
Chair, IRB  
Office of Research Compliance  
Research & Graduate Studies

540.231-4991/moored@vt.edu  
Telephone/e-mail

**Appendix S**  
**Parental Consent Form for Data Collection Subjects – Spanish**

**Consentimiento Informado Para  
Participar en un Proyecto de Investigaciones**

Title of Project: Gravamen del Sobrepeso de Niños en Escuelas

Investigadora: Elena Serrano, Ph.D.

Co-Investigadora: Kathryn Branstad, MS student

**I. Propósito del Proyecto**

Este estudio nos ayudará a determinar los niveles de de peso insuficiente y la obesidad entre niños de Virginia. También los ayuda identificar las preferencias de los adolescentes para los elementos del diseño de una escala del gravamen del cuerpo.

**II. Procedimientos**

En total, 200 niños y niñas entre 8 y 12 años participarán en este estudio. Se requiere 15 minutos participar en el estudio. La altura, peso, y circunferencia de la cintura de su niño(a) serán medidos/talladas. Su niño(a) llenará un cuestionario corto con preguntas sobre demografía y hábitos (el consumo de soda, el ver de la televisión, y jugar juegos videos). También indica su preferencia de tres escalas de cuerpo.

**III. Riesgos**

No hay riesgos reconocidos que están asociados con este proyecto.

**IV. Beneficios**

No hay beneficios directos que se gana participando en este estudio. Los resultados nos ayudarán desarrollar las escalas detalladas. No hay promiso ni garantía de beneficios para animarle a Ud. participar en este estudio.

**V. Anonimidad y Confidencialidad**

Vamos a tratar de asegurar su confidencialidad. Todas respuestas y información serán guardadas anónimas y confidenciales. Le asignaremos un número de identificación. Este número será usado en el cuestionario. El número de identificación será guardado en un lugar seguro, asegurando la confidencialidad.

**VI. Compensación**

Cada niño recibe una cuerda para saltar (“jump rope”), vale \$2.50, para participar en esta investigación.

## VII. Retirar de la Investigación

Su niño puede retirar del estudio a cualquier momento.

## VIII. Aprobación del Estudio

Este estudio ha sido aprobado, como se requiere, por el Comité Institucional de Investigaciones con Sujetos Humanos (IRB) de la Universidad del Estado de Virginia y el Instituto Politécnico (Virginia Tech), y el Departamento de Nutrición Humana, Alimentos, y la Actividad Física (Dept. of Human Nutrition, Foods, and Exercise).

El 13 de Noviembre, 2002  
IRB Fecha Approval Date

## IX. Permiso del Padre de Participante

Yo doy permiso a mi hijo participar en este estudio. Mi hijo(a) tiene las responsabilidades siguientes:

- El medir/tallar de su altura, peso y circunferencia de la cintura
- El llenar de un cuestionario con preguntas sobre hábitos, demografía, y la preferencia de escalas.

## X. Firma del Padre de Participante

Leí y entiendo el consentimiento y las condiciones de este proyecto. No tengo ninguna pregunta. Reconozco que he leído y entiendo la información expuesta y firmo voluntariamente por mi hijo(a):

\_\_\_\_\_  
Nombre de Niño

\_\_\_\_\_  
Nombre de Padre

\_\_\_\_\_  
Firma de Padre

\_\_\_\_\_  
Fecha

Si tengo preguntas sobre el estudio, como retirar del estudio, los derechos de los participantes, y con quien se debe ponerse en contacto si hay herida a causa del estudio, puedo llamar a:

Elena Serrano, Ph.D.  
Investigadora

540.231.3464/serrano@vt.edu  
Teléfono/e-mail

Michael Houston, Ph.D.  
Director, Departamento

540.231.4672/houstonm@vt.edu  
Teléfono/e-mail

David Moore  
Director, IRB  
Oficina de Investigaciones (Office of Research Compliance),  
Research & Graduate Studies

540.231-4991/moored@vt.edu  
Teléfono/e-mail

## **CHILD'S ASSENT FORM**

Title of Project: Assessment of Childhood Overweight in Schools

**I AM ASKING IF YOU WOULD BE WILLING TO PARTICIPATE IN A RESEARCH PROJECT. YOU WILL BE MEASURED FOR HEIGHT, WEIGHT, AND WAIST CIRCUMFERENCE, AND ASKED TO ANSWER A FEW QUESTIONS ABOUT YOURSELF.**

**THE TESTING SESSION SHOULD TAKE ABOUT 15 MINS TO COMPLETE. YOU WILL RECEIVE A JUMP ROPE FOR PARTICIPATING IN THIS ASSESSMENT.**

**THERE SHOULD BE NO RISK FOR PARTICIPATING. THERE ARE ALSO NO BENEFITS.**

**IF YOU DON'T WANT TO, YOU DON'T HAVE TO TAKE PART IN THIS SESSION. IF YOU WANT TO, PLEASE WRITE YOUR NAME BELOW ALONG WITH THE DATE. THANK YOU!**

**NAME:** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

## **CONSENTIMIENTO INFORMADO DEL HIJO**

**Título de Proyecto: Gravamen del Sobrepeso de Niños en Escuelas (Assessment of Childhood Overweight in Schools)**

**YO ESTOY PREGUNTANDO, SI TÚ QUIERES PARTICIPAR EN UN PROYECTO DE INVESTIGACIONES. TU ALTURA, PESO Y CIRCUNFERENCIA DE LA CINTURA SERÁN MEDIDOS/TALLADOS. TAMBIEN TE PREGUNTAMOS POCAS PREGUNTAS SOBRE TÚ MISMO(A).**

**SE DURA CERCA DE 15 MINUTOS PARA COMPLETAR TODO. TÚ RECIBIRÁS UNA CUERDA PARA SALTAR PARA PARTICIPAR EN ESTA INVESTIGACIÓN.**

**NO DEBE SER RIESGO EN PARTICIPAR NI BENEFICIOS.**

**SI TÚ NO QUIERES, NO TIENES QUE PARTICIPAR EN ESTA INVESTIGACIÓN. SI TÚ QUIERES PARTICIPAR, FAVOR DE ESCRIBIR TU NOMBRE Y LA FECHA ABAJO. ¡GRACIAS!**

**NOMBRE:** \_\_\_\_\_

**FIRMA:** \_\_\_\_\_

**FECHA:** \_\_\_\_\_

**Appendix V**  
**Letter to Classroom Teachers – Version 1 (English Only)**

Dear Teacher,

Thank you kindly for helping us with this research study. Childhood overweight and obesity have become serious health concerns for American kids. With your assistance, we hope to take an accurate count of the number of underweight, overweight, and obese elementary school children in Virginia. Currently, accurate data on these subjects do not exist. Also, this project will help us develop an assessment scale that should allow quick, inexpensive assessment of these problems in the future.

Enclosed with this letter, you should find consent forms (to be distributed to students), a reminder poster (that can be hung in the classroom to help kids remember to return their signed forms), and an envelope (in which you can collect the returned forms).

Please distribute the consent forms to all of the students in your class. Each child should get one packet of forms. Each packet includes a small cover slip that lets parents decide if their children should or should not be told their weight and height at the end of testing. Each packet also includes a Spanish and English version of the parental consent form (titled “Informed Consent for Participants”). Children ***must return a signed parental consent form to participate.***

Participating children will also be asked to sign a child’s assent form on the day of testing. Virginia Tech researchers will be responsible for the distribution and collection of these forms.

As with any scientific study, there should be no penalty for students who do not choose to participate. However, we do have incentives (very nice beaded jump ropes) for children who do choose to participate and who return both signed forms.

Please ask for, and collect, forms daily from interested students. Place the signed forms in the enclosed envelope. A Virginia Tech researcher will collect the forms from you on the day of data collection. If students have difficulty remembering to return their signed forms, you may wish to display the enclosed poster prominently within the classroom.

Again, thank you for your help. Hopefully, the information gathered by this project will help these, and future generations, of children.

Sincerely,

Dr. Elena Serrano

Kathryn Branstad

**Appendix W**  
**Letter to Classroom Teachers – Version 2 (English and Spanish)**

May, 2003

Dear Parent or Guardian -

Your child's elementary school has agreed to participate in an important study of childhood overweight and obesity. Virginia Tech researchers are studying the rates of overweight in Virginia, with hopes of being able to help kids stay fit and be healthier.

As part of the study, your child would be measured for weight, height, and waist circumference, and be asked to complete a short survey about his/her nutrition and physical activity habits. In return for participating, your child will be given a jump rope. All specific information your child gives, including his/her name, will be kept confidential.

For your child to participate in this study, you must return signed permission forms. This packet includes three types of forms, each in English and Spanish. *You* need to sign one version (either English or Spanish) of the *Informed Consent for Parents* form. *Your child* needs to sign one version (either English or Spanish) of the *Child's Assent* form. *Together* you should decide whether your child will be told his/her weight and height data. If you would like your child to be told this information, then check the box on the *last page*. If not, then leave it blank.

Have your child return the signed packet of forms to his/her teacher. The teacher will collect the forms and return them to the researchers on the day of testing.

This project has been reviewed and approved by a number of sources (including: Virginia Tech IRB #02-504; Fairfax County approval via Kenneth Hinson; Superintendents notified by Dr. Robert Stroube, State Health Commission, and Dr. Jo Lynne DeMary, Department of Education) to ensure that it is safe and sensitive for children. As with any research study, no child should be pressured to participate and only those children returning signed consent forms will be allowed to participate.

Thank you for your time and cooperation. Your child's participation will help the school, the county, and other kids across the nation.

Sincerely,

Dr. Elena Serrano

Kathryn Branstad  
Virginia Tech, Department of Human Nutrition, Foods and Exercise

El 18 de mayo, 2003

Estimado Padre:

La escuela primaria de su niño(a) va a participar en una investigación importante de sobrepeso entre niños. Investigadores de Virginia Tech están estudiando los índices de obesidad para que ayuden a los niños y aumenten su salud.

Como parte del estudio, su niño será medido para el peso, la altura, y la circunferencia de la cintura. También llenará un cuestionario corto sobre su nutrición y hábitos físicos de la actividad. Para su participación, su niño recibirá una cuerda del salto. Toda la información específica que su niño da, incluyendo su nombre, será mantenida confidencial.

Tiene que firmar y volver las formas de consentimiento informado, para que su niño participe en el estudio. Este paquete incluye tres tipos de las formas, cada uno en inglés y español. *Usted* necesita firmar una versión (inglés o español) del Consentimiento Informado de Padres. *Su niño(a)* necesita firmar una versión (inglés o español) de la Forma del Consentimiento de Niños. *Junto* usted y su niño(a) determinan si quisieran información sobre el peso y la altura de su niño. Entonces llene la caja en la última página o deje blanco. Su niño debe volver las formas a su maestro(a)/instructor(a).

Este proyecto ha sido aprobado por: Virginia Tech IRB # 02-504; las escuelas públicas del condado de Fairfax (por Kenneth Hinson); Dr. Roberto Stroube, Comisión de la Salud del Estado de Virginia; y Dra. Jo Lynne DeMary, Superintendente de la Instrucción Pública de Virginia). Estas personas han verificado que el estudio es seguro y sensible para los niños.

Como todas las investigaciones, la participación en el estudio es voluntaria. Solo los niños que vuelven las formas firmadas del consentimiento pueden participar.

Gracias por su tiempo y cooperación. La participación de su niño ayudará a la escuela, al condado, y a otros niños de la nación.

Sinceramente,

Dra. Elena Serrano

Kathryn Branstad

Appendix X  
Classroom Teacher Reminder Poster

# Remember!

Only students who return both the signed parent and student consent forms will be allowed to participate in this research project.

Only those students will be eligible for a free gift.

Don't forget to bring back your signed forms!

**Appendix Y**  
**“Check the Box” Form**

Check this box if you would like your child to be told his/her height and weight data after it has been assessed.

If you do not check the above box, your child will not be told this information.

---

Marca esta caja, si Ud. quisiera que nosotros le dijéramos a su niño su altura y peso, después de que se haya medido.

Si no marca la caja, no dirán su niño esta información.

**Appendix Z**  
**Researcher Check-List and School Data Form**

*Dear Researcher,*

*Please review each section of the following worksheet. Be sure that all the necessary equipment has been collected before arriving at the test location. Ask the school principal or other knowledgeable staff person to answer the school data questions. Record the pertinent testing information. As always, be sure to follow outlined testing protocol with every student. If you have any questions or concerns, contact Dr. Elena Serrano at (540) 231-3464.*

**Necessary Testing Equipment:**

- Send cover letter, teacher checklist, and parent and student consent forms to schools so that they arrive at least 1 week prior to testing.
- On test day, bring the following:
  - Balance-beam scale (1 or 2 depending on space and expected # subjects)
  - Seca waist measurement tapes (2)
  - Subject record sheets (# varies, at least 30 per tested class)
  - Photocopied surveys, **English and Spanish versions** (# varies, at least 35)
  - Laminated picture pages – **boy and girl versions** (all available)
  - Scantron forms (# varies, at least 35 for each tested class)
  - Privacy screens (1 or 2 depending on # of scales)
  - Jump rope incentives (# varies, bring 30 for each tested class)
  - Sharpened #2 pencils (# varies, bring at least 35)
  - Coded labels (# varies, be sure to check key)
  - Thank you gifts for actively involved teachers and administrators

**School Data**

1. School's full name: \_\_\_\_\_
2. Current principal: \_\_\_\_\_
3. Major Facilitating Coordinator: \_\_\_\_\_
4. Current Total School Enrollment: \_\_\_\_\_
5. Number of classes in each grade level:
  - 3<sup>rd</sup> grade \_\_\_\_\_
  - 4<sup>th</sup> grade \_\_\_\_\_
  - 5<sup>th</sup> grade \_\_\_\_\_
  - 6<sup>th</sup> grade \_\_\_\_\_

6. How are classes created in your school? (Are students divided by skill levels? Are classes created to reflect the gender or racial demographics of the surrounding geographic area? Are classes simply created in an arbitrary or random method?)

7. Record the following information for each participating group/class:

<u>Grade Level</u>	<u>Teacher's Name</u>	<u>Total # Students</u>	<u># Participating</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**Testing Information**

1. Date of testing session: \_\_\_\_\_
2. Location of testing session: \_\_\_\_\_
3. Arrival time: \_\_\_\_\_  
Departure time: \_\_\_\_\_
4. List of all participating Virginia Tech researchers: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. Total number of students tested: \_\_\_\_\_



**Appendix AB**  
**Subject Data Sheet**

Signed Parent Consent Form

Signed Child Consent Form

Identification Label:

Name: \_\_\_\_\_

Height: \_\_\_\_\_

Weight: \_\_\_\_\_

Waist Circumference: \_\_\_\_\_

Other Comments:



Signed Parent Consent Form

Signed Child Consent Form

Identification Label:

Name: \_\_\_\_\_

Height: \_\_\_\_\_

Weight: \_\_\_\_\_

Waist Circumference: \_\_\_\_\_

Other Comments:



**Appendix AC**  
**On-Site Observer Form**

DATE: \_\_\_\_\_

LOCATION: \_\_\_\_\_

RESEARCHERS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NUMBER OF SUBJECTS TESTED: \_\_\_\_\_

PRINTED NAME OF ON-SITE OBSERVER: \_\_\_\_\_

TITLE OF ON-SITE OBSERVER: \_\_\_\_\_

On the date(s), and at the location, listed above, I observed the named researchers conduct the project entitled "Assessment of Overweight in Schools". Virginia Tech researchers tested \_\_\_\_ students as part of this project. Research was conducted in the manner specified by the agreed protocol.

SIGNATURE OF ON-SITE OBSERVER: \_\_\_\_\_

SIGNATURE OF VTech LEAD RESEARCHER: \_\_\_\_\_

## VITA

### **Kathryn Elizabeth Branstad**

Kathryn Elizabeth Branstad was born on March 2, 1977 in Columbia, Maryland. She received her Bachelor of Science in Biology with high honors from the College of William and Mary in 1999. Ms. Branstad briefly studied law at the University of Texas at Austin School of Law before working as a substitute teacher in Virginia schools for two years. She will receive her Master of Science degree in Human Nutrition, Foods and Exercise from Virginia Polytechnic Institute and State University in August of 2003.