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Gitau, Tabither Muthoni

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EATING ATTITUDES, BODY IMAGE SATISFACTION, AND SELF-ESTEEM OF SOUTH AFRICAN URBAN ADOLESCENTS: THE IMPACT OF ACCULTURATION

By

Tabither Muthoni Gitau

Supervisors

Professor Shane Norris

Dr Lisa Micklesfield

A THESIS Submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa in fulfillment of the requirements for the degree of Doctor of Philosophy,

2014

Declaration

I, Tabither Muthoni Gitau hereby declare that the thesis entitled "Eating attitudes, body image satisfaction, and self-esteem of South African urban adolescents: The impact of acculturation" submitted for the degree of Doctor of Philosophy is the result of my own original work. Any assistance received or reference made to the work of others has been fully acknowledged.

This thesis is being submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg. It has not been submitted entirely or partially for any degree or examination at this or any other University or Institution.

Signature

Date

Dedication

I dedicate this work to my family: to dad (Gabriel Gitau; you are the best thing that ever happened to me, praying for me, setting targets for me (when to finish my PhD) and pushing me to pursue them even when I felt discouraged along the way was amazing, thank you for not just being a father but the best dad I would ever ask for; to mom (Jane Gitau); words can't describe how instrumental a mom's prayers, support, love and encouragement have been to me throughout this journey.

I dedicate it to you Benjamin , Peris and Robby for being the best siblings I would ever ask for. The love, support and prayers you showered me with were overwhelming. I dedicate it to you all!

Thesis material

During the course of this PhD, three manuscripts have been produced; one and two are in press, and three in review. The research findings have also been presented at various conferences, and successful grant applications attached to the study were obtained.

Publications

1. Tabither M. Gitau, Lisa K. Micklesfield, John M. Pettifor, Shane A. Norris. Ethnic differences in eating attitudes, body image and self-esteem among adolescent females living in urban South Africa. Journal of Psychiatry 2014; 17: 468-474

   Student's contribution to the paper

   Conducted literature search, conceptualized the paper, carried out statistical analysis, drafted the manuscript and worked on all the changes raised by co-authors.

2. Tabither M. Gitau, Lisa K. Micklesfield, John M. Pettifor, Shane A. Norris. Eating attitudes, body image satisfaction and self-esteem of South African male adolescents and their perception of female's body silhouettes. (Journal of Child and Adolescent Mental Health)

   Student's contribution to the paper

   Conducted literature search, conceptualized the paper, carried out statistical analysis, drafted the manuscript and worked on all the changes raised by co-authors.

3. Tabither M. Gitau, Lisa K. Micklesfield, John M. Pettifor, Shane A. Norris. Changes between early and late adolescent eating attitudes, body esteem and weight control behaviors: Birth-to-Twenty cohort. (PLOS ONE, accepted for publication September 2014).

Student's contribution to the paper

Conducted literature search, conceptualized the paper, carried out statistical analysis, drafted the manuscript and worked on all the changes raised by co-authors.

Conference presentations

1. 4th Cross Faculty Symposium

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1. PhD Fellowship from MRC/Wits Developmental Pathways for Health Research Unit sponsored by the Wellcome Trust, June 2010-2013.

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Abstract

Introduction: An increase in the prevalence of eating disorders, body image dissatisfaction, low self-esteem and unhealthy weight control behaviors have been reported among adolescents worldwide, and are a public health concern with physical and psychological consequences. Although underweight and stunting still persists in South Africa, overweight and obesity is increasing in all ages, gender, and ethnic groups. Obesity is a biological risk factor for body dissatisfaction, low self-esteem and eating disorders among adolescents, all of which have been found to be associated with various weight change behaviors and strategies. South Africa being a culturally diverse country is undergoing rapid political, socioeconomic, nutrition and epidemiological transitions, and therefore offers a unique opportunity to investigate this area of research.

Study design: There are two study components: (1) A cross-sectional study to determine gender and ethnic (black and white) differences in eating attitudes, self-esteem and body satisfaction in 13, 15 and 17 year-old boys (n=391) and girls (n=340) living in urban Johannesburg; (2) A longitudinal survey of the Birth-to-Twenty (Bt20) cohort at ages 13 and 17 years (n=1435) to compare eating attitudes, body-esteem and weight control behaviors between black and mixed ancestry adolescents, to examine the changes over time in these variables, and to investigate ethnic differences in the male and female perceptions of female body silhouettes at age 17 years. These ages were selected to provide a diverse sample of adolescents (early, mid and late adolescence).

Methods: Anthropometric measurements were performed on all participants. Overweight and obesity were determined using age-gender specific cut-offs for BMI for children aged up to 17

years. Eating attitudes test-26 (EAT-26) scores were used to determine an increased risk of developing an eating disorder. The total EAT-26 score is the sum of the 26 items and scores range from 0 to 78. Participants who score more than 20 are considered to be at greater risk of developing an eating disorder, and represent more unhealthy attitudes towards food, body weight and eating. Body-esteem was measured using a body esteem scale. It consists of a set of 21 questions which measure 1) global feelings about one's body e.g. "I like what I see when I look in the mirror", 2) satisfaction with one's weight e.g. "I really like what I weigh" and 3) positive evaluations about one's body and appearance e.g. "People my own age like my looks". The body-esteem assessment uses a 5-point scale ranging from "never" (1) to "always" (5) and the higher the score the more satisfied the participant is with their body. Total scores are divided into three categories; low body esteem (score 1 to 21), average body-esteem (score 22 to 42), and high body esteem (score $\geq$ 43). The Rosenberg self-esteem tool was used to measure general self-esteem of the participants. Body image satisfaction tool was used to rate participants satisfaction with different parts of their body whereas, the body esteem scale was used to assess participant's attitudes and feelings about their body and appearance. A series of randomly placed female silhouettes were used to assess participants association with different attributes. They were also asked to associate a series of randomly placed female silhouettes, with specific words or phrases including clumsy, happy, worst, strong, happiest, best, less respect, more respect, unhappy**.**

All participants were asked a number of questions about their attempts to change their weight. Girls and boys were asked the following questions: "During the past year have you done anything to try to lose weight?", "During the past year have you done anything to try to gain muscle?" If participants answered positively they were asked to give reasons, which included;

health and cosmetic reasons e.g. to look better, clothes too tight, too fat, unhappy with self, and want to be a model. They were further asked about the methods they used to lose weight, and their responses were categorized into three groups: (i) healthy weight control behaviors (e.g. to exercise, eat more fruits and vegetables, and to eat less high fat foods and less sweets) [20] unhealthy weight control behaviors (e.g. fasting, eating very little food, skipping meals, cigarette smoking and use of food substitutes (iii) extreme weight control behaviors (e.g. use of diet pills, self-induced vomiting, use of laxatives and diuretics).

Descriptive analyses were completed and stratified according to gender and ethnicity. For normally distributed data we used t-tests and ANOVAs, and for data that was not normally distributed Wilcoxon rank test was done to determine significant difference. Chi-square tests were used to determine differences between categorical data. Pearson correlation test was done to determine linear associations. A p-value of <0.05 was considered statistically significant.

Results: In the non-cohort sample, the prevalence of overweight and obesity was higher in the white girls and boys compared to their black peers, significantly more black than white adolescents of both genders reported an EAT-26 score ≥ 20 (predisposition to an eating disorder). Although the prevalence of low self-esteem was greater in the white compared to black girls, in the study of the male adolescents, the low self-esteem was more prevalent in the black compared to the white boys. Significantly more black than white girls had high body image dissatisfaction (38.8 vs. 16.7%). There were significant differences between the male and female ethnic groups in their perception of female silhouettes, and the majority of the white girls (65.4%) wanted to be thinner compared to only 38.8% of the black girls. BMI was positively associated with self-

esteem and negatively with dieting behavior in white boys , and with lower EAT-26 bulimic and oral control scores in black boys.

In the Birth to Twenty cohort, black African females had a higher BMI ($p<0.001$) and an increased risk of developing eating disorders as well as significant increase in the prevalence of weight loss practices between the ages 13 and 17 years. At age 17 years both mixed ancestry adolescents had lower body-esteem compared to black adolescents. The prevalence of possible eating disorders was 11% and 13.1% in early and late adolescents respectively. Males and females shared similar opinions on normal silhouettes being the 'best', 'getting respect' and being the 'happiest', while the obese silhouette was associated with the 'worst' and the 'unhappiest', and the underweight silhouette with the "weakest".

Conclusions: Black African urban teenagers seem to be embracing Western norms to fit in with the demands of Western culture, however there is still evidence of traditional influences in both boys and girls with regard to perceptions of female silhouettes. Our findings suggest ethnicity and gender play a major role in psychosocial disorders. Ethnicity and gender were found to be associated with an increased risk of future eating disorders, as well as weight loss and muscle gain practices. These findings are highly relevant for all African countries undergoing transition, and are important in planning the development of interventions to optimize adolescent health prior to adulthood.

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To the Birth-to-Twenty Plus and the non-cohort participants and families, thank you for your commitment to the study, I am grateful. I wish to extend my sincere gratitude to the Birth to twenty (Bt20) staff members who participated in the collection and capturing of the data, your work has been essential to the project.

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List of acronyms/abbreviations

ANOVA – Analysis of Variance

BMI – Body Mass Index

LMICs – Low-to-Middle Income Countries

PhD – Doctor of Philosophy

SD – Standard deviation

SES- Socio-economic status

EAT-26 – Eating Attitude Test-26

AN – Anorexia Nervosa

BN – Bulimia Nervosa

BITE – Bulimic Inventory Tests Edinburgh

ED – Eating Disorders

RSE – Rosenberg Self Esteem

EDI-3 – Eating Disorder inventory-3

DSM-V-TR – Diagnostic and Statistical Manual of Medical Disorders

EDNOS – Eating Disorder Not Otherwise Specified

NCDs – Non-Communicable Diseases

APA – American Psychological Association

ICD-10 - International Classification of Disease – 10^{th} version

Kg – Kilogram (s)

MD- Muscle Dysmorphia

SE- Self-esteem

U.K- United Kingdom

U.S. A. - United States of America

WHO- World Health Organization

CDC- Centers for Disease Control and Prevention

SIBES- Single-Item Self-Esteem Scale

SSA- Sub Saharan Africa

Definition of terms

Acculturation -A process in which members of one cultural group adopt the beliefs and behaviors of another group.

Anorexia Nervosa -An emotional disorder characterized by an obsessive desire to lose weight by refusing to eat.

Bulimia Nervosa -An emotional disorder involving disturbance of body image and an obsessive desire to lose weight, in which bouts of extreme overeating are followed by depression and self-induced vomiting, purging, or fasting.

Eating Disorder Not Otherwise Specified-An eating disorder that does not meet the criteria for anorexia nervosa or bulimia nervosa. Thus, individuals who are clinically significant eating disorders that do not meet DSM-V criteria for anorexia and bulimia nervosa are diagnosed with EDNOS.

Self-concept- An individual's general composite or collective view of self across multidimensional sets of domain specific perceptions, based on self-knowledge and evaluation of value or worth of one's own capabilities formed through experiences with and interpretations of the environment.

Self-esteem- Feelings an individual has about him/herself that affect the way he/she views him/herself, including self-observations, perceived feelings of him/her, and self-knowledge. The overall effective evaluation of one's worth, value or importance.

Preface

"It's embarrassing to be a fat African mama now…we are more aware since we got democracy, we want to be healthy, independent women who look good" (1).

"The spread of eating disorders, of course, is not just about images. The emergence of eating disorders is a complex, multilayered cultural "symptom" reflecting problems that are historical as well as contemporary, arising in our time because of the confluence of a number of factors."(Susan Bordo, 1993)

"*It is clear that within the broader South African community, eating attitudes exist that place a significant proportion of adolescents and young adults of all race groups at risk for the development of eating disorders."* (2)

The above quotes capture the essence of this research, which aims to understand eating attitudes, body image, self-esteem and lifestyle behavior trends in South African adolescents.

As a Kenyan, I arrived in South Africa some 6 years ago to do my Masters in Epidemiology and Biostatistics. While doing my Masters I got a chance to work on the Birth-to-Twenty cohort infant data that were collected from 1990 and decided to investigate the association between dietary patterns at age one and growth at age two. The thought of having infants with normal and abnormal growth curves in the same population was disturbing. I desired to pursue this further to investigate their eating habits at an older age. I had some time after my Masters to reflect on what I wanted to pursue for my PhD. With the help of available literature and my supervisors' guidance we identified a research opportunity.

In 2010, I realized that there has been an increasing desire for thinness among girls and muscularity among boys globally. This resulted in increasingly poor eating habits, engagement in excessive physical activity and unhealthy weight control behaviors among adolescents. Eating disorders and body dissatisfaction among adolescents is a result of biological, psychological, socio-cultural, organizational, physical environmental and policy factors. As South Africa is a culturally diverse country, I thought it would present an interesting setting to examine adolescents' eating attitudes, body image perceptions, and self-esteem and lifestyle behaviors, and weight management strategies. In addition, adolescents being at a "cross roads" where they are still feeling the influence of traditional ways but now being exposed to more western influences. This is a very confusing time for them on top of normal adolescent issues.

This research study explores acculturation among South African urban adolescent boys and girls of different ethnicities. It also presents the prevalence of risk for future eating disorders in different groups, as well as ethnic and gender differences in self-esteem, body esteem and body dissatisfaction during adolescence.

Whilst undertaking my project, I have acquired vast knowledge on protocol development, reviewing the literature, data cleaning and management, data analysis and on writing scientific papers.

This thesis is presented as publications. It comprises six chapters: Chapter one, the Literature Review which consists of two parts: one, an introduction and two, an integrative review of the psychosocial factors (eating disturbances, self-esteem , body dissatisfaction and body size status) among adolescents. We also reviewed the role played by BMI in predicting possible eating disorders, body image dissatisfaction and low body and self-esteem.

Chapter two outlines the methodology, providing study design, an overview of the study population, study sample (cohort and non-cohort participants), measurement tools and statistical analyses used for the study.

Chapter three consists of the first study which has been published in the Journal of Psychiatry and is entitled: "Ethnic differences in eating attitudes, body image and self-esteem among adolescent females living in urban South Africa". Chapter four comprises paper two "Eating attitudes, body image satisfaction and self-esteem of South African male adolescents and their perception of females' body silhouettes" which has been published in the Journal of Child and Adolescent mental health. Chapter five is the third paper which has been published in the Journal of Plos one and is entitled: "Changes in eating attitudes, body esteem and weight control behaviors during adolescence in a South African adolescent cohort". Chapter six is an integrative discussion of the results of the study, and includes conclusions and recommendations for future studies and policy.

CHAPTER ONE: BACKGROUND

1.0 Introduction

In writing this review we accessed peer reviewed articles, reports, reviews and chapters that presented data on the following topics; eating attitudes and related disorders, body satisfaction, self-esteem and factors associated with these psychosocial factors, between January 1980 and January 2014 from PubMed/Medline; Science Direct; and Google Scholar using the key words "eating attitudes", "body esteem", "body satisfaction" and "weight control behaviors". For comparison purposes, data on eating attitudes and psychosocial-related factors from other South African studies were selected. All accessible publications falling within this time period which included data on eating attitudes, body satisfaction and weight control behaviors and/or in South Africa and internationally were included.

1.1 Background

Until recently, body image dissatisfaction, eating disorders and low self-esteem were thought to be limited to western societies and mainly to adolescent and adult females (3-5). More recently, studies in developing countries (6-9) have highlighted that these psychosocial disturbances are now a global public health concern, and are affecting males as well (10). Furthermore, these disorders have been considered "western culture bound disorders" where white women were perceived to be at more risk and black people were somehow protected (11). However, over the last 30 years studies in Low-Middle Income Countries (LMICs) (6-9) have highlighted that these psychosocial disorders are now common in other ethnic groups, as well as developing countries.

Eating disorders, body image and self-esteem are multi-factorial resulting from the interaction between biological, psychological, socio-cultural and interpersonal factors (12). The incidence of eating disorders has increased over the past decades (13, 14). Anorexia nervosa is said to mainly affect adolescents between the age of 15-19 years, with bulimia nervosa affecting individuals between the age of 16-35 years (15). Consequently, eating disorders have significant physical, psychological and social implications during adolescence (16, 17).

A number of studies on adolescents have linked body image dissatisfaction with eating disorders, and unhealthy weight control behaviors such as smoking, alcohol and drug abuse (18-21). It is during adolescence that both females and males experience a growth spurt with rapid physical development and social changes. This makes it a vulnerable period for psychological disturbance in both females (22) and males (23), however puberty has a more positive effect in boys compared to girls (24). During adolescence, girls tend to gain body fat resulting in a physique that moves further from the Western societal ideal which defines a lean woman as desirable, attractive, and successful (25). In contrast, the increase in body size among adolescent boys during this period results in a physique closer to the societal ideal i.e. muscular (23). However, it is problematic in adolescent boys and girls who are underweight or overweight with little muscle bulk during puberty (23, 24).

According to a review by Ricciardelli and McCabe, these cultural values of the 'ideal body image' are present in children, adolescents, and adults. While weight management behaviors in females are focused more on attaining a leaner body, eating disorders in males are associated with an increased desire for muscularity (26-28). The majority of adolescents express a feeling of discontentment with their physical appearance, often with girls describing themselves as fat even

when they are not (29). This results in poor eating habits and inappropriate weight management strategies (30). A less consistent pattern has been observed among boys, some wanting to be thinner while others want to be more muscular (31). Feeling self-conscious about one's body has been shown to lead to a decrease in physical activity, which in turn affects their eating behavior and may result in increasing body weight with an increased risk of overweight and obesity (32, 33).

Ethnicity and culture are important determinants of body image and body size perception, which in turn influence attitudes and behaviors thereby impacting on health status, body size, norms and body weight (34). In South Africa, socio-cultural pressure has been found to encourage internalization of the societal thin ideal body shape, which leads to body dissatisfaction, and the development of eating disorders among school girls aged 15-18 years) (35). In South Africa the prevalence of bingeing eating disorder (13%) and body dissatisfaction is on the rise especially in adolescent girls (6). According to Szabo's (1999) first publication on disordered black female cases that appeared in 1995 he concluded that "It is clear that within the broader South African community, eating attitudes exist that place a significant proportion of adolescents and young adults of all race groups at risk for the development of eating disorders."

Due to the high risk of obesity among South African girls and women (36, 37), and the concomitant increase in the risk of metabolic disease (38), it is important to understand the influence of cultural norms on eating attitudes and body image in this multi-ethnic transitioning society.

1.1.1 Adolescence

There are a number of definitions of adolescence in the literature. According to the World Health Organization (WHO) adolescence is the period from 10-19 years of age, mainly characterized by physical, psychological and sociological growth that transforms the dependent child into a functionally independent young adult. Adolescence is "the period of life beginning with puberty and ending with completed growth and physical maturity which spans ages 12 to 21 years in females and 13 to 22 years in males. Adolescence is divided into three stages; early (10-13 years), mid (14-16 years) and late (17 to early 20s). Transition through adolescence involves significant changes (refer to Table **1**), the most visible being physical changes.

Table 1: Stages of adolescent development

Stages of Adolescence	**Physical development**	**Cognitive Development**	**Socio-Emotional**
Early adolescence (10-13 years of age)	-Puberty: growth of body hair, increased perspiration & oil production in hair & skin. Girls-breast & hip development, onset of menstruation Boys-growth in testicles & penis, wet dreams, deepening of voice. -Rapid physical growth; gain height & weight -Greater sexual interest	-Growing capacity for abstract thought. -Mostly interested in present with limited thought to the future. -Intellectual interests expand and become more important. -Deeper moral thinking	-Struggles with sense of identity -Feels awkward about one's self and one's body; worries about being normal -Realizes that parents are not perfect; increased conflicts with parents. -Increased influence of peer group. -Desire for independence -Greater interest in privacy -Adjustment to a new body image, adaptation to emerging sexuality
Middle adolescence (14-16 years of age)	-Puberty is completed. -Physical growth slows for girls, continues for boys	-Continued growth of capacity for abstract thought. -Greater capacity for setting goals. -Interest in moral reasoning. -Thinking about the meaning of life. - Expansion of verbal abilities and conventional morality; adjustment to increased school demands	-Increased health risk behavior; sexual interests in peers; early vocational plans
Late adolescence (17-21 years of age)	-Young women, typically, are fully developed. Young men continue to gain height, weight, muscle mass and body hair.	-Development of abstract, complex thinking; Emergence of post-conventional morality	-Increased impulse control; emerging social autonomy; establishment of vocational capability -Establishment of a personal sense of identity; further separation from parents

Adapted from the American Academy of Child & Adolescent's Fact for families; Reprinted from Ingersoll GM, Psychological and social development. In: McAnarney E. Textbook of adolescent medicine © 1992,

South Africa is home to different cultures. After the abolishment of the apartheid legislation, increased social integration among young South Africans has taken place resulting in a greater exposure to various different cultural beliefs, which could alter adolescents' perceptions of ideal body shape/size. Previously, in South Africa eating disorders appeared to exist exclusively in white people (39, 40). This has however, changed and black Africans and mixed ancestral youth are now in a sociocultural flux between traditional cultural and Western values instilled through Westernization (35).

Although there is conflict between traditional cultural perceptions around plumpness and the Western desire to be thin among females, the increasing desire for a slimmer shape amongst girls in Western, and non-Western cultures, is a growing public health concern because of its association with eating disorders and poor weight management strategies (41, 42). There is evidence to indicate that eating disorders may also occur in different South African ethnic groups due to increasing exposure to 'Western' norms around thinness (6, 35, 41).

1.2 Conceptual framework

Given the current societal ideal body shape/size for boys and girls, it seems that physical changes in body shape/size impact an adolescent's sense of self-esteem and general well-being. Longitudinal studies have shown that body dissatisfaction in adolescent boys and girls predicts the later development of depression, anxiety and low self-esteem. (43, 44), and is more likely to result in the development of eating disorders. Previous studies in Western countries have explored the relationship between eating disorders and bio-psychosocial contributors (biological, psychological and sociocultural factors) (45).

Figure 1 is a conceptual framework model adapted for this thesis illustrating the relationship between biological, psychosocial and sociocultural and disordered eating among adolescents. The framework is adapted from McCabe and Ricciardelli, whose bio-psychosocial model examines both body change strategies and eating disorders among the youth (46, 47) . Biological, psychological and sociocultural factors have been found to be associated with body weight/shape, and behavioral changes and eating disorders in adolescents. As for biological factors, BMI has been found to be the main predictor for body image and body change strategies. This is mainly prompted by the physical changes that take place during puberty.

Besides biological factors, psychological factors such as self-esteem, body esteem, adolescents' perceptions and evaluation of their body shapes and comparison with others have been associated with adolescents' engagement in body change strategies and eating disorders. Poor self-esteem in adolescents has been associated with high levels of body image dissatisfaction. Sociocultural factors include pressure from parents and peers, media, race, socioeconomic status and teasing. All these are aimed at achieving the societal ideal body shape, and consequently may lead to engagement in extreme weight loss/muscle gain strategies and eating disorders.

This conceptual framework fits well in a South African setting the following issues have been found to influence eating attitudes and body image include; (urbanization, gender, ethnicity, socio-economic status (SES), media and family and community influences) (48). South Africa is undergoing rapid urbanization which is accompanied with a shift from traditional norms to Westernized lifestyle. However, studies have shown that there is retention of beliefs around lifestyle and body image. Socio-economic inequalities is a major concern in South Africa, studies have shown association between households with food insecurity and poor dietary

quality. Conversely, increased consumption of meat products, fast foods and portion size have been noted among the affluent household (49). In addition, ethnic groups have been shown to play a major role in determining body shape/size preferences in South Africa (48, 50). Among the blacks overweight/obesity is a sign of health and being HIV/AIDS free.(51) Furthermore, African cultures encourages children and women to gain weight since it signifies affluence, beauty and a sign that the father/husband is taking ‘good’ care of the family (49).

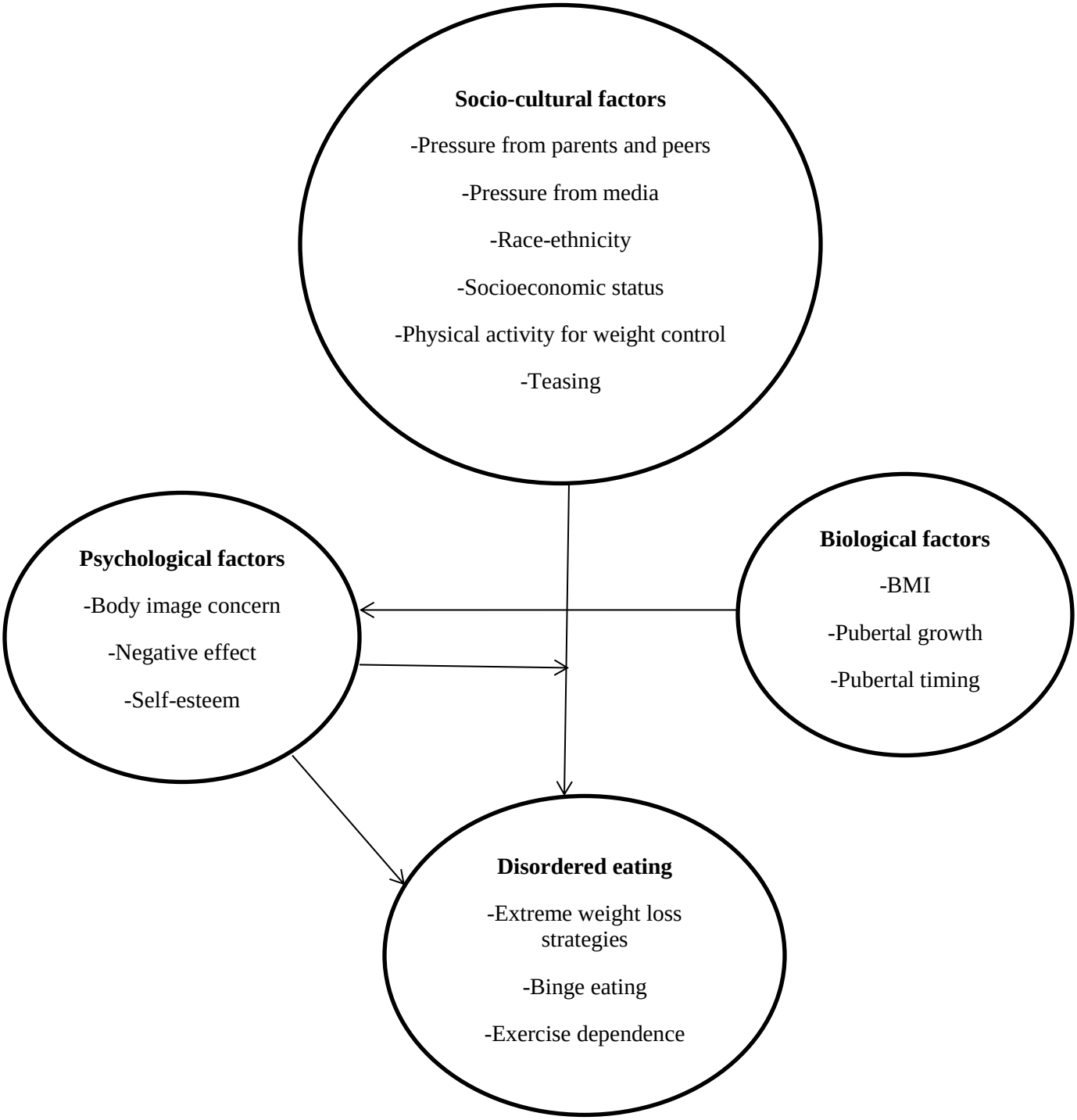


Figure 1: A bio-psychosocial model of males' body dissatisfaction and eating disorders

1.3 Obesity

Approximately 1.7 billion people globally are overweight or obese making it the biggest health threat (52) and a contributing factor to the overall burden of disease and mortality

(53-55). Obesity is an increasingly important cause of childhood and adolescent morbidity globally, and a huge contributor to metabolic diseases such as hypertension, cardiovascular diseases (CVDs) and type II diabetes (56). Obesity in adolescents has been well researched in developed countries such as the USA(57), Australia (58) and the Netherlands (59). Studies in Africa have shown that the etiology and prevention of obesity in adolescence is complex due to the coexistence of both under-nutrition and over-nutrition (60, 61). In Sub-Saharan Africa (SSA), the prevalence of overweight/obesity varies geographically; in Ethiopia is 1%, Gabon 21.1%, Swaziland 23.1%, Mauritania 23.3% and 27% in South Africa. The burden of non-communicable disease in SSA is projected to increase up to 20%-34% among adults aged 15-59 years by 2020 (62) (38).

Recent studies have documented an increasing prevalence of obesity in developing countries particularly in urban areas (63, 64). In South Africa, overweight/obesity prevalence increased from 11.9% to 21.8% in children at age six and thirteen years (65, 66). There are alarming increasing obesity trends as a result of a shift in nutritional and lifestyle behaviors such as an increased consumption of fast foods and soft drinks, increasingly sedentary lifestyles and reduced physical activity (67, 68). Previous studies found the prevalence of obesity related diseases such as type II diabetes in Africa to vary from 15-70%, with 20-50% of urban population in Africa classified as overweight and obese (69, 70). **Figure 2** explains how overweight predisposes youth to shape and weight concerns, which consequently trigger unhealthy eating behaviors (71, 72).

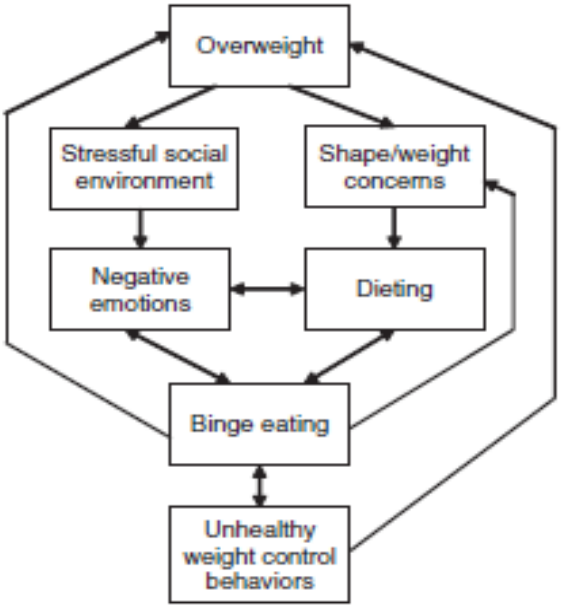


Figure 2: The relationship between overweight and shape and weight concerns (71)**.**

This study uses body mass index (BMI) measure which is the hallmark of overweight and obesity is excess adipose tissue. Body mass index derives a measure of adiposity by adjusting body weight for individual differences in height (73). However, BMI major assumption represents adiposity independent of age, gender and ethnicity i.e. all subjects have the same relative fatness regardless of age, ethnicity and age. Previous research has shown that relative extremity length independent of total stature to be associated with fatness and BMI, lower extremity to stature ratio is said to be greater in adult blacks than whites even with the same age (74).

1.3.1 Malnutrition in South Africa

South Africa just like any other developing country is undergoing a rapid political, health and socio-economic transition, which is associated with an increase in NCDs in both rural

and urban areas (38, 75, 76). Popkin and colleagues have also noted this previously in societies undergoing nutrition transition that includes a coexistence of under- and over-nutrition (68). South Africa is experiencing a quadruple burden of disease characterized by a combination of poverty related communicable diseases, increased HIV/AIDs infection and an increase in lifestyle related non-communicable diseases, in a population that is experiencing a heavy burden of perinatal and maternal disorders, injury and violence (38, 75, 77).

In South Africa obesity is most prevalent among black women. According to the most recent South Africa National Health and Nutrition Examination Survey (SANHANES-1) that was conducted in 2012, girls aged 10-14 years had a significantly higher prevalence of overweight and obesity than boys (16.5% and 5.6% compared with 7.5% and 2.7% respectively) (78). The prevalence of overweight and obesity among black women is 58.5%, which is higher than other South African ethnic groups (mixed ancestry 52%, white 49.2%, Indian 48.9%) (37). Similarly, in rural South Africa black girls had a greater prevalence of overweight than boys (16% and 4% respectively), at age 14 years 19% of the boys and 4% of the girls were underweight (61). The high prevalence of obesity among black South African women may be attributed to the cultural and aesthetic belief that "bigger is better" (49, 79). In some African cultures in South Africa, being overweight is regarded as a sign of success, wealth, good health (HIV/AID free) and an indication of happiness (80).

1.4 Body image satisfaction

Body image can be defined as "the picture of our body which we form in our mind, which includes our perceptions of our bodily boundaries, a sense of attractiveness and perception of bodily sensations" (81).

Body image is a multidimensional concept that involves perceptual, affective, cognitive or behavioral disturbances (82). Previously, body image studies have focused on girls and adult females because body image disturbances are pronounced in this gender. This has however, changed over the past 10 years since recent research has observed an increase in the number of boys and men presenting with progressing preoccupation with body dissatisfaction, and eating disturbances (10, 83, 84). Studies in developing countries including South Africa and Zimbabwe (7-9, 85) have highlighted that psychosocial disorders are now a global public health concern with increasing attention on males (10). While girls and women might feel pressurized to conform to an ideal level of thinness, males are more likely to adhere to pressure to be muscular, strong and broad (10, 28, 86, 87). Studies have shown that the drive for body shape change, whether to obtain muscularity or thinness, for aesthetic or athletic reasons, has resulted in negative physical and psychological effects on the adolescent (88-91). In pursuit of an ideal body, female and male adolescents are engaging in inappropriate weight management strategies such as dieting (92), engaging in strenuous physical exercise, and using steroids and laxatives (93).

1.4.1 Body image dissatisfaction during adolescence

Body image dissatisfaction is "a discrepancy between the individual's perception of their body size and their real body size, a discrepancy between their perception of their actual size and ideal

size/shape, or as feelings of discontent with their body size and shape". According to Stice and Shaw (94), body image dissatisfaction refers to "a negative subjective evaluation of one's physical body, such as figure, weight, stomach, chest and hips".

The development of body image dissatisfaction is more pronounced during adolescence (95), however some studies have traced body dissatisfaction back to childhood (96, 97). A significant proportion of adolescents are not satisfied with their body size/shape (98, 99). A number of factors are associated with the development of body image disturbance, including pubertal weight gain and associated body changes (100), high BMI (99), and increased social challenges (92). During adolescence, parental, peer and media attitudes towards overweight and obesity, as well as socioeconomic status and cultural influences, affect the adolescents' perception and evaluation of the "societal ideal". Other factors that influence body image during adolescence include low self-esteem, and negative affect and depression (43, 87, 101-103).

Several studies have examined body image perceptions among adolescent boys and girls. According to longitudinal studies, media, weight-related teasing, high BMI and social support deficit have been shown to play a major role in influencing body dissatisfaction which strongly predicts the development of disordered eating among adolescents. (104-106) According to a community-based study by Teinboon and colleagues (107)more than half of adolescent boys and girls (age 14-15 years) had tried to change their weight by eating less and exercising more. Of these participants 70% of the girls and 34% of the boys associated weight loss with overall well-being (feel better), 42% of girls who had a normal body weight perceived themselves to be overweight, and 73% of girls had tried losing weight. According to a prospective study that assessed 15-16 year old adolescent girls, approximately half of them had dieted to lose weight,

almost 40% had exercised to lose weight, 9% had vomited to lose weight and 6.8% had used diuretics and laxatives (98). According to a study that was done in Israel on early adolescents in grade 3 to 11 (8-16 years), 43% of the participants wanted to lose weight and 41.6% exhibited weight control behaviors (108). Another study that was done in the U.S among 8-13 year old adolescents, found that 50% of them wanted to weigh less and 16% had attempted losing weight (96). According to Duncan and others in the UK, a study among 11-14 year old boys and girls, found that boys had a better body image compared to girls (109). Body dissatisfaction was also found to be predominant in China among obese children and adolescents (110). In a study by Fear (1996), 70-76% of adolescent girls chose a thinner figure than their ideal (111) and over half indicated that they had tried to lose weight, and another study reported that a third of adolescent boys wished to be thinner while over a third of them desired to be larger than their current size (112)

1.4.2 Body image dissatisfaction in Africa

Few African studies have examined body image in adolescents (113, 114) as shown in **Table 2**. A study from Cameroon showed that females from rural areas desired to be "fat", those from the poor urban areas desired to be "a little bit fat" while those from rich urban areas desired to be "normal" (113). A Nigerian study that examined nicknames and factors associated with name calling revealed that 26.7% of adolescents in secondary school got their nicknames based on their physical appearance and more specifically their body weight. This study suggests that African cultures tend to emphasize physical appearance which may result in children and adolescents striving to meet the "societal ideal" figure (114).

Table 2: Adolescent boys and girls body image studies in Africa

Author	**Sample**	**Results**
Salokum et al., 1985	300 adolescent school children (160 boys and 140 girls) aged 12-16 years	-57% of the girls preferred a thinner body shape, -Both boys and girls associated poor intelligence, poor athletic ability and likelihood of being selfish with an overweight silhouette. -A thinner silhouette was associated with intelligence and poorer social skills by both boys and girls. -Muscular body shape was associated with increased intelligence and better social skills by boys and girls.
Dapi et al, 2007	12-15 year old adolescent females from Cameroon	Urbanization and SES influence desired shape. Girls in poor rural areas desired to be "fatter", whereas those in poor urban and rich urban areas desired to be "a bit fatter" and "normal", respectively
Kolawale et al., 2009	506 adolescent boys and girls in Ile-Ife, Nigeria	26.8% of nicknames was associated with the child's body weight

1.4.3 Body image dissatisfaction in South Africa

Previous studies have shown that body image is mainly influenced by social norms and culture (115, 116). Studies in South Africa have shown that leanness among black South Africans is not necessarily perceived as beautiful, but rather being plump (overweight) signifies beauty, health and higher social status (79). Furthermore, in a study of n=44 black women (28-60 years) from Khayelitsha, South Africa being overweight was associated with happiness, affluence, and the absence of disease (such as HIV/AIDS) (49). In addition, having overweight children is a measure of 'good' parental care (79). Mchiza et al. (2005) developed and validated culturally

sensitive body silhouettes for use in South African studies. In their study of measuring body image and body weight dissatisfaction in South African mothers and their daughters, black girls were found to have less body image concerns and had a better body image compared to white girls. Their findings also showed that black adolescents received less pressure from family and peers to change their current body shape. According to another study on 10-18 year olds Hispanics from El-Salvadoran American children and adolescents (Washington, DC), overweight participants had greater body image dissatisfaction compared to those with a normal BMI.(117). In addition, 33%, 26% and 20% of whites, blacks and mixed ancestry participants, respectively reported body image dissatisfaction (35), suggesting that body image dissatisfaction is ethnic bound in South Africa. According to the most recent SANHANES-1 findings, more females than males (13.8% vs 8.8%) indicated that they were unhappy with their current weight (78).

As much as the ideal for heavier body image protects black females from developing anorexia nervosa (118), it increases their risk for overweight (119). However, as South Africa goes through epidemiological transition adolescent boys and girls are exposed to Western ideals this is changing. This has resulted to cultural interaction that creates additional conflict between traditional beliefs and new Western ideals.

1.4.4 The measurement of body image dissatisfaction

Body image dissatisfaction can be quantified in three ways:

Distorted body size estimation

Body dissatisfaction is conceptualized as a distortion of body size estimation, and a perception that the body is larger than it really is. Studies which have used this approach have shown that anorexic patients overestimate their size and individuals with clinical eating disorders display greater perception distortion than non-clinical participants (81).

Discrepancy from the ideal

This approach emphasizes the discrepancy between reality and the ideal body shape and size. Individuals internalize a culturally determined body ideal and realize that there is a discrepancy between their own body and that of the ideal (81, 120). Body silhouette pictures of varying sizes are used in this approach and the participant is asked to state which of the silhouettes is closest to how they look now and which one best illustrates how they would like to look. Several studies have used this approach with normal participants (121), including pre-adolescents and adolescents (122), as well as subjects with eating disorders (123).

Negative response to the body

This approach measures one's negative feelings and cognitions regarding the body (81). This approach defines body dissatisfaction as negative subjective evaluations of the body (94) , referring to discontent with the stomach, hips, muscles, chest, thighs and buttocks. Negative responses to the body have been assessed using several questionnaires e.g. Body Shape Questionnaire (124)the Body Areas Satisfaction Scale (125), the Body Attitudes Questionnaire, the Body Esteem Scale (126).

1.5 **Self-esteem**

Self-esteem (SE) refers to the evaluative and affective sense of one's self (127), and is one component of an individual's self-concept, which includes their mental and physical characteristics and self-evaluation . SE is the discrepancy between what an individual is (self-image) and what an individual would like to be (self-ideal) (128). SE during adolescence is affected by an individual's judgment of self-competence in areas of greater value, such as physical attractiveness and acceptance by peers.

Research has shown that development of a high SE requires experiences of success within fields perceived to be of importance in someone's life (129). Previous research has shown that for a good sense of self-esteem to develop it is important to have a caregiver's guidance and support during childhood and adolescence (130). During childhood, self-esteem develops in response to the rejection or acceptance obtained from caregivers or significant others. During adolescence, positive and warm interaction with caregivers has been found to be associated with positive representation of self and a high self-esteem (131).

Studies have shown a strong association between low SE and increased eating disturbance and concerns about fatness (98) among adolescents. High self-esteem has been shown to be protective against disordered eating habits (132), and patients presenting with eating disorders have lower levels of self-esteem compared to controls (133, 134). Self-esteem during childhood has been shown to be slightly different between boys and girls (135), girls being more dissatisfied with their body weight and have a poorer body image than boys (136). According to Robins et al (137), self-esteem declines during adolescence because of body image dissatisfaction and puberty associated issues, and increases again during adulthood. Other studies

have shown low self-esteem, in males and females, to be associated with increased levels of body image dissatisfaction (138, 139). A significant association between muscle dissatisfaction in men and poor self-esteem has also been demonstrated (88, 140). The majority of adolescent males who use steroids had low self-esteem as compared to those with high self-esteem (30, 141).

Several studies have been done in South Africa to measure factors influencing self-esteem among adolescents. According to one study that measured association between racial preferences and self-esteem in black children found self-esteem and overall ethnocentrism to be high among older children (age 10-12 years) compared to younger ones (age 6-8 years). (142) Self-esteem was also found to be significantly associated with at least one risk behavior in both female and male adolescents in grade 8 and 11. (143)

1.5.1 Self-esteem across the lifespan

An internet based cross-sectional data was used to create a self-esteem trajectory (As shown in **Figure 3**) across the lifespan included a large sample of male and female participants (n=326,641) ranging in age 9-90 years. These participants were from different socio-economic status, ethnicity and nationality. Self-esteem was measured using the Single-Item Self-Esteem scale (SISE) at three time points (during childhood, adolescence and adulthood). (144)

Childhood: High SE during childhood may be attributed to self-view which is unrealistically positive, however as children grow they begin to base self-evaluation on external feedback and social comparison, hence forming a more balanced and accurate appraisal of their academic competence, social skills, attractiveness and other personal characteristics (144).

Adolescence: Adolescence is the most critical period in life for the development of SE as it is during this period that one gains a firm sense of identity. A decrease in SE may be attributed to body image dissatisfaction and other issues associated with pubertal development, acknowledgement of missed opportunities, failed expectations, academic challenges and societal complexities in schools (144).

Adulthood: A gradual increase in SE occurs throughout adulthood with its threshold around late 60s. (145) This can be associated with high levels of maturity and adjustment and increased levels of emotional stability.

Old age: A decrease in SE is observed which can be attributed to dramatic confluence of changes including retirement, loss of a spouse and health problems.

1.5.2 Gender differences in self-esteem

Increasing gender divergence has been observed throughout the lifespan and the gap widens during adolescence when boys' SE increases while girls' decreases. The gap persists during adulthood and narrows or even disappears in old age (144, 145). Brown and colleagues found in a longitudinal study that self-esteem tends to decrease with increasing age in adolescent girls compared to boys. (146). Similarly, boys have a higher self-esteem than girls especially during early adolescence (147).

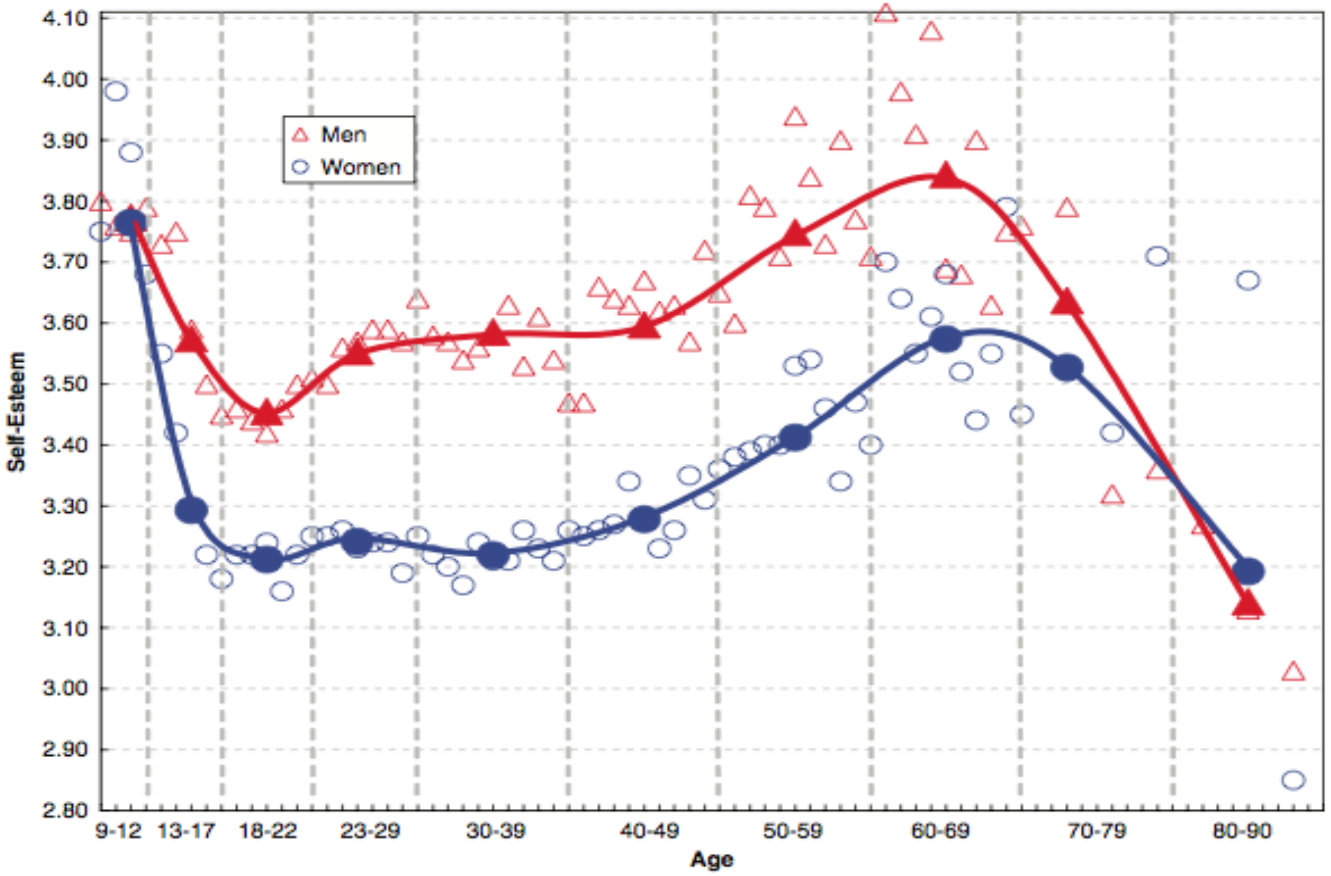


Figure 3: Mean levels of self-esteem for males and females across the lifespan. Adapted from Robin et al (144)

There have been methodological discrepancies between global self-esteem and the multi-dimensional self-concept measuring tool. Self-concept targets at measuring perceptions that are based on self-knowledge and evaluation of value of ones own capabilities formed through experiences. Self-concept narrows the focus to a more concise topic such as academic self-concept and addresses a more factual side of life and can vary throughout an individual's life. Global self-esteem on the other hand measures feelings an individual has about himself or herself. Self-esteem is dependent on attitudinal factors. Self-esteem differs from self-concept in that self-esteem addresses feelings and emotions of the individual. Research has shown that self-concept tends to be a component that varies little over time; self-esteem tends to flow throughout one's lifetime. (148)

1.6 Eating attitudes and eating disorders

Eating attitudes can include thoughts about dieting, striving for thinness and preoccupation with food. Abnormal eating attitudes are attitudes surrounding food that are unhealthy or different from that of the general population. (15, 149). A Nigerian study of black, urban secondary school pupils and university students, using the EAT-26 questionnaire, reported an abnormal eating attitudes prevalence of 18.6% (150). An Egyptian study (151), conducted at a secondary school (15-16 years) in Cairo, reported a prevalence rate for abnormal eating attitudes of 11.4% using the EAT-40 (152). The prevalence of abnormal eating attitudes among adolescents living in high income countries (HICs) as defined by the EAT-26 ranges from 5%-30% (153-158).

Eating disorders are "of great interest to the public, of perplexity to researchers and a challenge to clinicians" (15). The etiology of eating disorders is complex, and its associated risk and protective factors are not fully understood (159). Although most studies attribute eating disorders to socio-cultural influences, biological, psychological, sociological and familial factors are associated with their development (160). The

prevalence of eating disorders in female adolescents and adult women ranges between 0.5-1% for anorexia nervosa (AN) and 1-3% for bulimia nervosa (BN). Slightly lower percentages have been reported in males, with 1.08 % for BN and 0.92% for AN (161).

Social, environmental, cultural, familial and psychological norms are responsible for molding children and adolescents' beliefs about fatness and their awareness of the societal "ideal" body shape as dictated by the dominant culture in their society. Historically, eating disorders have been shown to occur in white adolescents and young adult females of upper socio-economic status who lived in socially competitive environments (162). Studies have observed an increase in the prevalence of eating disorders, and disturbed eating attitudes and behaviors not only among women in western cultures but also amongst adolescents and young adults of both genders, and across cultural and racial boundaries (163-165). Moreover, studies have noted that the age of onset of eating disorders is decreasing and significantly contributing to the increased prevalence of disturbed eating attitudes (149, 166). Some studies argue that it is more difficult to diagnose eating disturbances in males because they are less likely to engage in extreme weight loss behaviors. Furthermore, binge eating is socially acceptable for men than females (26). According to Striegel-Moore & Franko (2002), preadolescents and adolescents are at greater risk of developing eating disorders due to their increasing concern with their body shape thereby resulting in body image dissatisfaction.

1.6.1 **Eating disorders in the South African context**

Eating disorders in South Africa were first described in white females in the 1970s (39, 167), with the first cases in the black population only being reported in 1995 (168). According to a Cape Town hospital admission survey that was completed between 1979 and 1989, no black South Africans were referred for AN or BN treatment (169). In 1987 Shefer (170) reported that 11.8% of white female university students scored high on EAT-40 (indicative of possible

eating disorders), of whom 6.3% engaged in self-induced vomiting and 21.9% in binge-eating. Eating disorders in South Africa were considered to be as “a disorder that occurred predominantly in the white population”, due to their close alignment with Western cultural ideas (167, 170, 171). The first black patients described with eating disorders had several features in common including urbanization, higher education and a fear of being fat (172). South Africa is undergoing rapid nutritional, political, socio-economic and cultural transitions (173), which cut through all aspects of society, and have caused change and evolution of beliefs, values and the emergence of eating disorders in all population groups (174). This has led to homogeneity of eating disorders in South Africa i.e. a similar distribution of eating disorders across all ethnic groups (175). However, according to Szabo, there were very few cases of eating disorders among blacks, because of the stigma of having "a white man's disease" this kept some black Africans from seeking help. For example, he reported a case of a young black girl being treated for an eating disorder who was verbally attacked by black nursing staff. The nurse asked her how she could suffer from a 'white man's disease. In addition, there has been a tremendous migration of people from rural areas to urban settings has brought new sociocultural trends. The rising number of EDs among the blacks has been found to be as a result of acculturation (2, 176).

Several studies in South Africa have examined the relationship between ethnicity and eating attitudes, eating disturbances and behaviors (**Table 3**). Several studies of adolescent girls (35, 168, 176, 177) and university female students (1, 178) have shown that abnormal eating attitudes among females are prevalent in South Africa across all ethnic groups. Studies of adolescent males have previously received little attention, however Le Grange et al (6, 85) and Marais et al. (179) have reported that more black African than white male students had eating disorders.

Table 3: Summary of South African studies on eating disorders among adolescents

Authors	**Sample**	**Findings**
Shefer, 1987	Female undergraduate students (n=321) age 17-35 years.	11.8% of white females scored positively on the EAT40 of which 21.9% engaged in binge-eating and 6.3% induced vomiting on a regular basis.
Szabo et al., 1995	Adolescent girls of different ethnicities attending a private school in Johannesburg (mean age 14.75±1.4 years)	Adolescents and young adults across all the ethnic groups at risk of developing eating disorders.
Le Grange et al, 1995	N=321 adolescent boys and girls from different ethnic groups (mean age=14) in private and public high schools.	15% of females and 2.4% males had eating disorders
Szabo & Holland, 1997	n=213 girls (average age14.7±1.39 years), different ethnic groups in private high schools in Johannesburg	Abnormal eating attitudes (EAT-26 >20) in 26% of the white participants and 37.5% of the black participants.
Le Grange et al., 1998	1 435 male and female students (17-25 years) from 6 universities (Caucasians, Black, Asian and mixed ancestry) in Cape Town and Durban.	Using the BITE tool black students (5%) reported more severe eating related attitudes and behavior than white students (4%). Black females had a higher BITE score than others. Black males and females combined scored significantly higher than each of the other ethnic groups
Caradas et al., 2001	Adolescent girls (60 black, 83 mixed races and 85 white) aged between 15-18 years.	Similar distribution of abnormal eating attitudes (EAT-26) in Black (17.9%), mixed ancestry (17.1%) and white (21.2%) groups.

Marais et al., 2003	n=50 black males, 50 black females and 50 white males.	Black men had significantly higher scores than white men on the psychological subscale of the EDI.
Szabo et al., 2004	n=1353 adolescent girls	Prevalence of abnormal eating attitudes (EAT-26) was similar in black (18.7%) and white girls (18.6%).
Edwards et al, 2004	High school (13-19 years.) and University (20-21 years) black and white females	Both black and white females' students at high school and university had similar levels of eating related disturbances.
Edwards & Moldan, 2004	University students: 40 black females, 39 black males, 40 white females and 42 white males. Age 17-23 years.	6% of black females, 25% of white females, 5% of black males showed evidence of eating pathology using Bulimia Test (BULIT).
Szabo & Allwood, 2004	N=361 rural black females (mean age 17.87 (SD=2.77)	3% scored reported an EAT-26 score >20.
Szabo & Allwood, 2004	Urban black (n=578) and white (n=506) females and other ethnic groups (n=269).	Prevalence of abnormal eating attitudes was 18.7% among blacks and 18.6% among whites
Le Grange et al., 2006	895 high school and college students (n=515 white, n=126 black and n=254 mixed ancestry) males and females (age 14-24 years)	3.5% of the participants were at a higher risk of developing eating disorders. No significant differences in BITE score between black and white participants.
Gitau et al., 2014	340 urban South African adolescent girls aged 13, 15 and 17 years, attending private and government (public) high schools.	More black girls (31.2%) reported an EAT-26 score ≥ 20 compared to white girls (19.7%) even though the prevalence of overweight/obesity among the white girls was higher (29.5%) than in their black peers (25.1%). White girls had a higher BMI and lower self-esteem, yet better body image score compared to their black

		peers. Black girls exhibited a greater tendency to control what they ate compared to white girls, while more white girls had a desire to be thinner compared to black girls.

1.6.2 **Classification and diagnostic criteria for eating disorders**

According to the Diagnostic and Statistics Manual of Mental Disorders (DSM-V-TR), "eating disorders are characterized by severe disturbances in eating behavior" (180). There are three main classifications of eating disorders, namely anorexia nervosa, bulimia nervosa and atypical eating disorders (eating disorder not otherwise specified) (181).

Anorexia Nervosa

Anorexia nervosa (AN) is characterized by a severe and restrained food intake, with the exclusion of fattening foods from the diet, resulting in a body weight that is at least 85% below the normal weight-for-age and weight-for-height. Anorexic individuals are extremely afraid of becoming fat, even when they are underweight, they have distorted perceptions of their body shape and weight making them feel that they are overweight or that some of their body parts are fat, such as the hips and buttocks (180). As well as reducing their food intake the majority of individuals with AN also engage in other extreme weight control behaviors such as over exercising, self-induced vomiting, and misuse of laxatives or diuretics. The principal diagnostic criteria for AN according to the ICD-10 is a BMI equal to or below 17.5kg/m^2 (underweight) (180). Another criterion is amenorrhea among post-menarcheal females who are not on oral contraceptives (15, 180). Depression, irritability, impaired concentration and anxiety disorders are common symptoms associated with AN (15).

Bulimia Nervosa

Bulimia nervosa (BN) is characterized by recurrent episodes of uncontrolled over eating (binge eating), followed by extreme measures of weight gain control (180). The extreme strategies for weight gain control include compensatory self-induced vomiting, laxative misuse, diuretics, enemas, fasting or excessive fasting (180). Bulimia Nervosa has a persistent course, marked with high levels of co-morbidity with a lifetime prevalence of 2% among females (182). The principal diagnosis for BN patients includes over-evaluation of their body shape and weight (judging self-worth), recurrent binge eating and extreme weight control behaviors (15, 180).

Atypical eating disorders

Atypical eating disorders, also known as Eating Disorder Not Otherwise Specified (EDNOS) include those eating disorders that do not meet the DSM-V-TR criteria (183)for AN and BN. Most of the EDNOS cases are characterized by maintaining a strictly controlled eating plan and over evaluation of body shape and weight (15). EDNOS is the most common eating disorder and is 2-5 times as common as AN or BN (184, 185), and also highly prevalent among adolescents. Eating Disorder Not Otherwise Specified has serious and long-term health consequences.

1.6.3 Epidemiology of eating disorders

Approximately 90% of AN and most cases of BN occur in females (15). The prevalence of AN among adolescent girls is 0.7%, and 5% of these cases have their onset in the early 20s (186). BN is more common than AN, particularly in adults aged between 16-35 years with a prevalence of 1-2%. Societal influences have contributed to the steady increase in adolescent eating disorders over the past 50 years (187). A number of studies on socio-cultural theory have demonstrated that adolescents' internalization of the western ideal body shape may lead

to an increase in body dissatisfaction, dietary restraint and disordered eating habits (94, 187-189).

The National Institute of Mental Health estimates that EDs affect over 5 million Americans. According to studies in HICs, the prevalence of eating disorders (190) is not only increasing but also starting at an early age. (191) (192)

For many decades it was assumed that eating disorders were indigenous to western cultures only. However, there is growing current evidence suggesting otherwise. Community based African studies that measured eating attitudes in vast populations (adolescents, young adults in both rural and urban areas (35, 85, 150, 176, 193) (1, 151, 194, 195) during the 1980s and 1990s provide support for the hypothesis that the 'western' epidemic of eating disorders has arrived on the African continent.

1.6.4 Risk factors for eating disorders

A number of factors have been identified in the development of eating disorders (188), including:

Genetics

Research has shown that first-degree female relatives and monozygotic twin offspring of patients with anorexia nervosa have increased rates of anorexia nervosa and bulimia nervosa. Individuals who have had a family member with an eating disorder are 7-12 times more likely to develop anorexia or bulimia nervosa than of the general population. Suggesting that individuals who are born with certain genotypes are at heightened risk for the development of an eating disorder. This also means that eating disorders are heritable. Furthermore, families of patients with bulimia nervosa have higher rates of substance abuse, particularly alcoholism, affective disorders, and obesity (196). Personal traits such as impulsivity,

negative affect, perfectionism, and low self-esteem are risk factors that may largely be genetically determined (197).

Culture

Several studies have identified culture to be the leading etiological factor for the development of eating disorders and body dissatisfaction (7, 198). The "Western" culture's female beauty ideal of extreme thinness is a risk factor for the development of eating disorders. Cultural models include the following steps;

a) Exposure to the thin ideal
b) Internalization of the ideal
c) Experience of a discrepancy between self and ideal

These factors eventually lead to body dissatisfaction, dietary restraint or dietary restriction (5). In addition, several cultures objectify the female body contributing to the risk of teaching females that they are valued primarily for their physical looks thereby reinforcing the desire to pursue attractiveness (199).

Prince defined a culture-bound syndrome as "a collection of signs and symptoms restricted to a limited number of cultures primarily by reason of certain of their psychosocial features" (198, 200). Epidemiological studies have shown that eating disorders vary across different cultures and change across time as culture evolves. Although for many decades it has been assumed that eating disorders and body dissatisfaction mainly occur in western cultures, particularly in adolescents from middle or upper socio-economic groups, there is now evidence that suggests otherwise.

There is evidence that links the increase in eating disorders among non-western populations to rapid socio-cultural and economical transitions, leading to the emergence

of the “culture reactive syndrome” hypothesis, which implicates “culture change” as a major risk factor for the development of altered eating attitudes and behaviors within a culture (201).

Gender

Globally, more females than males have eating disorders, this is evident in both cross-sectional (202) and longitudinal data (203, 204) making female gender a strong risk factor.

Socioeconomic status

International data suggests that people residing in affluent countries, and individuals with higher socio-economic status are on average thinner as compared to those with a lower socioeconomic status (205). Bruch (1973) describes AN as a disease of affluence (206) and a number of recent studies have found AN to be common among individuals of high socioeconomic status (188, 207-209). Different from other developed countries findings, South Africa has shown an inverse relationship between socio-economic status and obesity (48). South African studies have demonstrated an association between obesity and increased access to clean water and electricity, reduced housing density and physical inactivity, indicating a shift from traditional norms to a more Westernized lifestyle (80, 210)

1.7 **Factors influencing eating attitudes, body image and self-esteem**

Previous research has found biological, psychological and socio-cultural factors to be strongly associated with eating attitudes, body image and self-esteem in children and adolescents.

1.7.1 Biological factors

Biological factors include:

Body Mass Index

Body mass index (BMI) is known to be the main biological risk factor for body dissatisfaction and dieting behaviors in children (211) and adolescents (94, 212) of both sexes. Both cross-sectional (213) and longitudinal (214) studies have found an association between obesity and weight control behaviors among adolescent males and females.

BMI in males is associated with the pursuit of muscularity, as a low BMI would suggest a small size and thus a desire to get bigger and more muscular, and a high BMI might suggest that a person is overweight or obese and thus seeks to reduce their body fat. However, in cross-sectional studies there are only weak associations between high BMI and dieting and other weight control behaviors among adolescent boys and girls (46, 215). Low BMI is associated with steroid use, overeating and the use of food supplements in males (216).Conversely, an elevated BMI was found to have a linear relationship with body image dissatisfaction among college female students (217), another study found high BMI to be strongly correlated with negative body image. (218)

Pubertal development

The onset of puberty signifies the start of physical development that is marked by significant muscular growth in males and fat accumulation in females, particularly on the abdomen, buttocks and thighs (219, 220). Rapid physical growth is experienced during puberty, with a mean weight increase of 38% in boys between the ages of 13 and 15 years, and of 40% in girls between the ages of 11 and 13 years (221). The physical changes that take place during puberty may prompt adolescents to direct their attention to their body changes, which may result in body dissatisfaction and the development of eating disorders (222). Early maturation among girls has been found to be a major risk factor for body dissatisfaction, low self-esteem, depression and eating disorders (223-226). According to a comparison study that was done between early and late maturers, those who matured late reported better body satisfaction and

lower rates of eating disorders compared to those experiencing early maturation (227). Contrary to girls, late maturation among boys is associated with high levels of body dissatisfaction, and more disagreements with parents (226, 228). However, a recent longitudinal study found that both early and late maturing boys engage in body change strategies in the pursuit of muscularity (89). Another study, by O'Dea & Abraham (1999), reported that when compared to pubertal boys, pre-pubertal boys are less likely to engage in weight loss and body building strategies. However, other studies have found no association between pubertal timing and weight change strategies in boys (229).

Gender

Studies have reported adolescent gender differences in body dissatisfaction, self-esteem and eating disorders (83, 230). Females are more likely than males to experience body image disturbances (92), and eating disorders (231, 232). Similarly, males are less likely than females to weigh themselves often, describe themselves as obese, and engage in dieting behaviors (233). Men have a tendency to have a more positive body image compared to women (234), as males view physical growth more positively than females (235). However, males are not immune to body image dissatisfaction (234), while females strive for a thin body with slim hips, bottom and thighs, males desire a V-shaped body with large biceps, chest and shoulders (83). Body dissatisfaction in males and females will very often develop into eating disorders (180).

According to Western culture beauty is emphasized as a core feature of femininity, and leads to an increase in eating disorders among girls and women as they try to conform to the societal 'ideal' body shape/size. In a study done on 8-12 year old boys and girls, almost half of the girls and a third of the boys wanted to be thinner (Rolland et al., 1996). In addition, Thelen and Cormier have shown that girls significantly desire a thinner body compared to

boys (236). There also appears to be a gender difference in body image satisfaction and weight concerns, with girls showing more dissatisfaction compared to boys (237). Studies have shown that adolescent boys tend to have steady or high body esteem (the level and degree of positiveness which an individual clearly attributes to his or her own body) while girls experience a decrease during adolescence (235).

Some males develop a condition known as muscle dysmorphia in which muscular boys and men see themselves as thin and underdeveloped (238). Muscle dysmorphia has been associated with increased levels of body dissatisfaction and active engagement in detrimental weight-management strategies such as eating disorders, use of anabolic steroids and excessive exercise in males (239-241). Muscle dysmorphia patients become "…pathologically preoccupied with their degree of muscularity, which may cause them to suffer severe subjective distress, and impaired social and occupational functioning, and results in the abuse of steroids and other substances" (242). Behaviors that reflect body image disturbance in muscle dysmorphia include persistent mirror checking, constant comparison with others and reassurance-seeking behavior.

Genetics

A number of studies have unpacked the role of genetics in the development of eating disorders (243, 244). Studies of AN and BN in families have found a higher lifetime prevalence of eating disorders among relatives (245, 246). According to twins studies, eating disorders, especially AN and BN, are mainly influenced by genetic factors (247, 248). Several studies have built up three casual models that explain the interplay between genetics and environment and how they influence eating attitudes (243). These include:

Passive gene-environmental correlation, which explains how children receive genes from the same individuals who have created their family environment (unless adopted). The parent

may be passing down genes that influence the development of eating disorders through modeling disordered eating behaviors and attitudes.

Evocative gene-environmental correlation, which explains how individuals with a genetic predisposition to a disorder seek out appearance related comments from parents and peers. These comments may be positive or negative, and reinforce the individual's tendency to over-value appearance.

Active gene-environmental correlation, which explains how an individual with genetic vulnerability to an eating disorder seeks out environments that reinforce appearance, e.g. modeling or gymnastics.

1.7.2 Socio-cultural influences

Socio-cultural factors have also been shown to be the most influential risk factors for eating disturbances, body dissatisfaction and low self-esteem during adolescence. Socio-cultural factors include media, family, cultural taboos, and social norms, (249). The tripartite influence model of body dissatisfaction and eating disturbances in adolescents (as shown in **figure 4)** is well-known to represent the three most common socio-cultural factors: messages from family, peers and the media (3), which translate into the processing of unrealistic ideals promoting a thin body image for female identity and societal approval (250). The model also explains the social comparison and thin ideal internalization mechanism which are said to mediate between the three factors. Human beings evaluate themselves through social comparison processes whereby they compare themselves to others by evaluating their ability, attitude and physical appearance. The process of social comparison is divided into three main parts; 1) acquisition of social comparison information; 2) thinking about the information in relation to self; 3) reacting to the information (251). Two cross-sectional studies have shown

that perceived pressure from parents, peers and media to increase muscle in males and leanness in females, were associated with weight change and muscle gain strategies (46, 87).

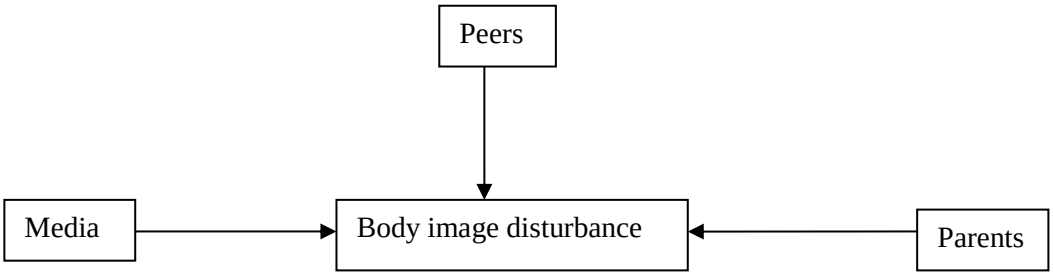


Figure 4: The tripartite influence model of body dissatisfaction of eating disturbances (252).

Research from African countries has shown that leanness is not necessarily perceived as beautiful (79), as opposed to western cultures that tend to overvalue thinness (253). According to Kruger et al., black women in South Africa view obesity as a normal state of health (254). Furthermore, research from South Africa has confirmed that black women associate overweight with happiness, affluence, and the absence of disease (such as HIV/AIDS) (49), and having overweight children is a measure of 'good' parental care (79).

Media

Research has widely acknowledged a significant relationship between exposure to media and body image (255). Eating disorders and body dissatisfaction have been observed to increase among girls and women who participate in subcultures that view thinness as desirable and beautiful (256). Media studies have shown that various advertising industries are targeting children and adolescents as consumers of fashions, cosmetics and exercise products (257). This has resulted in an increased proportion of young girls engaging in unhealthy eating habits such as dieting, fasting, induced vomiting and use of laxatives (31).

Studies have also examined the relationship between disordered eating behaviours and attitudes, and exposure to and use of images in the mass media (257, 258), and have

highlighted stereotypes associated with body size (259, 260). Media places an emphasis on women being thin suggesting that larger size reflects unattractiveness and thinness is associated with attractiveness as shown in **figure 5**. (81)

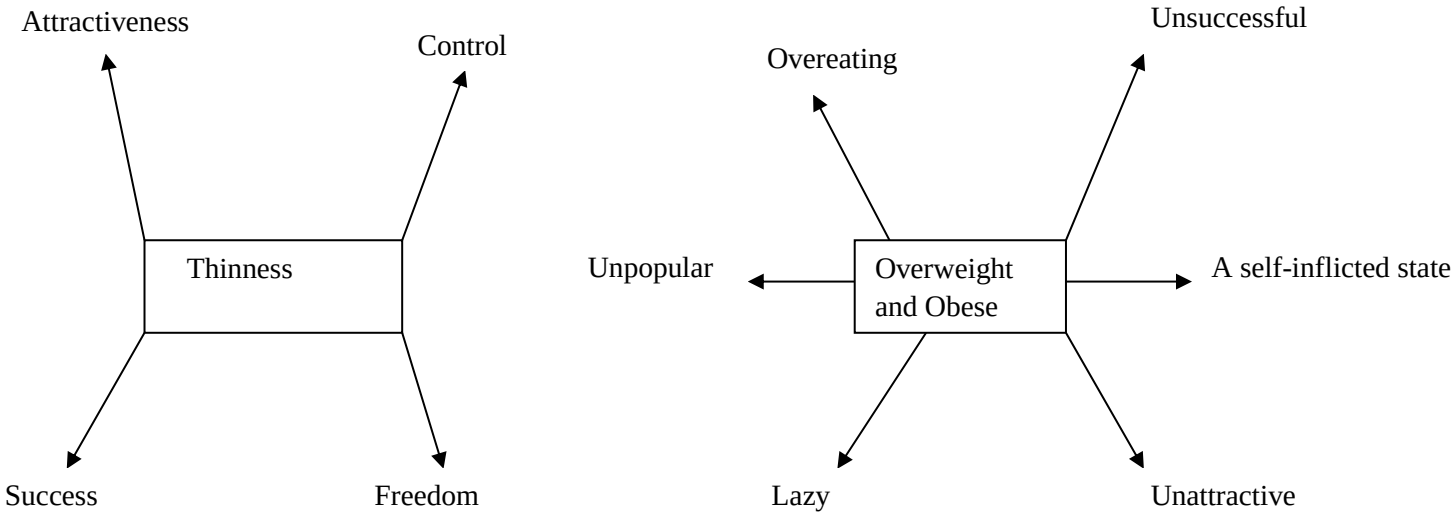


Figure 5: The Westernized meaning of thinness and overweight/obese in females (73)

Unlike the situation for girls, there is only a weak association between weight loss behaviors in adolescent males and the perceived role of the media (260). However, a longitudinal study in males and females showed that preoccupation with feeling fat and wanting to be leaner was strongly associated with strong motivation to look like same sex figures in the media (259). Another study reported that adolescent males who strongly identified with media idols who had "perfect bodies" were more likely to develop disordered eating behaviors (214). Food advertisements have negatively impacted on the adolescents' ability to make decisions regarding food choices (261). Dietary quality among adolescents has been compromised largely because of media influence which promotes consumption of foods that are high in sugar and fat, and the frequent consumption of snacks, and rarely promotes the consumption of fruits and vegetables (262).

According to Thomsen and colleagues (257), reading magazines by adolescent girls was associated with dieting behaviors. Previous research investigating the significance of beauty magazines suggest that women's happiness and accomplishments are strongly linked to the way they look, and 'ultra-thinness' is presented as the ultimate form of health and beauty (257). It has been suggested that the main readers of these magazines are those who are still developing their identity and, not surprisingly, it is adolescents who are the most common readers of beauty magazines (257).

Research has shown that when women become frustrated with their own failure to attain the ideals presented in the media, they resort to unhealthy cognitions and eating behaviors that may eventually lead to an eating disorder (257). Markey & Markey (2005) claim that a large proportion of people on a diet at any given time do not need to lose weight (263) Children also pick up messages from the media and a study by Sherwood (2001) indicated that dieting is common among girls as young as 10 years of age. Twenty five percent of the preadolescent girls in this study agreed with the statement "pictures of thin girls and women make me wish I were thin" (166).

Familial pressure

Family plays an important role in the development of body image and the development of eating disorders in adolescents (264). Research has demonstrated a dose response relationship between effective communication skills, discipline, nutrition and excellent eating habits among adolescents, and the number of times they have family meals (265, 266). Children acknowledge their parents' authority and adapt their behavior and their self-evaluation according to parental approval or disapproval (267). Parental pressure to lose weight was positively correlated with children's eating pathology (236). In a study conducted in Japan

the mother's criticism toward her daughter's weight was found to increase the daughter's vulnerability to disordered eating behaviors (268).

Children and adolescents are more likely to develop poor eating habits if their parents skip meals, or consume soft drinks instead of healthy drinks such as milk, water or fresh juice, when having family meals. According to Videon and Manning 2003, an increased consumption of vitamins and calcium rich food items among adolescents was also linked with the presence of a parent during dinner (269). Mothers who have or have had an eating disorder may also create abnormal behavioral patterns when feeding their children, such as irregular feeding schedules, detached non-interactive mealtimes and use of food for non-nutritive purposes, which may lead to second-generation eating problems (270, 271). According to a study conducted on 173 mother-daughter dyads in the United States, mothers who were highly preoccupied with weight and eating reported higher levels of restricting their daughters' access to energy-dense snack food and encouraging daughters to lose weight. Mothers' encouragement of daughters' weight loss was linked to daughters' restrained eating behavior between the ages of 9 – 11 years, but this relationship was partially mediated by daughters' perceptions of maternal pressure to lose weight over time. These relationships were independent of the influence of daughters' average weight status over time (272).

An alternative approach to children's diets has focused on developmental theories, and emphasizes the influence of significant others on a child's development of food preferences and eating habits. Research indicates that children may not only model their parents' food intake, but also their attitudes to food and their body dissatisfaction. For example, Hall and Brown (1982) reported that mothers of girls with AN show greater body dissatisfaction than mothers of girls without AN (273).

Peer pressure

A number of studies have shown peers to be an influential factor in adolescent body image (120, 268, 274). Several studies have shown among boys that greater peer acceptance and popularity may be achieved by attaining a more muscular body that demonstrates physical strength and athletic success (275). Additionally, more adolescent males with low to average peer relationships were found to use steroids compared to those who had better peer relations (141). Cross-sectional studies have shown that parents and peers exert their influence via modeling and by directly encouraging body change strategies in both female and male adolescents (46, 87, 260). However, according to a longitudinal study that followed up adolescent boys for 8 months, weight loss strategies were found to be only weakly associated with perceived parental and peer pressure to lose weight (46).

Similarly, perceived pressure to be thin from family, friends, dating partners and the media were positively related to bulimic symptoms (276, 277). Another study found that pressure from fathers on male adolescents not to be fat resulted in dieting behaviors (259). However, mothers were found to be more influential than fathers in emphasizing the need to lose weight among their sons and daughters (278)

Additionally, a longitudinal study confirmed that perceived messages from parents and peers predicted an increase in weight and muscle among adolescent males over a period of 8 months (46). Studies have also shown that adolescent males with low self-esteem and high negative emotional affect are easily influenced by social messages from parents, peers and media (279).

1.7.3 Environmental factors

Socio-economic status (SES) is the main environmental factor shown influence the development of eating disorders (177). Eating disorders are generally believed to predominate among adolescents in the middle or upper socio-economic status (188)

In addition, the nature of the school environment may be associated with self-esteem and abnormal eating attitudes in two ways;

1. **The type of school** - whether private or state funded. Caradas and colleagues (2001), and Szabo (2002) concluded from their studies of adolescent South African females from both state and private schools that within state schools, the preoccupation with being thinner is at a similar level for black and white respondents, whereas within a private school environment the preoccupation is greater amongst black respondents. (35, 177)
2. **The grade of the adolescent** - high school or primary school (280). Hirsch & Rapkin (1987) reported that environmental factors are associated with an age-related decrease in self-esteem and noted that self-esteem declines at the time of transition from elementary (primary) to high school (280). This decline can be explained by the socialization process, which takes place at this stage. Kandel (1980) broadly defines *social reinforcement* as the process whereby people internalize definitions and exhibit behaviors and values approved of by significant others. Stice (1998) applies this definition to eating pathology and thus defines social reinforcement as comments or actions of others that serve to support and perpetuate the thin-ideal body image for women, such as criticisms regarding weight (teasing) and encouragement to diet (281). This is also applicable to boys with the encouragement of a bigger, muscular body build.

> Modeling occurs when individuals copy behavior they see in others (282). From an eating disorder perspective, peers could model excessive dietary restraint, binge behavior, preoccupation with body shape and vomiting for weight control (281). If a school culture promoting abnormal eating attitudes does exist, then it might be that adolescents facing the transition from primary to high school experience a decline in self-esteem and thus engage in social reinforcement and modeling.

A study conducted by Striegel-Moore et al. (1991) to test whether a school's patterns and norms influenced the development of disordered eating behaviours in young women, found that girls with less disordered eating patterns perceived their school as encouraging social support and interpersonal involvement among students. Tiggemann (283), and Mensinger (284) also conducted research on school environments and disordered eating. Their focus was on the specific effect of the gender composition of the school. Although Tiggemann (2001) found no differences in disordered eating between girls attending single gender and those attending co-educational schools, Dyer and Tiggemann (1996) and Mensinger (2001b) suggest that girls educated in single gender schools report greater disordered eating symptoms (285, 286).

1.7.4 Psychological and individual factors

As discussed previously, low self-esteem is associated with body dissatisfaction, muscle increasing strategies in males and eating disorders among adolescent males and females (46). In addition, body importance and body comparison have also been found to affect the psychological well-being of adolescents. This is the tendency of adolescents to perceive their body shape as important and thus comparing it to the body shapes/sizes of their peers. Depending on the individual these are likely to result in body dissatisfaction, which may eventually lead to the development of unhealthy eating disorders (87, 287).

Research has shown that males with low self-esteem are more likely to succumb to peer pressure to alter their body shape compared to those with high self-esteem (87). According to a cross-sectional study examining adolescent (n=587) boys and girls (n=598) aged 11-15 years, an association between muscle dissatisfaction and signs of depression were observed in males. It also revealed a strong association between sociocultural messages directed to weight change and increased levels of negative body image in both boys and girls. (279) A number of studies have observed a positive association between negative affect (low self-esteem) and disordered eating in adolescent males (46, 288, 289).

1.7.5 Weight control behaviors

The high prevalence of overweight and obesity among adolescents, and the increasing societal pressure to have a thin ideal body shape/ size (290, 291) has led to an increase in weight control behaviors among adolescents (212, 289). Weight control behaviors include:

1. Healthy weight control behaviors including exercise, eating more fruits and vegetables, eating less high fat food and sweets;

2. Unhealthy weight control behaviors including fasting, eating very little food, skipping meals, cigarette smoking and the use of food substitutes;

3. Extreme weight control behaviors including the use of diet pills, self –induced vomiting and the use of laxatives and diuretics.

Unhealthy weight control behaviors are a common and increasing problem among adolescents, especially females (292, 293). According to a study by Neumark et al (2002), 57% of females and 33% of males had engaged in unhealthy weight control behaviors, such as skipping meals and fasting, or extreme weight control behaviors (289)., and 11-12% of female and 7-8% of male adolescents engage in extreme weight control behaviors (289, 294).

Unhealthy weight control behaviors can develop into clinical eating disorders such as AN and BN (295).

The prevalence of unhealthy weight control behaviors among adolescents is influenced by body weight, gender and ethnicity. Unhealthy weight control behaviors are more prevalent among adolescents with a high BMI compared to those with a low BMI (216, 296), and are more prevalent among girls than boys (216) (297).

SUMMARY OF LITERATURE REVIEW

The literature review has highlighted the following:

1. Eating attitudes, body image dissatisfaction, self-esteem and weight control behaviors are influenced by biological, psychological and socio-cultural factors, as well as the physical environment. There has been an increase (last decade) in the prevalence of eating disorders, body image dissatisfaction, low self-esteem, obesity and weight control behaviors among adolescents globally, and specifically in South Africa adolescents.
2. Female adolescents are at a higher risk of developing eating disorders, body image dissatisfaction and low self-esteem, and engage in unhealthy weight control behaviors, than males.
3. Factors influencing the development of psychosocial disorders were also highlighted.

Gaps in the literature

This review has identified some research gaps that this study will add knowledge to. Although eating attitudes, body image and self-esteem have been the subject of many studies, there are still research gaps in what is known about these factors and how they vary by age, ethnicity and gender. Including South Africa, majority of the studies have only included

women and girls for eating disorders, self-esteem and body image concerns. In addition no longitudinal studies have been done in South Africa to investigate changes in eating attitudes, body esteem and weight control behaviors during adolescence. The current study will look at these factors using cross-sectional and longitudinal data; it will also look at the three stages of adolescence and how these factors differ with age. Another gap that we identified in the literature is that in Africa, specifically Sub-Saharan Africa, very few studies have looked at weight control behaviors during adolescence. The current study will utilize longitudinal data to assess weight change behaviors during early and late adolescence, and perceptions related to the female body silhouette. Most importantly for the current study, ethnic and gender differences in adolescents, which have been sparsely researched, will be assessed using both cross-sectional and longitudinal data.

1.8 Relevance and justification

The literature reviewed has shown marked gender, age and ethnic differences in prevalence and risk factors of eating disorders, and very little is known about males. This study looked at both boys' and girls' risk for future eating disorders, body image dissatisfaction, as well as self and body esteem.

There is also growing evidence to indicate that eating disorders may also be occurring in South African ethnic groups other than Caucasian populations as a result of increasing exposure to 'Western' norms around thinness (35, 85, 175). A study that was done in South Africa by Petersen and others in 2006 on eating attitudes among 11 year old white and black children, highlighted the need for a longitudinal study throughout adolescence that can be used to identify precursors and trends of dietary related pathology. The current study will explore adolescent eating attitudes using both cross-sectional and longitudinal data. This will assist in identifying behavioral change on weight changes, body dissatisfaction and eating attitudes across adolescence (298).

Despite the significant body of literature around factors that influence adolescent eating habits and the risks associated with poor lifestyle behavior in developed countries, to our knowledge no longitudinal data is available in South Africa with regard to culture, eating attitudes, body size and weight control behaviors. Some South African cultures associate overweight with the wellbeing of a person while others prefer slender body sizes. Due to the high risk of obesity among South African girls and women and the concomitant increase in the risk of metabolic disease, it is important to understand the influence of cultural norms around eating attitudes and body image in a multi-ethnic transitioning society.

1.8.1 Aim

To explore eating attitudes, self-esteem and body image in black and white male and female adolescents at various time points during adolescence, and to examine longitudinal changes in these psychosocial factors, as well as weight change behaviors, during adolescence in black and mixed ancestry adolescents.

1.8.2 Specific objectives

1. To explore ethnic and age differences in eating attitudes, body image and self-esteem at three time points in male and female adolescents of different ethnicities living in urban South Africa;
2. To determine the change in eating attitudes, body-esteem and weight control behavior between early and late adolescence in a cohort of black and mixed ancestry adolescents.
3. To assess perceptions of female silhouettes by males and females.

1.8.3 Research questions and hypothesis

1. Is there a difference in eating attitudes, self-esteem and body image dissatisfaction between black and white boys and girls at 13, 15 and 17 years of age?

Hypothesis

H0: There is no difference in eating attitudes, self-esteem and body image dissatisfaction between black and white adolescent girls and boys.

2. Does BMI influence eating attitudes, self-esteem and body image dissatisfaction?

Hypothesis

H0: There is no association between BMI and eating attitudes, body image dissatisfaction and self-esteem.

3. Is there a longitudinal change in eating attitudes, body esteem and weight control behaviors between early and late adolescence?

Hypothesis

H0: There is no change in the prevalence of eating attitudes, body image dissatisfaction and self-esteem among early and late adolescents.

4. How does gender and ethnicity influence the perception of female body silhouettes?

Hypothesis

H0: There is no significant difference between male and females perceptions of the female body silhouettes.

CHAPTER TWO: METHODOLOGY

2.0 Introduction

This chapter outlines the research design, study population, preliminary sampling, selection and recruitment of study participants, and also describes the different methods used for both study one and study two. The instruments used in the studies are discussed including their reliability and validity. Statistical analyses and the ethical considerations that the study adhered to are also included.

This thesis comprises of two studies: Study one uses data collected from adolescents attending schools in and around Soweto, Johannesburg, and study two, data were collected longitudinally as part of the Birth-to-Twenty (Bt20) cohort study.

2.1 Study setting: Soweto-Johannesburg

Soweto is located 15 km (Refer to **figure 6**) southwest of Johannesburg's central business district (CBD). Soweto is an acronym for South Western Townships, which was initially established to house black mine laborers. Soweto is home to 34 suburbs and covers an area of 150km^2. According to the Department of Finance and Economic Development there are 301 000 households in Soweto, with two-thirds of these houses made of bricks. Approximately 35% of the Soweto adult residents have attained a high school education, with 7% of the residents being classified as illiterate (299).

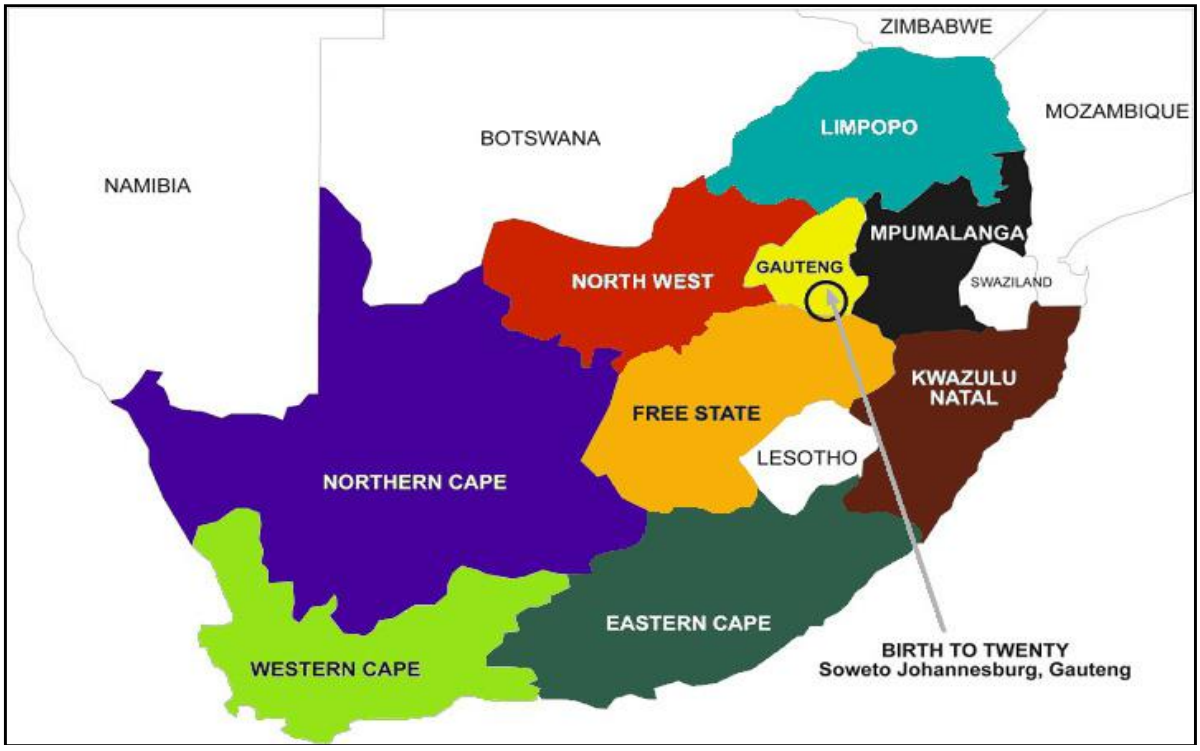


Figure 6: A map showing regional location of Soweto-Johannesburg

2.2 Study sample

2.2.1 Cross-sectional study

A convenience sample of adolescents was obtained from both public and private high schools in Johannesburg, South Africa. Invitation letters for participation were submitted to various schools based on their location and demography, and adolescents were recruited only from schools that were willing to participate. The research background and procedures of the study were explained to adolescents who were age 13, 15 and 17 years of age, and those who were interested were provided with consent forms for them and their parents to complete. This provided a diverse sample of adolescents (early, mid and late adolescence). Only participants who returned both signed informed consent forms and were available during the timeslot allocated by the school for the study, were recruited. Unfortunately we did not collect data on the non-participants so I cannot comment on the differences between the participants and

non-participants. For this study a total of 731 adolescents (362 black and 369 white; 391 males and 340 females respectively) participated as shown in **figure 7**.

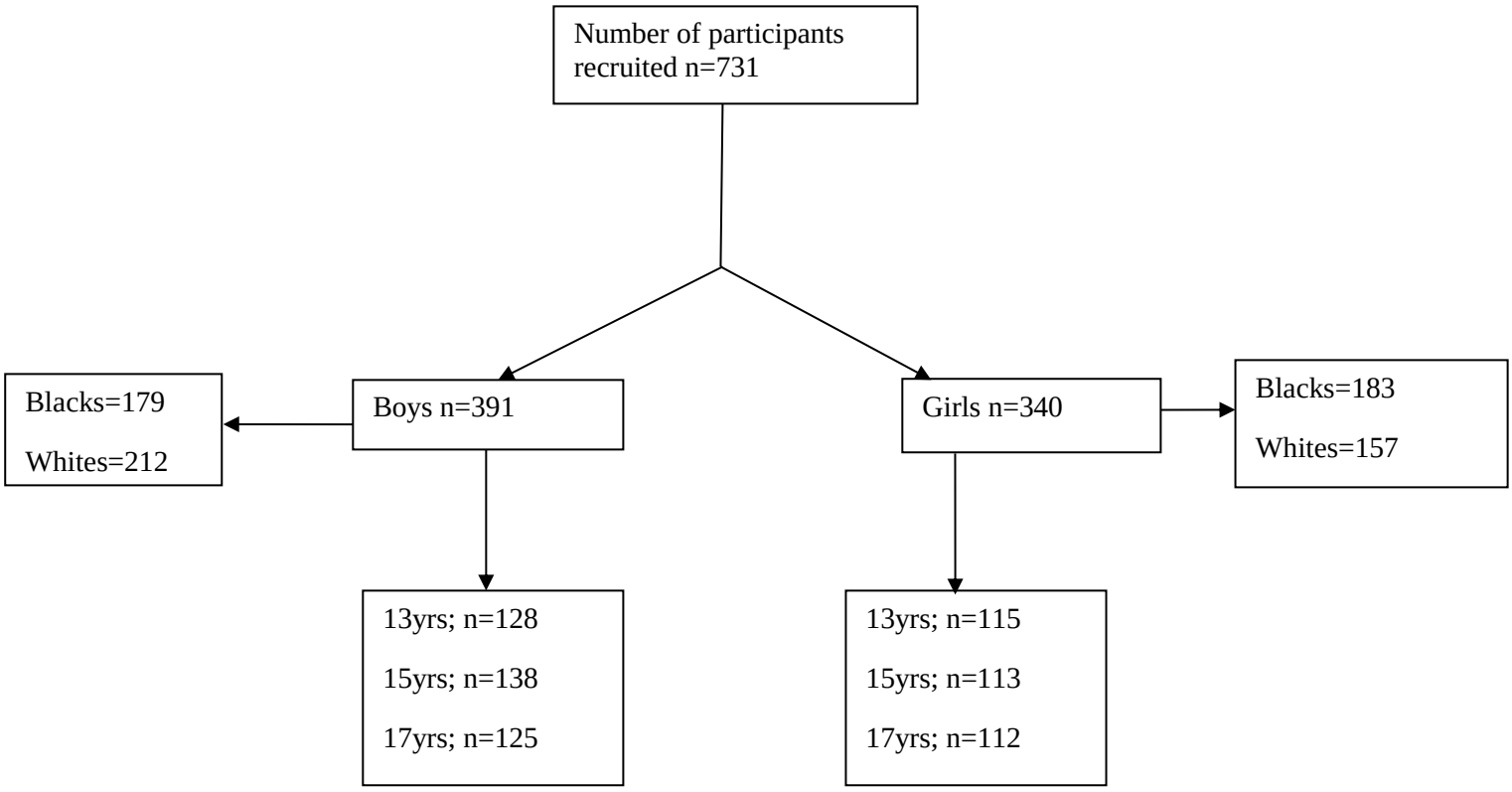


Figure 7: Flowchart diagram of sample breakdown

2.2.2 Longitudinal study: Birth-to-Twenty cohort

The Birth-to-Twenty (Bt20) study is a longitudinal observational study and a continuation of the Birth-to-Ten (Bt10) study, which was started in 1990, the same year that the former President of South Africa Nelson Mandela, was released from prison. A pilot study to test the feasibility of a long-term follow-up study of children's health and wellbeing started in 1989 (300). Women were enrolled in their second and third trimester of pregnancy through public health facilities and interviewed regarding their health, social history and current circumstances. Singleton children (n=3 273) born between April and June 1990, and resident for at least 6 months in the municipal area of Soweto-Johannesburg (as shown in figure **8**),

were enrolled into the birth cohort and have been followed up on an annual basis since then (301).

Attrition over two decades has been comparatively low (30%), mostly occurring during the participants' infancy and early childhood, and approximately 2 300 children and their families remain in contact with the study (302). The sample is roughly representative of the demographic parameters of South Africa with approximately equal proportions of gender. Assessments across multiple domains have been made of the participants and their families, households, schools and communities during the course of the study, including growth, development, psychological adjustment, physiological functioning, genetics, school performance, and sexual and reproductive health. The third generation, children of Bt20 children, began to be born in 2004. The Bt20 research program, including all data collection, has received clearance by the Ethics Committee on Human Subjects at the University of the Witwatersrand (M010556) **Appendix 1**.

A team of research assistants collected data on adolescents and their primary caregivers at the Birth to Twenty offices situated in the Chris Hani Baragwanath Hospital in Soweto, Johannesburg. Annual visits for data collection followed the same procedures each year.

The procedure, relevant to this study, was as follows:

1. An appointment was made with family
2. Adolescents arrive at Bt20 offices where the interviews and data collection were performed
3. Informed assent/consent were obtained from both adolescent and primary caregiver.

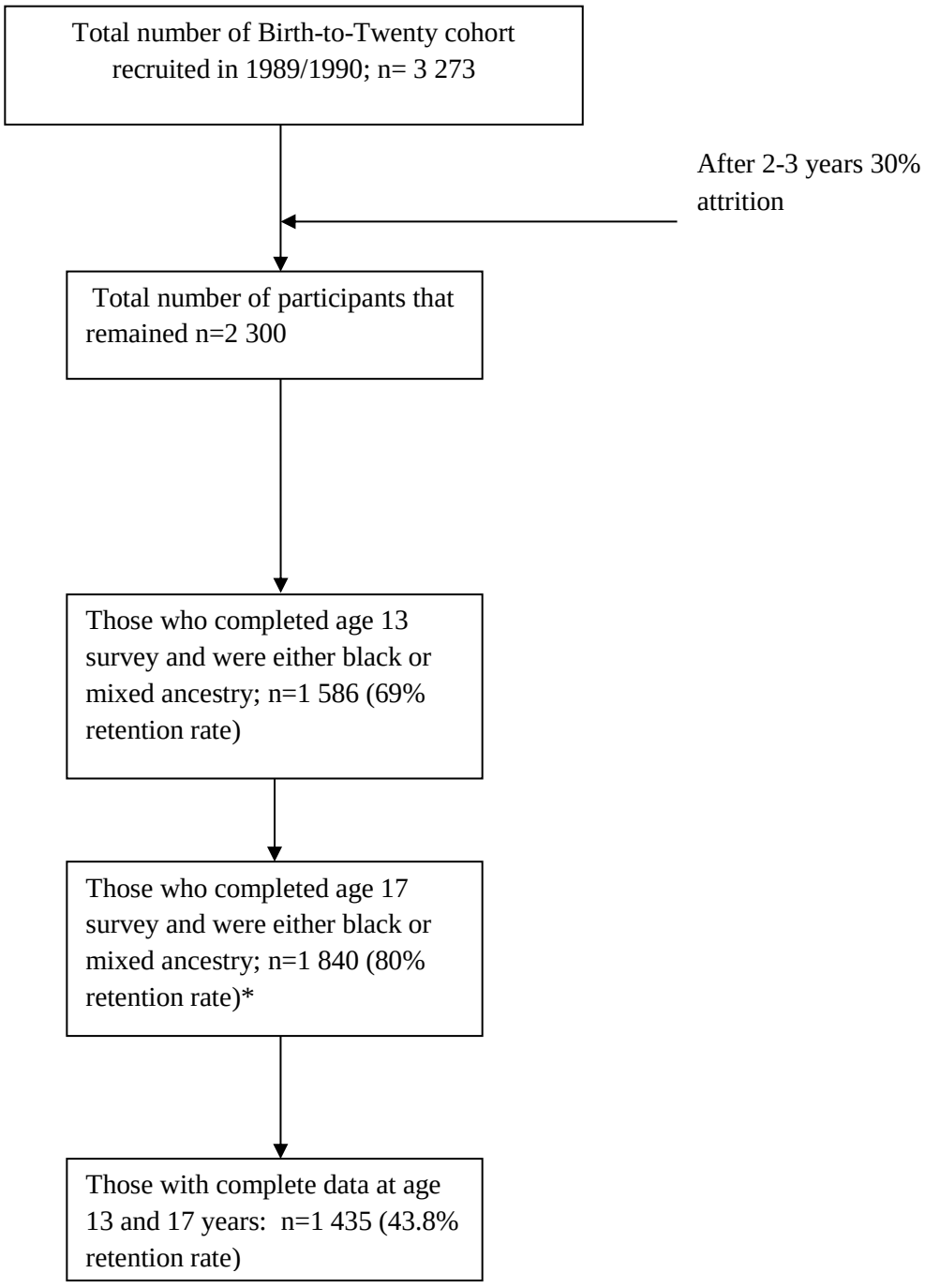
4. Interviews were conducted with both the adolescent and primary caregiver (socio-demographic questionnaire, EAT-26, self-esteem, body image satisfaction, weight loss/muscle gain practices, weight control behavior, perceptions of female silhouettes)

5 Anthropometric measurements (height, weight) were obtained.

Birth-to-Twenty cohort participants

The criteria for inclusion into study 2 were all adolescent participants who presented for their annual visit at age 13 and 17 years, and had completed all questionnaires and procedures. The sample consisted of 1,435 participants.

Flowchart the Birth-to-Twenty participants' recruitment.



- The high turnover at age 17 years was as a result of increased efficiency in re-calling the cohort participant.

Figure 8: Flowchart diagram of the cohort sample inclusion process for Study 2

Table 4: General characteristics for the early (at age 13 years) and late (at age 17 years) adolescent cohorts in Study 2

Variables	Early adolescents (n=1586)	Late adolescents (n=1840)
Ethnicity		
Black	1 414(89.2%)	1 625(88.3%)
Mixed ancestry	172(10.8%)	215(11.7%)
Gender		
Male	748(47.2%)	886(48.2%)
Female	838(52.8%)	954(51.8%)
Height (cm)	155.23±7.4	165.1±8.5
Weight (kg)	47.4±11.2	58.9±11.3
BMI (kg/m^2)	19.6±3.9	21.6±4.1
Males BMI cut-offs*		
Underweight	453(60.6%)	234(26.4%)
Normal	216(28.9%)	587(66.2%)
Overweight	53(7.1%)	43(4.9%)
Obese	25(3.4%)	22(2.5%)
Females BMI cut-offs*		
Underweight	300(35.8%)	107(10.8%)
Normal	346(41.3%)	589(59.3%)
Overweight	139(16.6%)	215(21.6%)
Obese	53(6.3%)	82(8.3%)

* Age-gender specific BMI cut-off (303)

2.3 Measures

2.3.1 Demographic characteristics

Demographic data for study 1 included: age, grade, type of school the participants attended and ethnicity whereas for study 2 this information was obtained from the Birth to Twenty databases.

2.3.2 Body mass index (BMI)

Height was measured using a portable stadiometer (Holtain; UK) and recorded to the nearest millimeter, and weight was measured to the nearest 100g, using a digital scale. Participants were measured in light clothing without shoes. Height and weight measurements were used

to compute the participant's body mass index (BMI) in kg/m^2. The age-and gender-specific adolescent cut-off points were used to define overweight and obesity (303) these cut-offs are in line with the International Obesity Task Force (IOTF), as shown in **Table 5.**

Table 5: International cut-off points for BMI for overweight and obesity by age and gender (303)

	BMI 25kg/m^2 (Overweight)		**BMI 30kg/m^2 (Obese)**	
Age	***Males***	***Females***	***Males***	***Females***
13	21.91	22.58	26.84	27.76
14	22.62	22.98	27.63	28.57
15	**23.29**	**23.94**	**28.30**	**29.11**
16	23.90	24.37	28.88	29.43
17	**24.46**	**24.70**	**29.41**	**29.69**
18	25	25	30	30

Perception of female body silhouettes

Participants were asked to associate a series of randomly placed female silhouettes (as shown in **Figure 9**), with specific words or phrases including clumsy, happy, worst, strong, happiest, best, less respect, more respect, unhappy**.** These silhouettes, were adapted from the Indian pathways study and then (121), validated for use in South African pre-adolescent females (304). For analysis purposes the body silhouettes were coded 1 to 8 (from the thinnest to the fattest). Female participants were also required to select a body silhouette, which they identified as representing their current body shape (i.e. 'actual' figure), as well as the body shape that they would desire to have (i.e. 'ideal figure').

Body discrepancy was calculated by determining the difference between the 'actual' and 'ideal' figure, which is termed the 'Feel minus Ideal Discrepancy or FID' and indicates body discrepancy. Negative, zero and positive scores indicated desire to be thinner, content with body shape and desire to be fatter, respectively. (35, 121, 305) The participants were also asked to select silhouettes which they believed their family (family ideal) and peers (peers

ideal) would want them to have. The participants were also asked to select silhouettes which they believed their family (family ideal) and peers (peers ideal) would want them to have.

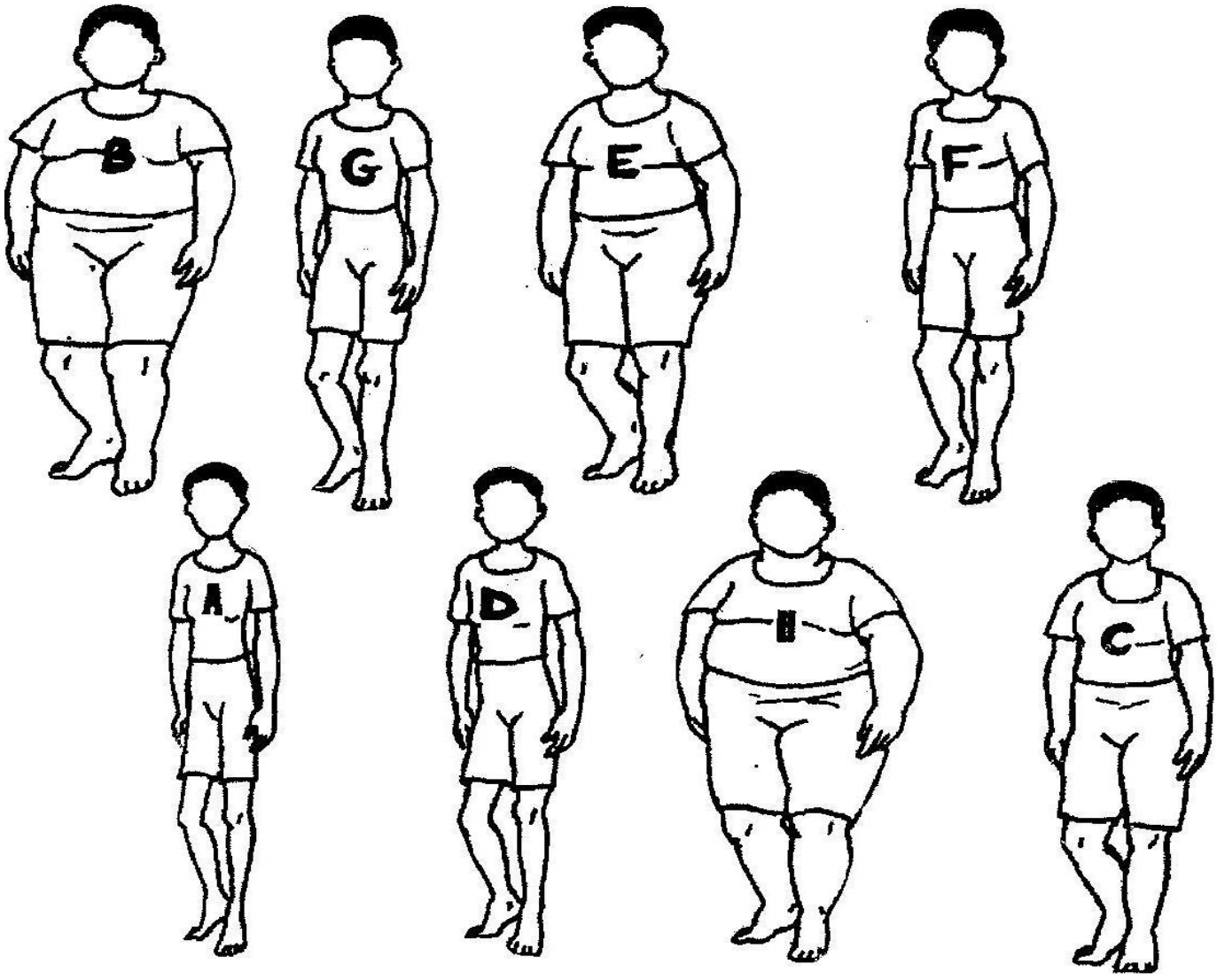


Figure 9: Female body silhouettes used to determine body size and shape preference.

The body silhouettes were grouped into five categories based on WHO body mass index percentiles from CDC growth chart (**Table 6)** to correlate the body silhouettes with age specific BMI percentile and appropriate weight.

Table 6: BMI-for-age percentiles and weight designation in relation to Silhouette BMI

Silhouette	**Weight Designation**	**BMI Category**
Silhouette A & B	Underweight	1
*Silhouette*s C&D	Normal	2
*Silhouette*s E &F	Overweight	3
*Silhouette*s G &H	Obese	4

2.3.3 Eating attitudes test (EAT-26)

Eating attitudes, which is associated with an increased risk of developing an eating disorder (ED), was measured using the Eating Attitudes Test-26 (EAT-26), developed by Garner and associates in 1982 (306). The questionnaire was self-administered with field workers available to answer questions. As shown in **appendix 2,3 and 4** (questionnaires) the EAT-26 tool consists of 26-items which are scored on a 6-point Likert scale, yielding a numeric score corresponding to eating disorder risk (156). The EAT-26 items range on a continuum from *always* to *never*; never, seldom and sometimes are assigned a 0 and often, very often and always are scored 1, 2 and 3, respectively. EAT-26 scores range from 0 indicating no risk of a future eating disorder, to 78 indicating highest risk (156, 307). EAT-26 score ≥20 indicates a high risk of developing an eating disorder that may require further clinical evaluation (156). Examples of the questions in the EAT-26 include "I am terrified about being overweight", "I have gone on eating binges in which I feel that I may not be able to stop", "I vomit after I eat", "I feel extremely guilty after eating" and "I am preoccupied with the thought of having fat on my body" (307).

The EAT-26 consists of three subscales (**Table 7**) which include the following:

1) **Factor I/Dieting**: consists of questions that relate to avoidance of fattening food items and preoccupation with the desire to be thinner;
2) **Factor II/**Bulimia and food preoccupation: includes 6 items that relate to thoughts about food and compensatory behaviors;
3) **Factor III/**Oral control: consists of 7 items that measure the ability to control eating and perceived pressure from others to increase body weight.

Table 7: EAT-26 sub-scores (dieting, oral control, and bulimia and preoccupation).

Dieting	**Oral Control**	**Bulimia and Food preoccupation**
1) I am terrified about being overweight 6) I am aware of the calorie content of foods I eat 7) I particularly avoid food with a high carbohydrate content (bread, rice, potatoes, etc) 10) I feel extremely guilty after eating 11) I am preoccupied with a desire to be thinner 12) I think about burning up calories when I exercise 14) I am preoccupied with the thought of having fat on my body 16) I avoid foods with sugar in them 17) I eat diet foods 22) I feel uncomfortable after eating sweets 23) I engage in dieting behavior 24) Enjoy trying new rich foods 26) I enjoy trying new rich foods	2) I avoid eating when I am hungry 5) I cut my food into small pieces 8) I feel that others would prefer if I ate more 13) Other people think I'm too thin 15) I take longer than others to eat my meals 19) I display self-control around food 20) I feel that others pressure me to eat	3) I find myself preoccupied with food 4) I have gone on eating binges where I feel I may not be able to stop. 9) I vomit after I have eaten 18) I feel that food controls my life 21) I give too much time and thought to food 25) I have the impulse to vomit after meals

2.3.4 Body image satisfaction

The participants were asked 9 questions (**As shown in appendix 3**)from the Multidimensional body self-relations questionnaire developed by Cash (308), to rate their satisfaction with different parts of their body. It assesses the participants' attitude to their body shape and the degree to which they are dissatisfied with different parts of their body, such as the stomach, hips, and buttocks. Body dissatisfaction was measured using a 5-point scale ranging from 1="very satisfied" to 5="very dissatisfied", the higher the score the more dissatisfied the participant was with their body. The scores were later divided into three categories; above average, average and below average.

2.3.5 Rosenberg self-esteem scale (RSE)

The Rosenberg self-esteem scale was used to measure general self-esteem (SE) (Rosenberg 1965). As shown in **appendix 2** the 10-item scale consisted of global statements to which respondents indicated agreement to the items on a 4-point scale, ranging from 1="strongly agree" to 4="strongly disagree", yielding a score ranging from 10-40. Some of the statements were positive, such as, "On the whole I am satisfied with myself,' while others were negative, "At times, I am no good at all." The positive items were reversed scored for consistency with the negative statements. Rosenberg SE scale has been previously used in South Africa sample of high school and college students (boys and girls) in Cape Town age 14 and older (201). Scores were categorized into low (scores 1-20), average (score of 21-30) and high (scores of 31-40), with a high score indicating a high self-esteem (309).

2.3.6 Body esteem (BES)

Study 2 adapted the body esteem scale used by Mendelson and associates (310), to assess participants' attitudes and feelings about their body and appearance (**As shown in appendix 3 and 4**). It consists of a set of 21 questions, which measure three components of body esteem;

1) Global feelings about one's body e.g. "I like what I see when I look in the mirror";

2) Satisfaction with one's weight e.g. "I really like what I weigh";

3) Positive evaluations about one's body and appearance e.g. "People my own age like my looks".

Body esteem was measured using a 5-point scale ranging from 1="never" to 5="always", the higher the score the more satisfied the participants were with their bodies. Some of the positive items were reverse scored in order to be consistent with the negative statements. The scores were later divided into three categories; low body esteem (score =1-21), average body-esteem (score range 22 to 42), and high body esteem (score>43)(310).

2.4.7 Weight control behaviors

Several questions regarding weight control related behaviors were included in this study (**As shown in appendix 3 and 4**). All participants were asked the following questions "*During the past year have you done anything to try to lose weight or gain weight?", "During the past year have you done anything to try to gain more muscle?"* For the two questions the participants had two options (Yes or No). Participants were also asked to give reasons for trying to gain or lose weight, or gain muscle, and the responses were classified into six options namely; for health reasons, to look better, clothes too tight, too fat, unhappy with self, and want to be a model. They were then asked to give the methods they used to lose or gain weight, or gain muscle and their responses were categorized as follows;

1) Healthy weight control behaviors (i.e. exercise, eat more fruits and vegetables, eat less high fat food and less sweets).

2) Unhealthy weight control behaviors (i.e. fasting, eat very little food, skipping meals, cigarette smoking and use of food substitute).

3) Extreme weight control behaviors (i.e. diet pills, self-induced vomiting, use of laxatives and diuretics).

2.5 Data management

2.5.1 Data capturing and coding

All data were captured in a Microsoft Excel spreadsheet. Data cleaning was completed to identify extreme values, missing values and any inconsistencies.

2.5.2 Data analysis

Data was imported into STATA version 12 (Texas, USA) for analysis. Descriptive analyses were carried out to describe the data. Further inferential analyses were carried out to test significant associations between dependent and independent variables. The following tests were used;

1) Cronbach's Alpha reliability test was done to test for internal consistency of the questionnaires.
2) Wilcoxon-Mann-Whitney test was used to test for significant differences between non-normally distributed continuous variables and categorical variables.
3) Analysis of Variance (ANOVA) was employed to test for significant differences between normally distributed continuous variables and categorical variables.
4) Scheffe's test was used to adjust for multiple comparisons among groups with unequal sample sizes between continuous variables and categorical variables
5) Chi-square test was used to test the difference in proportions between groups (gender, ethnicity, eating attitudes, body image, self-esteem and body esteem).
6) Pearson correlation test was used to test for linear relationships between normally distributed continuous variables

7) Multi-nominal logistic regression models were fitted to identify determinants of weight control behaviors, eating attitudes and body esteem.

8) Multi-nominal logistic regression models were fitted to identify determinants of weight control behaviors, eating attitudes and body esteem. We ran several bivariate models and identified variables that were significantly associated with the outcomes at the 5% level and included them in the multinomial regression.

CHAPTER THREE: ETHNIC DIFFERENCES IN EATING ATTITUDES, BODY IMAGE AND SELF-ESTEEM AMONG ADOLESCENT FEMALES LIVING IN URBAN SOUTH AFRICA

Tabither M. Gitau, *, Lisa K. Micklesfield[1], John M. Pettifor, [1], Shane A. Norris, [1]

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3.1 Introduction

Black adult African women are more likely to be obese in a middle-income country like South Africa. (37) In South Africa, the prevalence of overweight and obesity among black women is 58.5%, which is higher than other South African ethnic groups (mixed ancestry 52%, white 49.2%, Indian 48.9%) (37). This higher prevalence is likely to be the result of a complex interaction of biological, cultural, environmental and physiological factors (12), and for black South African women in particular, the concepts of cultural beliefs around fatness may be a key contributing factor. Research from African countries has shown that leanness is not necessarily perceived as beautiful, but rather being plump (overweight) signifies beauty, health and higher social status (12, 79). Research from South Africa has confirmed that black women associate overweight with happiness, affluence, and the absence of disease (such as HIV/AIDS) (49), and having overweight children is a measure of 'good' parental care (79).

Recently, there have been conflicts between traditional cultural perceptions around plumpness and the Western culture desire to be thin among females. Nevertheless, the increasing desire for a slimmer shape amongst girls in Western, and non-Western cultures, is a growing public health concern because of its association with eating disorders and poor weight management strategies (41, 42). More girls than boys express a feeling of discontent with their body size and shape, and the pattern of disordered eating habits is now starting at

an earlier age than previously (12, 311). There is growing evidence to indicate that eating disorders may also be occurring in South African ethnic groups other than Caucasian populations as a result of increasing exposure to 'Western' norms around thinness (6, 35, 41). Due to the high risk of obesity among black African girls and women and the concomitant increase in the risk of metabolic disease (38) it is important to understand the influence of cultural norms around eating attitudes and body image in a multi-ethnic transitioning society. Therefore, the aim of this research was to determine whether there is a difference in eating attitudes, self-esteem and body image dissatisfaction between ethnic groups in urban South African adolescent girls.

3.2 Methods

3.2.1 Sample

A sample of adolescent girls stratified according to ethnicity and age was obtained from a mix of private and public (government model C) high schools in Johannesburg, South Africa. A proposal for participation was submitted to several schools based on their location and demographic composition, and adolescents were recruited only from schools that were willing to participate. The rationale and procedures of the study were explained to all adolescents who met the age criteria. Those interested in participating in the study were provided with consent forms for them and their parents to complete. A random sample of those children who returned both completed written informed consent forms and were available during the timeslot allocated by the school for the study were recruited.

A total of 340 girls were randomly selected from the volunteers and participants were included until our stratified target samples were reached, (183 black and 157 white girls, aged 13 (n=115), 15 (n=113) and 17 (n=112) years). Written informed consent was obtained from the girls' guardian and written assent from the participants themselves. The study was

approved by the Committee for Research on Human Subjects of the University of the Witwatersrand.

3.2.2 Data collection

Demographic information and anthropometrics measurements were obtained from each adolescent by a team of trained data collectors. The research assistant's coefficient of variation was below 2%. Age-and gender-specific adolescent cut-off points were used to define overweight and obesity. (303)

All participants completed the 26-item Eating Attitudes Test (EAT-26) (152). Participants completed the Rosenberg self-esteem scale, which has been previously used in South Africa. (201) Scores were categorized into three; low (scores 1-2), average (score of 3) and high (scores of 4-5), with a high score indicating a high self-esteem. (309)

Perceptions of body image among our participants was measured using a 5-point scale ranging from 'very satisfied' to 'very dissatisfied', the higher the score the more dissatisfied the participant was with their body image. The scores were later divided into; low dissatisfaction (score=1 and 2), average (score=3) and high dissatisfaction (score=4 and 5). Further, participants were asked to associate different body shapes from a series of randomly placed silhouettes, with specific words or phrases**.** For analysis purposes the body silhouettes were coded 1 to 8 (from the thinnest to the fattest). Participants were also required to select a body silhouette which they identified as representing their current body shape (i.e. 'actual' figure), as well as the body shape that they would desire to have (i.e. 'ideal figure'). Body discrepancy was calculated by determining the difference between the 'actual' and 'ideal' figure, which is termed the 'Feel minus Ideal Discrepancy or FID' and indicates body discrepancy. Positive, zero and negative scores indicated desire to be thinner, content with body shape and desire to be fatter, respectively. (35, 121, 305) The participants were also

asked to select silhouettes which they believed their family (family ideal) and peers (peers ideal) would want them to have.

3.2.3 Statistical analyses

Statistical analyses were performed using a statistical package STATA version 11 (StataCorp Texas, USA). Crobanch's Alpha reliability test was done to test for internal consistency of the questionnaires. Wilcoxon-Mann-Whitney, ANOVA and chi-square test was used to test for significant differences between ethnic groups across study variables by age and ethnicity. Scheffe's test to adjust for multiple comparisons among groups with unequal sample sizes. Spearman's rank correlation coefficient analyses were conducted to test for associations between the independent variables. A p-value <0.05 was considered statistically significant.

3.3 Results

Table 8 presents descriptive data of the sample. There was a similar distribution of ethnicity within the three age groups and within the whole sample, with 46.2% of participants being white and 53.8% black. The majority of both white (87.3%) and black (86.9%) participants attended public schools. Overall, white girls had a higher BMI than black girls (22.6±4.3 vs. 21.5±4.2; p=0.03).

EAT-26 questions scored an alpha Crobanch of 0.88 and 0.85 for white and black girls respectively, which is considered good. The overall Crobanch's alpha score for the body image scale was satisfactory (0.85), but the Rosenberg self-esteem questionnaire (0.51) performed less well. EAT-26 scores (median and inter-quartile range) for all the girls were 9 (4-18), 11 (5-20) and 12 (5-23) for ages 13, 15 and 17 years, respectively. There was no increase in abnormal eating behavior (EAT-26 $\geq$20) with age: white adolescents had a prevalence of 20%, 19.6% and 17.8% across the three age groups while black girls had a prevalence of 21.4%, 31.6% and 38.9% (not significantly different). Although there were

also no significant differences between the ethnic groups within the different age groups (X^2=2.98; p=0.226), when the age group data were combined significantly more black girls (31.2%) than white girls (19.7%) had an EAT-26 score ≥20 (X^2= 5.6; p<0.05) as shown in **figure 10**. Of the sub-components of the EAT-26 questionnaire, only the oral control sub-score was significantly higher in black than white girls (p=0.009). For the whole group, less white have low self-esteem than blacks (26.7% vs 48.7%; X^2=14.8; p=0.001).

Table 8: Characteristics of study participants

Variable	Sample	White girls	Black girls	P-value
Age (years)				
13	115	54(34.4%)	61(33.3%)	X^2=0.004
15	113	54(34.4%)	59(32.2%)	
17	112	49(31.2%)	63(34.4%)	P=0.8
Type of school**				
Private school	44	20(12.7 %)	24(13.1%)	X^2=0.004
Public School	296	137(87.3 %)	159(86.9%)	P=0.9
BMI (mean and SD) by race	333	22.6±4.3	21.5±4.1	P=0.025
BMI (mean and SD) by age				
13	108	21.9±5.3	19.9±3.2	0.02*
15	113	22.8±3.7	21.3±4.8	0.07
17	112	23 ±3.7	23.1±3.7	0.88
Overweight/Obesity				
Age 13	35	18(15.7%)	17(14.8%)	
Age 15	26	15(13.3%)	11(9.7%)	
Age 17	31	13(11.6%)	18(16.1%)	0.61
EAT-26 cut-offs**				X^2=5.6
<20	252	126(80.3%)	126(68.8%)	
≥20	88	31(19.7%)	57(31.2%)	P=0.02*
Body image satisfaction**				
Above	137	90(57.7%)	47(25.7%)	X^2=33.5
Average	105	40(25.6%)	65(35.5%)	
Below average	97	26(16.7%)	71(38.8%)	P=0.001*
Self-esteem**				X^2=20.5
High self-esteem	110	44(29.1%)	66(36.1%)	
Average	100	32(21.6%)	68(37.2%)	P=0.001*
Low self-esteem	121	72(48.7%)	49(26.7%)	

* Differences between black and white girls were statistically significant

****** Variation in sample size due to missing information

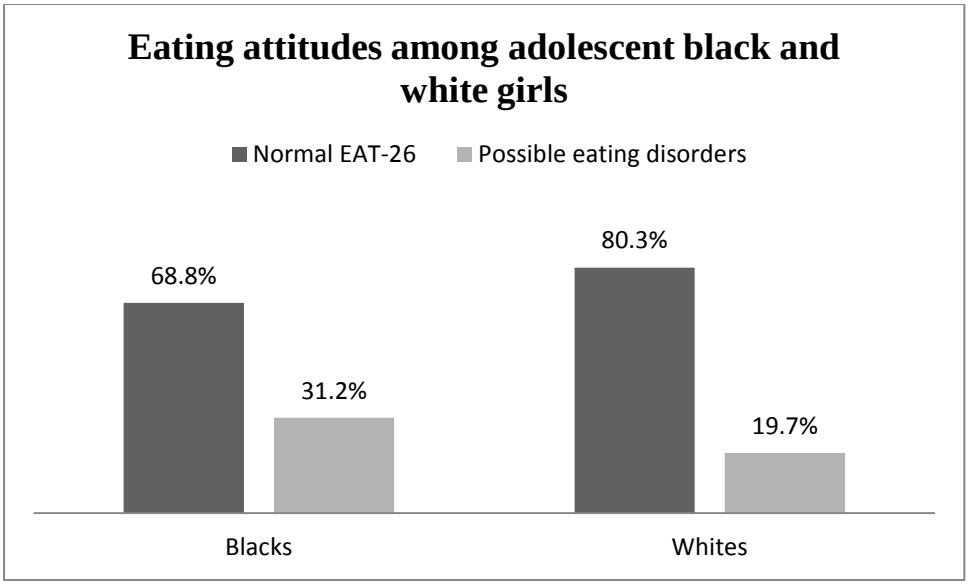


Figure 10: Distribution of eating attitudes among black and white female adolescents

Body image dissatisfaction was significantly lower in the white than black girls (X^2=33.5; p=0.0001) as shown in **figure 11**. There were also significant differences in perceptions of body image between the ethnic groups within the age groups with the black girls being more dissatisfied than their white peers at age 13 (X^2=6.4; p=0.04), 15 (X^2=15.4; p=0.001) and 17 (X^2=19.8; p=0.0001) years.

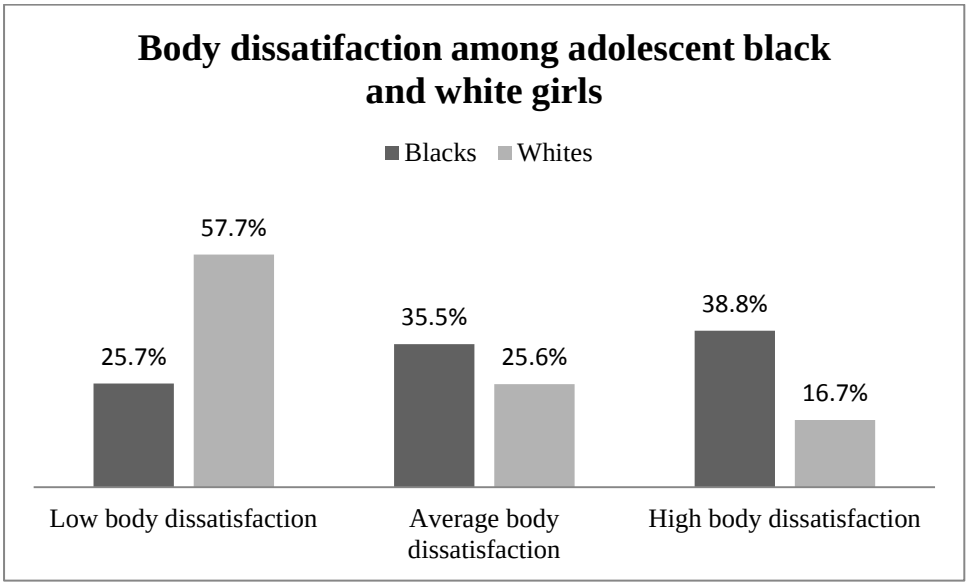


Figure 11: Distribution of body image dissatisfaction among black and white female adolescents

BMI was inversely associated with body image dissatisfaction with body image (whites: r=-0.40; blacks: r=-0.30; both p=0.001) and positively associated with EAT-26 score (whites: r=0.30, p=0.0001; blacks=0.16, p=0.038). In the white girls, self-esteem score was inversely associated with body dissatisfaction (r=-0.49; p<0.0001) and EAT-26 score (r=-0.29; p=0.004).

Data on the girls' perceptions of different body shapes are presented in **Table 9**. There were significant differences in perception of silhouettes by ethnicity. The majority of black girls chose a silhouette with a higher BMI to be the 'best' and to receive more 'respect', than the BMI chosen by the white girls (P<0.05). The white girls perceived a higher BMI silhouette to be 'clumsier' than black girls (P<0.05) and the black girls perceived a low BMI silhouette to receive less respect than the white girls. Black girls perceived that their family and friends desired them to have a higher BMI than that indicated to be the perceptions of the family and friends of their white counterparts. There was no significant association between body image perceptions and the type of school (indicator of socio-economic status) they attended.

Amongst the black girls there was an even spread amongst those wanting to be thinner (38.8%), fatter (29%) and those who were content (32.2%), while in the white girls two thirds (65.4%) wanted to be thinner and only 10% wanted to be fatter (X^2=27.7; p=0.0001).

Table 9: The association of body silhouettes with attributes as assessed by black and white South African girls

	13 years		15 years		17 years	
Silhouette	**White girls**	**Black girls**	**White girls**	**Black girls**	**White girls**	**Black girls**
Mean BMI	21.9 ± 5.3	19.8 ± 3.3	22.8 ± 3.8	21.3 ± 4.8	23.0 ± 3.7	23.3 ± 3.6
Best*	4 (3-4)	5 (4-5)	4 (3-4)	5 (4-5)	3 (3-4)	5 (3-5)
Worst	8 (7-8)	8 (2.5-8)	8 (7-8)	8 (7-8)	8 (7-8)	8 (7-8)
Clumsy*	1 & 8 (3-7)	7 (3-7)	8 (2-8)	1 (1-7)	8 (6-8)	7 (7-8)
More respect*	4 (3-6)	4 (3-6)	4 (3-5)	4 (4-5)	4 (3-4)	5 (2-5)
Less respect*	8 (3-8)	8 (2-7)	8 (3-8)	1 (1-7)	8 (3-8)	8 (1-7)
Strong*	6 & 7 (5-7)	8 (5-8)	5 (4-6)	8 (5-8)	4 (4-6)	6 (5-7)
Weakest	1 (1-1)	1 (1-1)	1 (1-1)	1 (1-1)	1 (1-1)	1 (1-1)
Happiest*	3 & 4 (3-4)	5 (4-5)	3 (3-4)	4 (4-5)	3 & 4 (3-4)	5 (4-5)
Unhappy*	8 (1-8)	8 (1-8)	8 (1-8)	8 (1-8)	8 (1-8)	8 (2-8)
Perceived	4 & 5 (3-4)	5 (4-5)	4 & 5 (4-5)	5 (4-5)	3 (3-4)	4 (4-5)
Desired	3 & 4 (3-4)	4 (4-5)	3 (3-4)	4 (4-5)	4 (3-4)	5 (3-5)
Family*	4 (3-4)	5 (4-5)	4 (3-4)	5 (4-5)	4 (3-4)	5 (4-6)
Friends*	4 (3-4)	5 (4-5)	4 (3-4)	5 (4-5)	4 (3-4)	5 (3-5)

Note: The silhouettes were divided into 8 from the thinnest to the fattest (1-8). The values given in the table are the mode and interquartile ranges. The left hand column list the words the girls were asked to best associate with a particular shape. The remaining columns provide the mode and 25^{th}-75^{th} centiles for the associated body shape.

***** Significant difference across race

3.4 Discussion

The study highlights the complexities governing adolescent females' perceptions of body image, self-esteem, and eating attitudes in a multi-ethnic, highly transitioning, urban African environment. The study demonstrates that although white adolescent girls have a higher mean

BMI, they tend to be less predisposed to eating pathology, have healthier images of their body, but lower self-esteem, and a preference to be thinner than their black peers. Black females in the study tended to have a greater predisposition to abnormal eating pathology, in particular, controlling what they eat, and a less healthy body image, but higher self-esteem. We had hypothesized that white South African females would demonstrate a greater prevalence of eating attitude pathology linked to their greater desire for thinness than black females. Even though white females did demonstrate a greater desire for thinness than their black peers, it does not appear to manifest as an abnormal attitude to eating or influence their BMI.

Our study does not show differences in perceptions of body image, eating attitudes or self-esteem between the different age groups. This is not consistent with findings from previous studies in high-income countries. Hoare and Cosgrove, observed more abnormal eating scores, lower self-esteem and more body dissatisfaction in older than younger girls (312). Differences in sample and time might account for the differences in findings between our study and that of Hoare and Cosgrove, considering our study was done more than a decade later.

Our findings indicated a higher prevalence of possible eating disorder pathology (EAT-26 ≥20) among black females (31.2%) compared to their white peers (19.7%). This supports previous research in South African, which showed that black females are at a higher risk of eating disorders than white females and demonstrates a possible marked increase in prevalence among black adolescent girls and a decrease among white adolescent girls over the last 10-15 years. Le Grange et al observed that 11% of white and 13% of black females (6) and Senekal et al reported that 14% of black females scored above the EAT-26 cut-off. (194) This could be as a result of conflict between traditional cultural beliefs and 'Western' expectations, with black urban teenagers embracing Western norms to fit in with the demands

of Western culture. This suggests that acculturation is slowly occurring among black urban adolescent females and eroding the more traditional/cultural concepts of an overweight female being beautiful, healthy and affluent.

Our results show a higher percentage (25.4%) of adolescent girls had high EAT-26 scores than previous South African studies, which found prevalence between 13% and 22%, also using the EAT-26. (2, 6) The higher prevalence in our study could be attributed to the fact that the other studies had been done some fifteen years previously, with the current adolescents being exposed to greater pressures to fit in with 'Western' norms (35). A similar explanation and differences in the sample might account for the differences in findings between our study and those of Szabo et al., 1999.

Our study suggests that black girls experience a significantly high engagement in oral control behaviors across the three age groups, indicating a greater tendency to restrict their intake and being more concerned about physical appearance than their white counterparts. However, Szabo found a greater prevalence of bulimic symptoms in black students than their whites' peers. (2) These differences could be a result of the different time periods in which the studies were carried out, the Szabo study was completed 10 years earlier than our study and thus our girls might have been exposed to greater urbanization pressures.

We showed a significant linear association between BMI and EAT-26 score in both the black and white girls suggesting that the heavier girls were more likely to present with disordered eating behaviors. This is likely as overweight females are more likely to engage in weight control behaviors such as oral control and dieting behaviors. (313) Our study also showed that black girls had a lower BMI and higher EAT-26 score than the whites; we speculate that black girls are slowly adopting Western norms which emphasize leaner body sizes/shapes hence encouraging inappropriate weight control behaviors such as dieting and oral control. The South African Youth Risk Behavior Survey more whites 9.7% were classified as obese

compared to colored (6.7%) and black African females (7.3%) (36). The higher BMI in white girls is different to what is seen in older South African women, where the prevalence of obesity is higher in black than white women. This may suggest that the shift in overweight and obesity in black females occurs later, in early adulthood (49). We also found that white females had a lower self-esteem than their black peers. Low self-esteem among overweight and obese white females may be attributed to the cultural differences between blacks and whites. Among black females overweight is associated with affluence, health, body and being HIV/AIDs negative (79) whereas whites associate a leaner body with beauty. (314) These findings are in line with a study that was done in the US which demonstrated that black girls have a high self-esteem than whites girls (315). Our study found that high self-esteem is associated with low eating attitude scores, which is consistent with the findings of Hoare and Cosgrove of an higher eating attitude score (possible eating disorder) being associated with a lower self-esteem. (312) Our study has also shown that the majority of white and black girls reported a desire to be thin, although close to 30% of the black girls still wanted to be fatter compared to only 10% of the white girls. We can only speculate that cultural perceptions on ideal body shape play a role here, where blacks strive to be fatter and white's leaner, highlighting that black girls are still being influenced by traditional values although showing signs of acculturation as shown from higher EAT-26 scores. Previous findings in the US are consistent with our research (314) and other research has shown that black females demonstrated a preference for a heavier body size and perceived greater approval of a heavier body size from both their peers and family as compared to whites. (316)

In the current study black girls demonstrated significantly greater body image dissatisfaction than white girls. A number of South African studies on body image have shown inconsistent results. Walker et al., 1991(317) found that both white and black girls experienced body image dissatisfaction, while a more recent study that examined body dissatisfaction among

white urban, black urban and black rural girls, found white urban girls were more dissatisfied compared to urban and rural black girls. (176) However, Caradas and colleagues (35) observed that white girls had a significantly better body image (more satisfied) than their black counterparts. This might be as a result of the increased body discrepancy among black teenagers as the majority of the black girls desired to be bigger or smaller (not content with their current body shape/size) compared to whites. Our study demonstrated that an increase in BMI was associated with better body image. These findings are not in agreement with previous studies that found obesity to be strongly associated with poor body image. (318)

Our study also highlights the influence of peer and family opinions on the adolescents' perception of an ideal body shape and support the findings of Paxton et al.,. (319) Previous studies have shown that parental influences play a vital role in their children's eating attitudes as children tend to attach importance to their parents' comments and preference on physical appearance and emphasis on a leaner body shape/size. Similarly, peer teasing and negative comments on female adolescents' body shapes/sizes have been linked to body dissatisfaction, occurrence of eating disturbances and low self-esteem. (187)

This study has a limitation in that the measure of cause-effect relationships as it is difficult to establish these in a cross-sectional study. It is imperative that these factors be examined longitudinally throughout adolescence in order to identify precursors and trends in eating related pathology; and we are currently conducting such a study. Another limitation is that the study sample was obtained through convenience sampling and was restricted to the city of Johannesburg only. For findings to be applicable to a general South African adolescent population, a representative sample including multiple rural and urban settings is necessary as various cities have different backgrounds and cultures. However, as Johannesburg is the economic hub of South Africa, most transitioned, and the most integrated, we can assume that along the continuum of urbanization and acculturation Johannesburg will represent the

greatest of these as compared to other South African cities, and may serve as a proxy to a trend that may evolve in other communities over time. Even though we did not measure household socio-economic status (SES) directly and level of parents' education, the schools were selected to provide SES diversity and the ethnic differences observed in the study are unlikely to be due to SES inequality, as we found no statistical differences between public and private school participants.

CONCLUSION

We conclude that there are significant ethnic differences in eating attitudes, body image and self-esteem between black and white South African adolescent girls, however eating attitudes and body image were similarly associated with BMI in both ethnic groups. It appears that many of these differences may still be due to cultural demands and preferences on the adolescent girls. This study offers evidence that acculturation of Western ideals of thinness is occurring in urban black South African females. Despite this, there is an increasing prevalence of adult female obesity in South Africa, currently standing at 35%, (37) and an associated high metabolic disease burden (38). The study is highly relevant for all African countries undergoing transition where researcher and policy leaders grapple with the development of interventions to optimize adolescent health prior to adulthood.

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CHAPTER FOUR: EATING ATTITUDES, BODY IMAGE SATISFACTION AND SELF-ESTEEM OF SOUTH AFRICAN MALE ADOLESCENTS AND THEIR PERCEPTION OF FEMALE BODY SILHOUETTES.

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Tabither M. Gitau, MSc. [a,], Lisa K. Micklesfield, PhD[a,], John M. Pettifor, MBBCh, PhD[a]; Shane A. Norris, PhD[a]

4.1 Introduction

Based on theoretical models of eating disorders, body dissatisfaction, eating disorders, and low self-esteem were thought to be limited to Western societies and only present in adolescent girls and adult females (3-5). However, studies in developed and developing countries (6-9, 320) have highlighted that eating disorders and body dissatisfaction are now a growing public health concern and are affecting males as well (10, 88).

With increasing Westernization, adolescents are subjected to greater social and potentially cultural pressure to meet the societal 'ideal' body shape, which is unrealistic. In Westernized societies, while weight management behavior in females is focused more on attaining a leaner body, in most cases weight management in males is associated with an increased desire for muscularity (26-28). A condition known as muscle dysmorphia in which muscular boys and men see themselves as thin and underdeveloped (242, 321) has been associated with increased levels of body dissatisfaction and active engagement in detrimental weight-management strategies such as eating disorders, use of anabolic steroids and excessive exercise (239-241, 322).

Research in high-income countries (U.K and U.S.A) has shown that approximately 5-20% of boys report restrained eating habits, steroid use, vomiting, laxative abuse or cigarette smoking for weight control in order to obtain a muscular body and reduced body fat (26, 83,

242, 323, 324). In the USA, African-American males have been shown to engage in more unhealthy weight management strategies, such as binge eating, compared to Caucasian males (27). A number of studies have been done in South Africa to explore eating disorders using a racial diverse sample and confirmed the increasing prevalence of eating disorders in developing countries however, these studies concentrated on females (1, 41, 176). According to a study done by Le Grange and colleagues, found that black male university students engaged in bulimic and anorexic behaviors more than their white peers (6). Failure to obtain the ideal body shape and size set by society can create high levels of body dissatisfaction when adolescents fail to meet the expectation (26), while sacrificing their health.

Due to the limited research conducted in low-or middle-income countries, like South Africa, we aim to examine the difference in eating attitudes, body image satisfaction and self-esteem in South African adolescent boys, and to determine whether these differences are influenced by age. In addition, little attention has focused on adolescent boys' perceptions of girls' body shape and size yet research has shown that during adolescence the opposite sex plays an important role in the development of body image and body-esteem concerns (325). It is also during this time when their bodies are changing and an interest in the opposite sex develops. Studies have also shown that peer pressure, increased focus on appearance and the negativity around being overweight or obese (326, 327) especially from the opposite sex during adolescence play a major role in the development of the desire for thinness among girls (328-330)

Another key component of this study is to examine racial differences in eating attitudes, body image satisfaction and self-esteem as this may elucidate aspects of cultural differences and acculturation. This will assist with better understanding of cultural and attitudinal factors that influence eating behavior in adolescent boys.

4.2 Method

Based on a bio-psychosocial model, that demonstrated associations between adolescents' behaviors (eating attitudes, body image satisfaction and self-esteem) and bio-psychosocial factors (biological, psychological and sociocultural factors) (26) a rationale for key predisposing domains were identified for this current study. These include socio-cultural factors (e.g. ethnicity, SES), psychological factors (e.g. body image, self-esteem), and biological factors (e.g. BMI, age). Therefore, a convenience sample of adolescent boys stratified by ethnicity and age was recruited from both private and public high schools in urban Johannesburg, South Africa. A letter requesting participation was submitted to schools according to their location and demographic profile, and adolescents were recruited from those schools if they were willing to participate in the study. Inclusion criteria were that completed parental consent forms were provided and that the adolescents were available during the times allocated by the school for the study. Participants included Black Africans (n=179) and White (n=212) adolescents who were stratified into the following ages: 13 (n=128), 15 (n=138) and 17 (n=125) years.

4.2.1 Measures

Socio-demographic information on age, race and type of school the participants attended i.e. (private or government/public) was collected.

Anthropometric measurements: Height was measured using a portable stadiometer (Holtain; UK) and recorded to the nearest millimeter, and weight was measured using a digital scale to the nearest 100 grams. Participants were measured in light clothing without shoes. These devices were calibrated regularly throughout the study. Height and weight measurements were used to compute the participants' body mass index (BMI) in kg/m^2. Age and sex-specific cut-offs for underweight and overweight/obesity were determined as recommended by the International Obesity Taskforce (303).

The Eating Attitudes Test-26 (EAT-26): The EAT-26 tool developed by Garner and Garfinkel to measure eating attitudes was used for this study (306), which had been used previously among girls samples in both rural (174) and urban (175) South Africa. The total EAT-26 score is the sum of the 26 items and scores can range from 0-78. Participants who score more than 20 are more likely to develop an eating disorder, with a higher score representing more unhealthy attitudes towards food, weight and eating. Participants' responses were classified into 3 groups namely: dieting, bulimia and food preoccupation, and oral control. We utilized Cronbach alpha to determine the internal reliability for EAT-26 for White and Black African adolescents and found the questionnaire had a good reliability ($\propto$=0.77 and $\propto$=0.71 respectively).

Rosenberg Self-Esteem scale: All participants completed the Rosenberg Self-Esteem (RSE) scale and self- esteem scores were categorized into three groups; low, average and high (331). The Rosenberg self-esteem scale consists of 10 questions which are ranked on a 4-point scale ranging from "strongly disagree" which was scored as "1" to "strongly agree" with a score of 4. Scores were categorized into three; low (scores 1-2), average (score of 3) and high (scores of 4-5), with a high score indicating a high self-esteem. The Rosenberg Self-esteem scale has been previously used in South Africa (le Grange et al., 2006).

Body image satisfaction: The participants were asked a set of 9 questions from the Multidimensional body self-relations questionnaire developed by Cash (308) to rate their satisfaction with different parts of their body. It assesses the participants' attitude related to body shape and the degree to which they are dissatisfied with different parts of their body, such as the stomach, hips, and buttocks Body image was measured using a 5-point scale ranging from "very satisfied" to "very dissatisfied", the higher the score the more dissatisfied the participant was with their body. The scores were later divided into three categories; satisfied above average, average and below average. Cronbach alpha reliability test was also

utilized for body image satisfaction for White and Black African adolescents and found the questionnaire had an excellent reliability ($\propto$=0.9 and $\propto$=0.8 respectively).

Perception of female silhouettes: Male participants were asked to select a body silhouette from a series of 8 randomly arranged Stunkard's body silhouettes (121) which they associated with specific words or phrases such as 'looks best', 'looks clumsy', 'looks worst', 'looks happy', 'looks strong', 'looks weak', 'I respect', 'looks unhappy'). For analysis purposes, the body silhouettes were coded 1 to 8 (from the thinnest to the biggest), they were further grouped into 4 groups; silhouette 1 and 2 (underweight), 3 and 4 (normal), 5 and 6 (overweight) and 7 and 8 (obese). As shown in table 10 Cronbach alpha reliability test was also utilized for perception of female silhouettes for adolescent boys and found the questionnaire had a poor reliability ($\propto$=0.4).

Table 10: Reliability of the female silhouette tool

Item	**observation**	**Item-test correlation**	**Item-rest correlation**	**Average inter-item covariance**	**alpha**
1	658	0.46	0.34	0.093	0.4
2	660	0.36	0.05	0.05	0.5
3	661	0.34	0.02	0.02	0.5
4	659	0.56	0.38	0.38	0.3
5	660	0.49	0.18	0.18	0.4
6	660	0.44	0.25	0.26	0.4
7	660	0.28	0.10	0.10	0.4
8	658	0.50	0.32	0.32	0.4
9	656	0.51	0.20	0.21	0.4

Ethics clearance

Ethical approval for this study (M050226) was received from the University of the Witwatersrand Human Research Ethics Committee**.**

4.2.2 Data analyses

Statistical analysis was completed using a statistical package STATA version 12 (StataCorp, Texas, USA). Descriptive analyses were used to describe the participants' demographic characteristics, frequencies and percentages were reported for categorical variables, and means and standard deviations for continuous variables (height, weight and BMI). Cronbach alpha reliability test were carried out to determine the internal consistency of the EAT 26 questionnaire and the Rosenberg self-esteem scales. The non-parametric Wilcoxon Mann Whitney test was used to test for significant differences between data that were not normally distributed (EAT-26). Spearman's rank correlation coefficient analyses were conducted to test for associations between self-esteem scores and eating attitudes, body mass indices and body image satisfaction scores. To assess the differences between groups that were normally distributed, chi-square tests were carried out. A two-sided tail at 0.05 was considered to be statistically significant.

4.3 Results

Participants' characteristics are presented in **Table 11**. Black (n=179) and white (n=212) participants were distributed similarly across the age groups. White adolescents had a significantly higher BMI (22 ± 3.2 vs 19 ± 2.8 kg/m^2; $p<0.001$), and prevalence of overweight and obesity (28.8% vs. 11.2%) than their black peers. The type of school the participants attended was not found to be significantly different between the ethnic groups ($p>0.05$).

Table 11: Characteristics of study participants

Variable	Whites	Blacks	P-value
Age			
13	68(32.1%)	60(33.5%)	0.795
15	78(36.8%)	60(33.5%)	
17	66(31.1%)	59(33.0%)	
Type of school			
Private schools	87(41.0%)	60(33.5%)	0.126
Public schools	125(59%)	119(66.5%)	
BMI (kg/m^2)			
13	20.9±3.3	18.1±1.9	<0.001
15	21.6±2.8	19±2.9	
17	23.4±2.9	20.1±2.8	
BMI			
Underweight	21(9.9%)	79(44.1%)	<0.001
Normal	130(61.3%)	80(44.7%)	
Overweight/Obese	61(28.8%)	20(11.2%)	
Self-esteem			
High self-esteem	75(39.3%)	24(13.4%)	<0.001
Average	75(39.3%)	72(40.2%)	
Low self-esteem	41(21.4%)	83(46.4%)	
Body image satisfaction			
Above	62(29.2%)	60(33.5%)	0.229
Average	79(37.3%)	52(29.1%)	
Below average	71(33.5%)	67(37.4%)	
Eating attitudes			
<20	201(94.8%)	107(59.8%)	<0.001
>20	11(5.2%)	72(40.2%)	

Eating attitudes

For the whole group, the overall median for the EAT-26 total score was 9 (IQR=4 -18), however significantly more black than white adolescents had an EAT score greater than 20 (40.3 vs. 5.2%; p< 0.001). All scores for the EAT-26 sub-groups including dieting (z=-11.8; p=0.0001), bulimia and food pre-occupation (z=-8.4; p=0.001) and oral control scores (z=-8.2; p=0.0001) were higher in the Black than the White adolescents.

When the whole group was divided according to the three age categories, 41% of 15 year olds had an EAT-26 score >20 (p>0.05) indicating possible eating disorders. Overall, there was a significant difference between mean EAT-26 score and BMI categories (underweight

16.7±10.7, normal BMI 10.2±9.2, overweight/obese 10±9.7) p<0.0001. BMI was inversely correlated with the EAT-26 dieting score in the 13-year-old adolescents (r=-0.257, p=0.004), with the EAT-26 oral control score in all the age groups (13 year olds: r=-0.388, p<0.001; 15 year olds: r=-0.176, p=0.042; 17 year olds: r=-0.294, p=0.0009), and with the EAT-26 bulimia scores at age 13 and 15 years (13 year olds: r=-0.416, p<0.0001; 15 year olds: r=-0.2469, p=0.004).

In the underweight group, significantly more of the adolescents reported an EAT-26 score> 20 (35%), compared to the normal weight (17.1%) and the overweight/obese (14.8%) groups as shown in **figure 12**. The EAT-26 bulimia score was significantly different across the BMI categories (Underweight 4.9±3.9, normal 2.9±3.2 and overweight 2.7±3.1 p<0.0001) however there were no significant differences found in the dieting or oral control scores between the BMI groups. The EAT-26 score was not significantly associated with age or type of school they attended (p>0.05) in the whole group. However there was a significant inverse relationship between the EAT-26 score and self-esteem score in both the Black (r=-0.22, p=0.003) and White (r=-0.20, p=0.005) adolescents.

Self-esteem

For the whole group, the overall mean for the self-esteem total score was 31.9±4.2. White adolescents had a significantly higher mean self-esteem total score than Black African adolescents (mean 33.2 vs 30.5; p<0.001). The prevalence of low self-esteem was higher (46.4%) in Black African than White adolescents (21.4%) p< 0.001).

For the whole sample (refer to **figure 13**), when the three age categories were compared, the proportion of adolescents with low self-esteem was greater in the youngest group, (43% of the 13-year-old adolescents compared to 35% of the 15-year-olds and 23% of the 17-year olds; p=0.033).

A third of the whole sample (33.5%) was found to have low self-esteem, and of these, 21.2% reported an EAT-26 >20 which was significantly higher than those with an EAT-26 score >20 in the high (78.8%) self-esteem groups (X^2=24.03, p=0.0001).

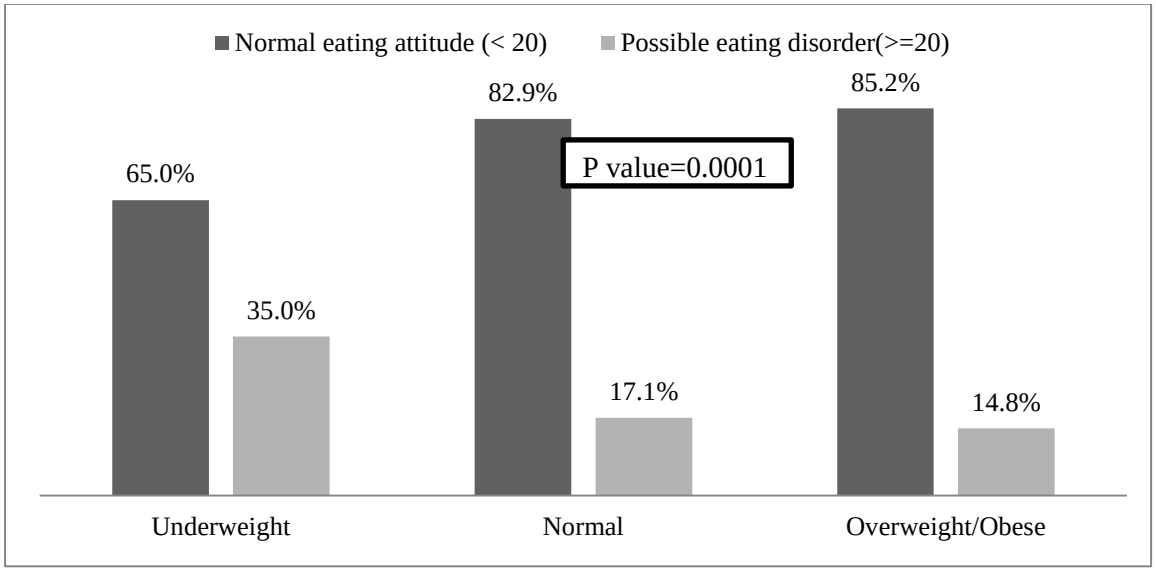


Figure 12: Eating attitudes cutoff and BMI categories

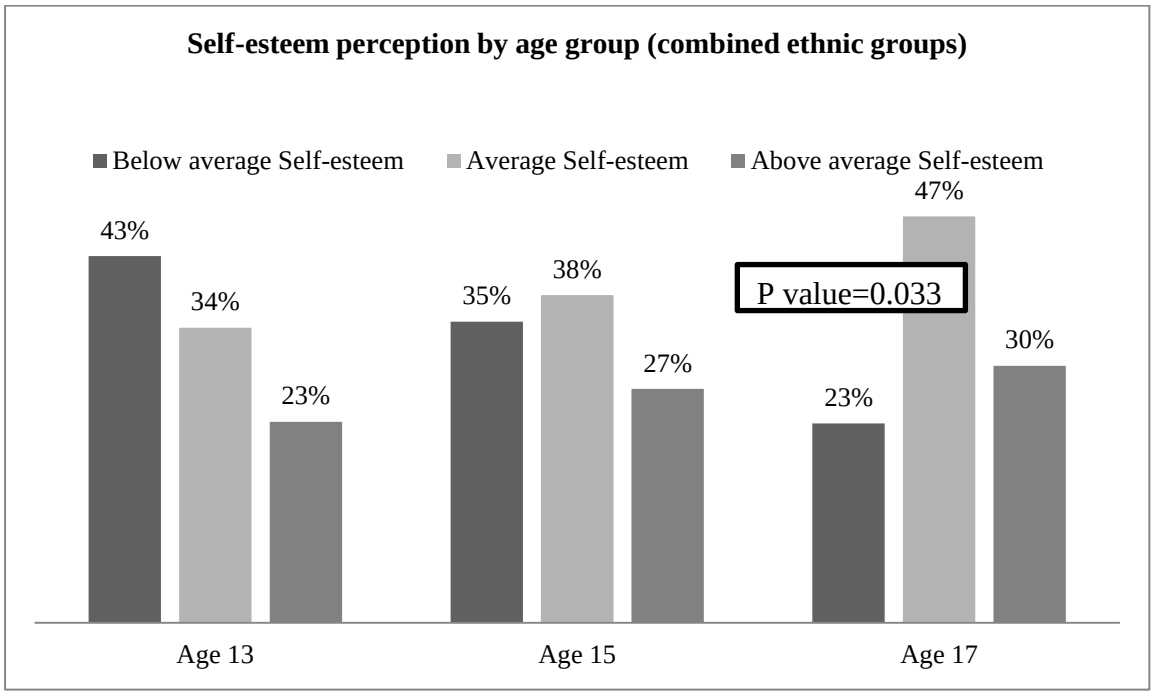


Figure 13: Self-esteem by age group (combined ethnic groups)

For the 13 year olds, the self-esteem score was positively correlated with BMI (r=0.1349, p=0.01), however this relationship was not found in the other two age groups. The majority (49.2%) of the normal BMI adolescents had low self-esteem compared to those that had an underweight BMI (33.9%) or overweight/obese BMI **(**16.9%) (p<0.0001). There was no significant association between self-esteem and type of school the adolescents attended.

Body image satisfaction

There was no difference in body image satisfaction between the ethnic groups (**Table 10**), with a prevalence of 37.4% below average body image satisfaction in the black and 33.5% in the white boys. Approximately one third of white participants (37.3%) had an average body image satisfaction, whereas a third of Black African adolescents (33.5 %) had a body image satisfaction that was above average.

The prevalence of body image satisfaction category was not different between the age groups (p=0.451). When both ethnic groups were combined, no significant relationship between body satisfaction and race, age, EAT-26 score and type of school (p>0.05) was found. However, there was an inverse relationship between body satisfaction and EAT-26 score among White adolescents (r=-0.2, p=0.025), suggesting that the adolescents who were more dissatisfied with their bodies had a lower EAT-26 score. There was no significant correlation between body satisfaction and self-esteem (p>0.05), nor was there any association between body image satisfaction and BMI categories.

Boys' perception of girls' silhouettes across race

There was a significant difference in the adolescent males' perception of female body silhouettes between the ethnic groups (**Table 12**). There was a significant difference between the Black and White adolescents with respect to which silhouette they considered to be "best" with 67.1% of the Black adolescents selecting the overweight silhouette and 86.2% of the

White adolescents selected a silhouette with a normal BMI ($p<0.0001$). Although Black and White adolescents perceived an obese silhouette to be 'clumsy', Black African adolescents associated strength with the obese silhouette while White adolescents with overweight silhouette. In comparison 74.5% of the White adolescents considered the silhouette with a normal BMI to be 'happiest', while the highest percentage (44.7%) of Black African adolescents selected the overweight silhouette to be 'happiest'. Interestingly, Black African adolescents found underweight and obese silhouettes to demand less respect from others and to be unhappy.

Table 12: The association of female body silhouettes with attributes as assessed by black and white South African males

Silhouettes	Blacks	Whites	P-value
Best*			
Underweight	2(1.1%)	13(6.2%)	**<0.0001**
Normal	55(30.7%)	181(86.2%)	
Overweight	120(67.1%)	15(7.1%)	
Obese	2(1.1%)	1(0.5%)	
Worst *			**0.003**
Underweight	34(19%)	18(8.6%)	
Normal	4(2.2%)	1(0.5%)	
Overweight	5(2.8%)	2(1.0%)	
Obese	136(76%)	188(90%)	
Clumsy*			**0.002**
Underweight	61(34.3%)	41(19.6%)	
Normal	14(7.9%)	9(4.3%)	
Overweight	21(11.8%)	37(17.7%)	
Obese	82(46.1%)	122(58.4%)	
More respect*			**0.025**
Underweight	28(15.6%)	34(16.4%)	
Normal	65(36.3%)	96(46.2%)	
Overweight	67(37.4%)	49(23.6%)	
Obese	18(10.6%)	29(14%)	
Less respect *			**<0.0001**
Underweight	80(44.7%)	25(12.6%)	
Normal	18(10.1%)	32(16.2%)	
Overweight	20(11.2%)	19(9.6%)	
Obese	61(34.1%)	122(58.4%)	

Strongest *			**0.002**
Underweight	3(1.7%)	0 (0%)	
Normal	29(16.2%)	55(26.3%)	
Overweight	61(34.1%)	86(41.2%)	
Obese	86(48%)	68(32.5%)	
Weakest			
Underweight	151(84.4%)	184(88.0%)	0.729
Normal	14(7.8%)	11(5.3%)	
Overweight	5(2.8%)	5(2.4%)	
Obese	9(5.02%)	9(4.3%)	
Happiest*			**<0.0001**
Underweight	18(10.1%)	16(7.7%)	
Normal	60(33.5%)	155(74.5%)	
Overweight	80(44.7%)	34(16.3%)	
Obese	21(11.7%)	3(1.4%)	
Unhappiest*			
Underweight	61(34.1%)	18(8.7%)	**<0.0001**
Normal	11(6.1%)	7(3.4%)	
Overweight	15(8.4%)	6(2.9%)	
Obese	92(51.4%)	176(85%)	

Note: The silhouettes were divided into 8 from the thinnest to the fattest (1-8). The values given in the table are the frequencies and percentages. The left column list the words the boys were asked to best associate with a particular shape. The remaining columns provide the frequencies and percentages for the associated body shape**.**

***** Statistical significance

4.4 Discussion

We found that nearly a third of the white adolescent in our sample were overweight or obese with the White adolescents having a significantly higher mean BMI than the Black African adolescents. Nearly half of the black adolescents were underweight, more of the Blacks reported a lower self-esteem and had EAT-26 scores suggestive of possible eating disorders than the White adolescents. We also found that the male adolescents' perception of female silhouettes was significantly influenced by ethnicity with the White adolescents associating positive characteristics with silhouettes of a lower BMI than the Black adolescents.

Eating attitudes

The results indicate that both Black and White adolescents who were underweight had a higher EAT-26 score than those with a greater BMI. Previous research has shown that a low BMI in adolescents may be a risk factor for eating disorders as male adolescents may associate low BMI with having lower muscle mass (332), and a low BMI may also suggest a small body size and thus a desire to get bigger and more muscular (88). More than a third of the male participants in our study who were underweight were at a high risk of disordered eating, this may suggest that their body weight controls their body shape/size control behaviors such as; eating behaviors.

Black African adolescents reported a significantly higher EAT-26 score, as well as higher scores for all EAT-26 components including oral control, bulimia and food preoccupation, and dieting compared to the White adolescents. Petersen and Taylor (1980) were the first to suggest that Black males were more likely than White adolescents to use binge eating as a body building strategy as a result of acculturated stress (333-335). This is targeted to make up for the low muscle bulk mainly caused by societal pressure to assimilate with the dominant culture in America; this increased their risk for body image and development of binge eating.

In South Africa, Szabo and colleagues reported that eating disorders not only affected white but also Black children (2). Similarly, a study conducted by Neumark-Sztainer and Hannan in the USA, showed that adolescent non-Hispanic Black males reported engaging in binge-purge habits (215). Other studies from Africa, U.S.A and Australia, comparing Black and White males also observed more binge eating among black males than whites (6, 179). Contrary to these results, a study that was done in South Africa looking at a small number of Black and White males aged 17-23 years found no racial differences in bulimia and food preoccupation scores between the ethnic groups. The authors suggest that the small sample size might have resulted in a type II error (336). We showed an inverse association between eating attitude scores and BMI in Black adolescents, indicating greater possible oral control and dieting behaviors in those with lower BMIs. We speculate that Black adolescents engaged in unhealthy eating habits to gain weight so as to obtain a muscular body.

It is surprising that the type of school participants attended was not associated with any of the outcomes. In South Africa, a study comparing eating attitudes and body satisfaction among adolescents attending public and private schools, reported that a larger proportion of students attending private schools had EAT-26 scores indicative of possible anorexia nervosa tendencies and body image dissatisfaction than those attending public schools (337).

Our study showed that in the younger group, BMI was associated with all components of the EAT-26 score, but in 15 year olds only with oral control and bulimia, and in 17 year olds only with oral control. This might be as a result of the relatively small number of participants in each age group, as other studies have found disordered eating habits to be more common in older adolescents (15-16 years), which suggests that eating disorders increase with age (149).

Self-esteem

White adolescents had higher self-esteem as compared to the Black African adolescents. An inverse association was observed between self-esteem score and the EAT-26 score which supports previous findings examining adolescent eating attitudes and psychological health (215, 338, 339). Moreover, prospective studies have shown that low self-esteem significantly predicted eating disorders (139, 340).

The data indicates that the younger adolescents had a lower self-esteem compared to the older groups. It is commonly recognized that self-esteem declines with adolescence due to body image dissatisfaction, early or delayed maturation, BMI changes and peer influence, and then rises during adulthood (137).

We showed a significant association between BMI and self-esteem in the whole group. In addition, we found that white boys having a higher self-esteem compared to the black African boys, we also found more black African boys to be underweight. Low self-esteem among black African boys could possibly be as a result of their low BMI (underweight). In male adolescents, an increase in BMI is often associated with an increase in muscle mass whereas, in females it's associated with accumulation of fat. In males both low and high BMI were associated with poor self-esteem. Previous studies found low self-esteem in males to predict higher rates of dieting, unhealthy weight control behaviors and binge eating and smoking in subsequent years (341).

Body image satisfaction

Previous studies have shown that African American males have a greater preference for larger bodies and are more satisfied with their body shape/size compared to whites (7, 342, 343).

Cafri and others (2005) found pubertal timing to be an essential aspect to consider when looking at body satisfaction in male adolescents because of marked physical development e.g. muscle growth, that occurs at that time (88). In addition to these findings, Bearman and colleagues observed that boys in late adolescence were more dissatisfied with their bodies compared to pre-pubertal boys, hence they tried to gain greater muscle (237). Another longitudinal study found that both pre- and post-adolescent boys engage in body image change strategies targeted to increase their muscles (344), suggesting that there is no difference in pubertal stage and body image change strategies.

Interestingly, and contrary to other studies, we found that body dissatisfaction was associated with a normal EAT-26 score. Jaeger and colleagues (345) found that body image dissatisfaction to be a precursor for dieting and that often precipitates to disordered eating behavior in most HICs and that countries undergoing westernization show an intermediate amount of body dissatisfaction compared to the low levels demonstrated by non-western countries. South Africa is now considered to be a middle-income country rapidly undergoing economic and nutritional transitions, but still largely influenced by traditional customs and beliefs despite increase in Westernization. Berry (1997) refers to this as cultural integration where by the native group (blacks) maintains their own values and customs and adding them to these of dominant group (346).

Our study results indicate that whites had a higher BMI, which is in line with the Youth Risk Behavior Survey (YRBS) that was carried out in SA (36). The YRBS study documented that 20.2% of White adolescents and 5.2% of Black male adolescents were overweight. This is also in line with Aruguete and others' findings (217, 333, 343, 347-350). This finding may be explained by the possibility of Black male adolescents being less susceptible to societal pressures to be fat or engage in physical activity or eat less fast foods or snack less or have delayed puberty and eat foods prepared at home compared to South African Whites.

Male adolescents' perceptions of girls' silhouettes

During adolescence, both males and females become more aware of their bodies and appearance (3, 149, 351, 352), and begin to seek external approval to identify them, thus becoming vulnerable to comments from others (352, 353).

Black male adolescents perceived a more overweight silhouette to be the most favorable; they described this silhouette as being the strongest, happiest and most respectable as opposed to White adolescents who chose a thinner silhouette. This supports previous findings that have shown that black male adolescents associate a larger female silhouette with beauty, health and a higher social status (12, 354, 355). Other studies from South Africa, Australia and the USA found similar results (79, 352, 356). Despite the Black male adolescents' preference for a larger female silhouette compared to the White adolescents, they also perceived the most obese silhouette to be the worst and clumsiest. This illustrates the complexities of adolescent boy's perceptions, particularly in a country such as South Africa.

White adolescents also perceived an obese silhouette to be clumsy, unfavorable, less respected and unhappy. This is in line with other studies that showed whites preference for normal weight or underweight female figures (357). We also found that White adolescents did not consider very thin females to be the best. On the contrary, other findings observed that whites prefer thinner females as compared to the thinnest. This might be the case because they are trying to fit into the society that appreciates bigger women (320).

Limitations

We acknowledge that this study has a number of limitations. The current study employed a cross-sectional study design hence making it difficult to identify a cause-effect relationship between the variables. We acknowledge the importance of examining adolescents longitudinally so as to identify the precursors and trends in eating attitudes. Another

limitation of this study is that the sample was obtained through convenience sampling and was limited to adolescents who attended schools in Johannesburg only. For generalizability of our study findings in South Africa, a more representative sample is required since communities living in various cities have different backgrounds and cultures. However, Johannesburg is the economic hub of South Africa and the most integrated city in South Africa, hence may serve as a proxy for a trend that may evolve in other communities over time. Finally, lack of cultural validity of the tools used for this study influence the generalizability of the findings however, these tools have previously been used in South Africa. There is need for developing and validating culture sensitive tools. Nevertheless, this study highlights the importance of ethnicity as a predictor for the determination the patterns of eating disorders, self-esteem and body image in male adolescents.

Conclusion

To our knowledge this the first study in Africa to examine eating attitudes, body image and self-esteem cross-sectionally at age 13, 15 and 17 years among boys. In conclusion, this study established some differences between White and Black African adolescents with regard to BMI, eating attitudes and self-esteem. This may therefore suggest the possible influence of cultural factors on these factors in the African population groups. There is need to better understand how cultural aspects influence male adolescents to inform practices that can optimize adolescent physical and mental health in South Africa.

CHAPTER FIVE: CHANGES IN EATING ATTITUDES, BODY ESTEEM AND WEIGHT CONTROL BEHAVIOURS DURING ADOLESCENCE IN A SOUTH AFRICAN COHORT

(***Accepted for publication in Plos One***)

Tabither M. Gitau, MSc. [a,], Lisa K. Micklesfield, PhD [a], John M. Pettifor, MBBCh, PhD(Med) [a]; Shane A. Norris, PhD [a]

5.1 Introduction

Nutritional needs are greater during adolescence than at other times during childhood, and over-consumption or failure to consume an adequate diet during this period can disrupt normal growth and development, resulting in undesirable weight change (358) Previous research has shown that unhealthy weight control practices related to eating and exercise are on the rise among adolescent girls and boys in order to meet the societal 'ideal' body shape, particularly in the developed world (289, 359).

In most high-income countries (HICs)(360) women are considered desirable, attractive, and successful when they are lean (361). Furthermore, men are considered attractive when they have a muscular body shape with large shoulders and a slim waist (26). It is during adolescence that individuals start to experience body dissatisfaction, and may begin engaging in unhealthy weight control behaviors such as fasting, skipping meals, excessive dietary restriction, consuming diet pills, self-induced vomiting and extreme exercising (289). In contrast, in some African cultures being overweight is associated with positive attributes (49). In South African women, leanness is not necessarily perceived as beautiful; rather being plump (overweight) signifies beauty, health and a higher social status (79). Furthermore, black African women associate overweight with happiness, affluence, and the absence of disease (such as HIV/AIDS), and having overweight children is a measure of 'good' parental care (79). However, with ongoing Westernization occurring

in South Africa (68), there has been a change in eating attitudes and body image satisfaction in South African adolescents.

Research by Mchiza and others in an urban adolescent sample (Cape Town) of South African girls found that body image dissatisfaction was greater in white than black African girls. In addition, black African girls experienced less pressure from family and peers to change their current body shape (362). In another South African study of 15-18 year-olds, 33%, 26% and 20% of white, black African and mixed ancestry girls, respectively experienced body dissatisfaction (35). More recently in a cross sectional study in urban South Africa (Soweto) we found that more black African than white girls were at risk of future eating disorders, however the black adolescents still favored a body silhouette with a greater BMI than their white peers (50).

Some studies have shown that increasing age during adolescence is strongly associated with heightened emphasis on appearance and body shape (363), however other studies have shown a strong association between low self-esteem and body dissatisfaction across gender, age, weight status, ethnicity, socioeconomic status and time. (311).

Because of limited longitudinal information on eating attitudes, body image perception and weight control behaviors in South African black and mixed ancestry adolescents, we examined changes in these parameters between early (13 years) and late (17 years) adolescent boys and girls. Secondly, we assessed differences between 17-year-old boys and girls in their perceptions of female body silhouettes.

5.2 Methods

5.2.1 Sample and study design

Data for this study were obtained from the Birth-to-Twenty longitudinal birth cohort study (364). A total of 3 723 babies born to mothers who were residing in the Soweto-Johannesburg (formal and informal urban areas) region for at least 6 months after birth in 1990 were enrolled into the study. After nearly two decades, the cohort has had a relatively low attrition rate of 30%, and approximately 2 300 participants still remained in contact with the study (364).

A trained research team collected socio-demographic and anthropometric data, and interviewer-assisted questionnaires on eating attitudes, body esteem and weight control behaviors on the adolescents at two time points: at age 13 years (n=1 580: girls=833, boys=747) and four years later at age 17 years (n=1 820: girls=939, boys=881). A total of 1 435 participants had complete data at both 13 and 17 years (boys=690 and girls=745). This study only included black African and mixed ancestral (children born to white European and black African parents) participants from the cohort and those who had data at both time points. Adolescents belonging to other racial groups (i.e. white and Indian) were excluded because of the small sample sizes. This study is presented in two-phases: A cross- sectional study at age 13 and 17 years, and a longitudinal study that examines the changes that took place between age 13 and 17 years. Ethics approval was obtained from the University of the Witwatersrand Human Research Ethics Committee. Written informed consent was obtained from the participants' legal guardians/caregivers, and written assent from the participants themselves.

5.2.2 Measures

Anthropometric: Height and weight were collected at both time points. Height was measured using a portable stadiometer (Holtain; UK) and recorded to the nearest millimeter, and weight was measured using a digital scale to the nearest 100 grams.

Participants' height and weight measurements were used to calculate BMI (weight (kg)/height (m^2)). Age- and gender-specific BMI cut-offs were used to define underweight (2^{nd} grade i.e. < -2SD), overweight and obesity prevalence (365).

Eating attitudes test-26 (EAT 26): The EAT-26 questionnaire was completed in order to measure eating attitudes (306). This questionnaire has been previously validated in both rural (174) and urban (175) South African settings. The total EAT-26 score is the sum of the 26 items and scores can range from 0 to 78. Participants who score more than 20 are considered to be at greater risk of developing an eating disorder, and represent more unhealthy attitudes towards food, body weight and eating. We utilized Cronbach alpha to determine the internal reliability for EAT-26 at both early and late adolescence and found that the questionnaire had good reliability (early adolescence: α=0.71 and late adolescence: α=0.70).

Body Esteem: Body-esteem was measured using a body esteem scale (310). It consists of a set of 21 questions which measure 1) global feelings about one's body e.g. "I like what I see when I look in the mirror", 2) satisfaction with one's weight e.g. "I really like what I weigh" and 3) positive evaluations about one's body and appearance e.g. "People my own age like my looks". The body-esteem assessment uses a 5-point scale ranging from "never" (1) to "always" (5) and the higher the score the more satisfied the participant is with their body. Total scores are divided into three categories; low body esteem (score 1 to 21), average body-esteem (score 22 to 42), and high body esteem (score > 43) (310). Internal reliability for the body-esteem scale was very good (early adolescence: α=0.86 and late adolescence: α=0.89).

Weight control behaviors: All participants were asked a number of questions about their attempts to change their weight. Girls were asked: "During the past year have you done anything to try to lose weight?" and boys were asked: "During the past year have you done anything to try to gain muscle?" If participants answered positively they were asked to give reasons, which included; health and cosmetic reasons e.g. to look better, clothes too tight, too fat, unhappy with self, and want to be a model. They were further asked about the methods they used to lose weight, and their responses were categorized into three groups: (i) healthy weight control behaviors (i.e. to exercise, eat more fruits and vegetables, and to eat less high fat foods and less sweets) (366) unhealthy weight control behaviors (e.g. Fasting, eating very little food, skipping meals, cigarette smoking and use of food substitutes (iii) extreme weight control behaviors (e.g. use of diet pills, self-induced vomiting, use of laxatives and diuretics).

Perception of female silhouettes: At 17 years of age female and male participants were asked to select a female body silhouette from a series of 8 randomly arranged body silhouettes (121) which they associated with the following specific words or phrases: 'looks best', 'looks clumsy', 'looks worst', 'looks happy', 'looks strong', 'looks weak', 'I respect', 'looks unhappy'. For the purposes of this analysis the body silhouettes were coded from 1 (thinnest) to 8 (biggest) and then grouped into 4 categories; silhouettes 1 and 2 (underweight), 3 and 4 (normal), 5 and 6 (overweight) and 7 and 8 (obese).

Table 13: Reliability of the female silhouette tool age 17 years.

Item	**observation**	**Item-test correlation**	**Item-rest correlation**	**Average inter-item covariance**	**alpha**
1	658	0.46	0.34	0.093	0.4
2	660	0.36	0.05	0.05	0.5
3	661	0.34	0.02	0.02	0.5
4	659	0.56	0.38	0.38	0.3
5	660	0.49	0.18	0.18	0.4
6	660	0.44	0.25	0.26	0.4
7	660	0.28	0.10	0.10	0.4
8	658	0.50	0.32	0.32	0.4
9	656	0.51	0.20	0.21	0.4

Table 14: Reliability test of the EAT-26 among 17 year olds.

Item	item-test correlation	average item-rest correlation	Average interitem covariance	alpha
1	0.34	0.17	0.08	0.70
2	0.44	0.35	0.08	0.68
3	0.27	0.14	0.09	0.69
4	0.30	0.19	0.09	0.69
5	0.34	0.24	0.09	0.69
6	0.36	0.20	0.08	0.69
7	0.41	0.31	0.08	0.68
8	0.40	0.29	0.08	0.68
9	0.31	0.27	0.09	0.69
10	0.43	0.37	0.09	0.68
11	0.50	0.42	0.08	0.67
12	0.42	0.30	0.08	0.68
13	0.29	0.17	0.09	0.69
14	0.41	0.31	0.08	0.68
15	0.34	0.20	0.08	0.69
16	0.40	0.31	0.08	0.68
17	0.37	0.29	0.09	0.68
18	0.38	0.27	0.08	0.68
19	0.16	-0.01	0.09	0.72
20	0.43	0.33	0.08	0.68
21	0.38	0.28	0.08	0.68
22	0.42	0.33	0.08	0.68
23	0.45	0.37	0.08	0.68
24	0.41	0.34	0.09	0.68
25	0.34	0.20	0.08	0.69
26	0.50	0.42	0.08	0.67
Test scale			0.08	0.69

Table 15: Reliability test of the EAT-26 among 13 year olds.

Item	item-test correlation	average item-rest correlation	Average interitem covariance	alpha
1	0.22	0.07	0.24	0.76
2	0.46	0.38	0.23	0.74
3	0.42	0.32	0.23	0.74
4	0.40	0.30	0.23	0.74
5	0.37	0.27	0.23	0.74
6	0.47	0.35	0.22	0.74
7	0.39	0.32	0.23	0.74
8	0.42	0.33	0.23	0.74
9	0.25	0.20	0.24	0.75
10	0.42	0.37	0.24	0.74
11	0.49	0.42	0.23	0.74
12	0.46	0.36	0.22	0.74
13	0.29	0.19	0.24	0.75
14	0.40	0.31	0.23	0.74
15	0.35	0.23	0.23	0.75
16	0.38	0.29	0.23	0.74
17	0.49	0.43	0.23	0.74
18	0.40	0.28	0.23	0.74
19	0.26	0.13	0.24	0.75
20	0.40	0.31	0.23	0.74
21	0.50	0.42	0.22	0.73
22	0.43	0.35	0.23	0.74
23	0.47	0.40	0.23	0.74
24	0.31	0.24	0.24	0.75
25	0.28	0.15	0.24	0.75
26	0.37	0.32	0.24	0.74
Test scale			0.23	0.75

Table 16: Reliability test of the Body esteem among 13 year olds.

Item	item-test correlation	average item-rest correlation	Average interitem covariance	alpha
1	0.46	0.38	0.20	0.86
2	0.40	0.32	0.21	0.86
3	0.53	0.48	0.20	0.86
4	0.51	0.44	0.20	0.86
5	0.58	0.52	0.20	0.85
6	0.50	0.42	0.20	0.86
7	0.66	0.59	0.19	0.85
8	0.43	0.32	0.20	0.86
9	0.63	0.56	0.19	0.85
10	0.39	0.31	0.21	0.86
11	0.42	0.34	0.20	0.86
12	0.48	0.43	0.21	0.86
13	0.49	0.42	0.20	0.86
14	0.58	0.52	0.20	0.85
15	0.60	0.53	0.19	0.85
16	0.44	0.39	0.21	0.86
17	0.41	0.34	0.21	0.86
18	0.63	0.55	0.19	0.85
19	0.50	0.44	0.21	0.86
20	0.61	0.54	0.20	0.85
21	0.63	0.57	0.20	0.85
Test scale			0.20	0.86

Table 17: Reliability test of the Body esteem among 17 year olds.

Item	item-test correlation	average item-rest correlation	Average interitem covariance	alpha
1	0.60	0.54	0.25	0.89
2	0.35	0.28	0.27	0.90
3	0.70	0.67	0.25	0.89
4	0.56	0.49	0.26	0.89
5	0.70	0.66	0.25	0.89
6	0.57	0.51	0.25	0.89
7	0.76	0.71	0.24	0.89
8	0.54	0.46	0.25	0.90
9	0.68	0.62	0.25	0.89
10	0.47	0.41	0.26	0.90
11	0.44	0.36	0.26	0.90
12	0.50	0.45	0.26	0.89
13	0.47	0.39	0.26	0.90
14	0.69	0.65	0.25	0.89
15	0.56	0.49	0.25	0.89
16	0.52	0.48	0.27	0.89
17	0.51	0.46	0.26	0.89
18	0.64	0.60	0.26	0.89
19	0.57	0.52	0.26	0.89
20	0.65	0.60	0.25	0.89
21	0.66	0.61	0.25	0.89
Test scale			0.26	0.90

5.2.3 Data analysis

STATA (Version 12 StataCorp, Texas USA) was used for analysis. Skewness and kurtosis tests for normality were applied to all numerical variables. A kurtosis of 3 was used to define a normal distribution and parametric tests were conducted. Data with a kurtosis greater than 3 were considered to be skewed and were subjected to non-parametric methods. None of the data was transformed. Student t-tests were used to determine differences in normally distributed numerical variables between the binary variables (e.g. gender and ethnicity).

Associations between categorized weight–control behaviors and other characteristics (gender, ethnicity and BMI category) were assessed with chi-squared tests.

As shown in **table 20**, the individual change in outcomes were also measured in this study between age 13 and 17. Multi-nominal logistic regression models were fitted to identify determinants of weight control behaviors, eating attitudes and body esteem. We ran several bivariate models and identified variables that were significantly associated with the outcomes at the 5% level and included them in the multinomial regression.

5.3 RESULTS

This study is presented in three parts: Part 1 examines the cross-sectional data at ages 13 and 17 years, part 2 examines longitudinal changes in those who had complete data at both time points, and part 3 presents the participants' perceptions of the silhouettes at age 17 years.

5.3.1 Part 1a: Cross-sectional comparison at age 13 years (Table 18)

The prevalence of underweight ranged from 2.1% in the black boys to 7.4% in the mixed ancestry boys. Black African females had the highest prevalence of overweight (14%) compared to black African male adolescents (6.3%), mixed ancestry females (7.8%) and mixed ancestry males (4.9%). Black African females were heavier and had a higher BMI than mixed ancestry females, but there were no differences between the males in weight or BMI, although the mixed ancestry males were taller than the black African males. BMI was greater in the black and mixed ancestry females compared to their male counterparts.

In the whole group, 11% of the participants reported an EAT-26 score >20, which is indicative of being at risk of developing an eating disorder. Significantly more females than males engaged in weight loss practices, and conversely, significantly more males than females engaged in muscle gain practices.

Overall, a significant proportion of 13 year olds engaged in unhealthy weight control behaviors (males 30.6% and females 40.2%). Of these, 6.8%, 14.6%, 7.4% and 21.9% of black African males, black Africa females, Mixed ancestral males and females respectively engaged in weight control behaviors with majority of them (60%) engaging in healthy weight control habits.

Table 18: General characteristics at age 13 years

	Black			Mixed ancestral			P-value	
Variables	**Boys (n=666)**	**Girls (n=742)**	**P-value**	**Boys (n=81)**	**Girls (n=91)**	**P-value**	**A**	**B**
Age (years)	13.7±0.2	13.7±0.2		13.7±0.2	13.7±0.2			
Height (cm)	154.5±8.4	155.7±6.2	**0.002**	156.8±9.9	155.1±6.7	0.188	**0.025**	0.346
Weight (kg)	44.6±10.1	50.2±11.5	**0.001**	44.7±11.3	47.0±10.9	0.16	0.977	**0.012**
BMI (kg/m2)	18.6±3.2	20.6±4.2	**0.001**	18.0±3.3	19.5±4	**0.008**	0.09	**0.014**
BMI (kg/m2) [a]							**0.04**	0.216
Underweight	14(2.1%)	27(3.6%)		6(7.4%)	6(6.6%)			
Normal	580(87.1%)	565(72.2%)		69(83.9%)	73(80.2%)			
Overweight	42(6.3%)	104(14%)		4(4.9%)	7(7.7%)			
Obese	21(3.2%)	46(6.2%)		2(2.5%)	5(5.5%)			
EAT-26	8(4-14)	8(3-14)	0.625	9(4-13)	7(4-12)	0.779	0.599	0.831
EAT-26 score								
<20	594(89.2%)	655(88.3%)	0.588	71(87.7%)	82(90.1%)	0.608	0.676	0.605
>20	72(10.8%)	87(11.7%)		10(12.3%)	9(8.9%)			
Body-esteem			0.332			0.54	0.377	0.551
Low	1(0.1%)	0%		0%	0%			
Average	636(95.5%)	717(96.6%)		80(98.8%)	89(97.8%)			
High	29(4.4%)	25(3.4%)		1(1.2%)	2(2.2%)			
Weight loss practices			**0.004**			**0.008**	0.216	0.268
No	575(86.5%)	599(80.7%)		74(91.4%)	69(75.8%)			
Yes	90(13.5%)	143(19.3%)		7(8.6%)	22(24.2%)			
Muscle gain practices			**0.023**			**0.028**	0.906	0.268
No	335(50.6%)	644(88.1%)		36(45%)	69(76.7%)			
Yes	327(49.4%)	87(11.9%)		44(55%)	21(23.3%)			

[a] Cole et al Age-gender specific BMI cutoffs for age 13.5 years adolescent boys and girls

A- Chi-square statistical significance for black and mixed ancestral boys

B – Chi-square statistical significance for black and mixed ancestral girls

Table 19: General characteristics of 17 year old black and mixed ancestry boys and girls

	Black			Mixed ancestral			P-value	
Variables	**Boys (n=781)**	**Girls (n=826)**	**P-value**	**Boys (n=100)**	**Girls (n=113)**	**P-value**	**A**	**B**
Age	17.7±0.3	17.7±0.3		17.9±0.3	17.9±0.3			
Height (cm)	170.9±6.6	159.7±6.1	**0.001**	171.2±7	159.1±6.2	**0.001**	0.81	0.362
Weight (kg)	59.3±9.7	58.9±12	0.513	59.9±13.9	54.1±11.9	**0.001**	0.57	**0.001**
BMI (kg/m2)	20.3±2.9	23.1±4.5	**0.001**	20.4±4.2	21.3±4.5	0.101	0.713	**0.0001**
BMI (kg/m2)							**0.005**	**0.001**
Underweight	48(6.2%)	23(2.7%)		10(10%)	10(8.6%)			
Normal	684(87.6%)	575(66.1%)		79(79%)	85(72.7%)			
Overweight	35(4.5%)	158(19.1%)		4(4%)	11(9.7%)			
Obese	14(1.8%)	69(8.4%)		7(7%)	7(6.2%)			
EAT-26score	9(6-15)	10(6-17)	0.193	9(3-14)	9(6-13)	0.91	0.779	0.493
EAT-26 score								
<20	661(84.6%)	689(83.4%)	0.504	90(90%)	101(89.5%)	0.882	0.154	0.104
>20	120(15.4%)	137(16.6%)		10(10%)	12(10.5%)			
Body-esteem			0.850			0.833	**0.001**	**0.001**
Low	26(3.3%)	29(3.4%)		11(11%)	14(12.3%)			
Average	746(95.5%)	785(95%)		89(89%)	100(87.7%)			
High	9(1.1%)	12(1.6%)		0(0%)	0%			
Weight loss practices			**0.001**			0.307	0.513	**0.005**
No	669(88.8%)	533(67.2%)		77(86.5%)	81(81%)			
Yes	84(11.2%)	260(32.8%)		12(13.5%)	19(19%)			
Muscle gain practices			**0.001**			**0.001**	**0.006**	0.703
No	417(55.2%)	704(88.2%)		52(58.4%)	84(84%)			
Yes	339(44.8%)	94(11.8%)		37(41.6%)	16(16%)			

[a] Cole et al Age-gender specific BMI cutoffs for age 17.5 years adolescent boys and girls

A- Chi-square statistical significance for black and mixed ancestral boys

B –Chi-square statistical significance for black and mixed ancestral girls

5.3.2 Part 1b: Cross-sectional comparison at age 17 years (table 19)

The prevalence of underweight for the whole sample was 6.9% with the prevalence of obesity being greatest in the black African females (8.4%). Black African females weighed more and had a higher BMI than the mixed ancestry females, and there was a significant difference in the proportion of underweight, normal, overweight and obesity between the ethnic groups for the males and the females.

For the whole sample, 13.1% had an EAT-26 score >20. Significantly more Mixed ancestry males and females had low body esteem compared to their black African counterparts (both $p<0.001$). Similar to the 13-year-old participants, significantly more black African females than males engaged in weight loss practices and significantly more males than females, in both ethnic groups, engaged in muscle gain practices. Overall, a significant proportion of 17 year olds engaged in unhealthy weight control behaviors (males 25.5% and females 45%). Of these a total of 10.5%, 27.4%, 10% and 16.8% of black African males, black African females, Mixed ancestral males and females respectively and 65.9% engaged in healthy weight control habits.

Factors associated with eating attitudes, weight control behaviors and body esteem

At 13 years of age, there was no significant association between body esteem, eating attitudes and weight control behaviors, and ethnicity and BMI. At 17 years old, girls were more likely than boys to engage in unhealthy weight control behaviours (OR 1.05, 95% CI: 0.037-1.72, p=0.002) irrespective of ethnicity and BMI. At age 17 years girls of mixed ancestry origin were 36% less likely to be at risk of developing eating disorders (EAT26>20) compared to their black African peers, irrespective of BMI (OR -0.64, 95% CI: -1.26- -0.036, p=0.038).

Reasons for engaging in weight control behaviors

The frequency of the various reasons given for the weight control behaviors reported by the adolescents at 13 and 17 years of age was determined (**Figures 14-17**). The desire to look better was the most commonly reported reason given by all four groups at both time points. Other reasons in the black African females included clothes being too tight and for health reasons however this decreased from 18.2 to 4% between 13 and 17 years of age. The Mixed ancestry females also wanted to control their weight for health reasons while the main reasons given by the black African males were for health reasons, a desire to look better, because their clothes were too tight and a desire to model. Among the mixed ancestry males at 17 years of age, 50% of them engaged in weight control behaviors because they wanted to look better and to model, but at the age of 13 years engaged in these practices mainly for health reasons (12.5%), a desire to look better (34.4%) and because their clothes were too tight (34.4%).

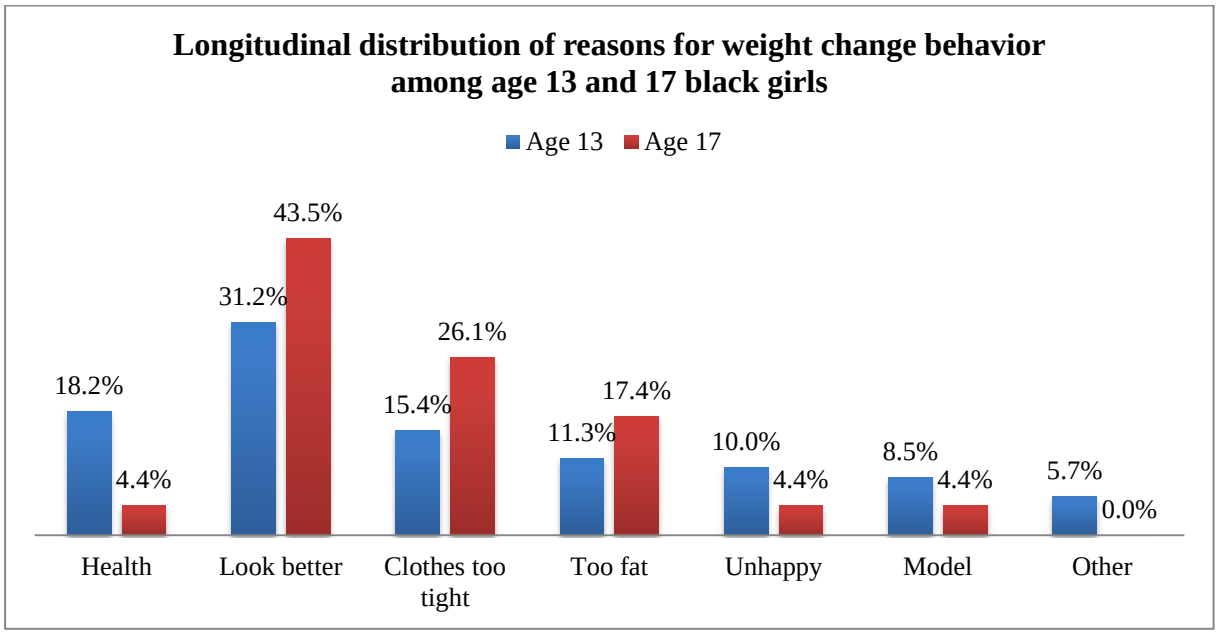


Figure 14: Longitudinal distribution of reasons for weight change behavior among age 13 and 17 black girls

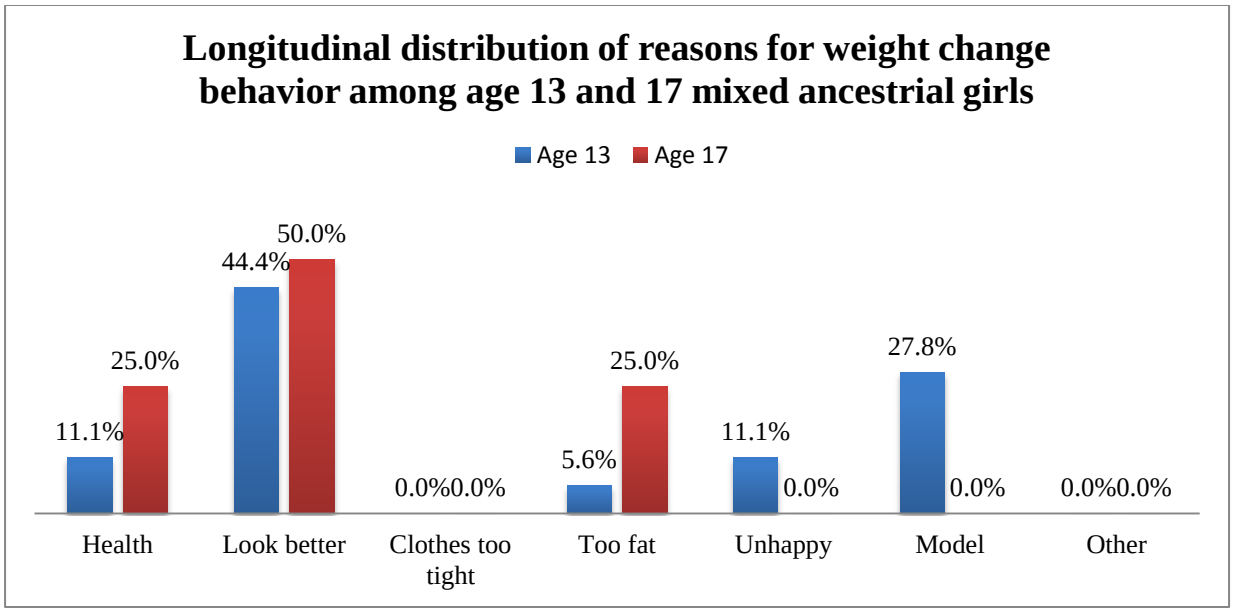


Figure 15: Longitudinal distribution of reasons for weight change behavior among age 13 and 17 mixed ancestral girls

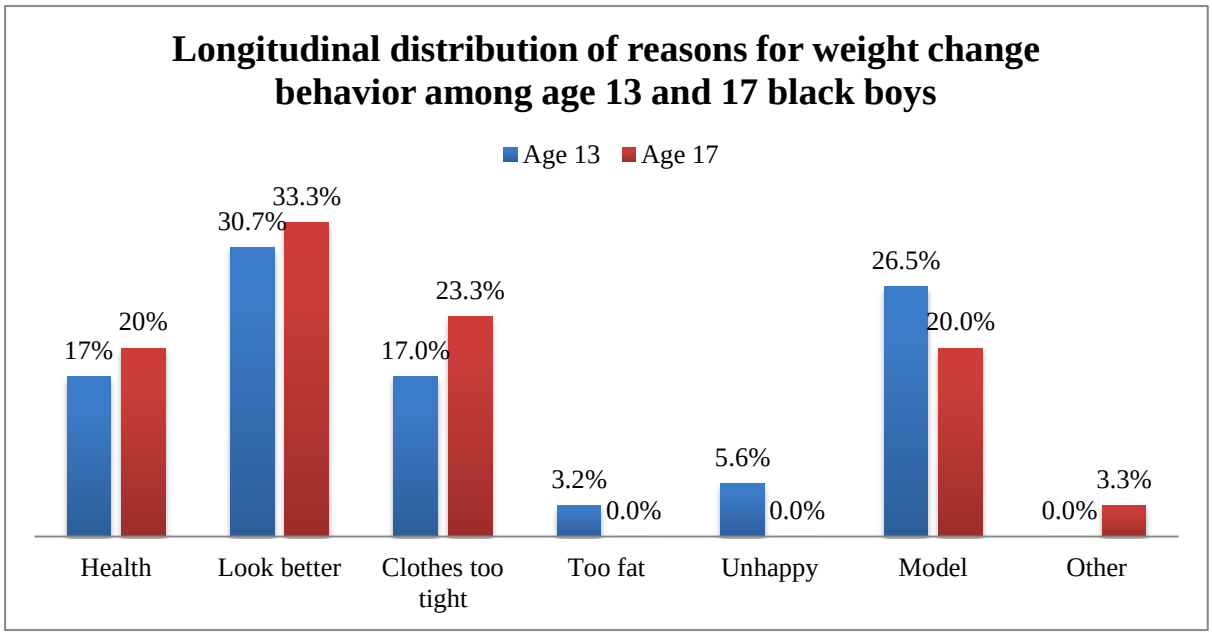


Figure 16: Longitudinal distribution of reasons for weight change behavior among age 13 and 17 black boys

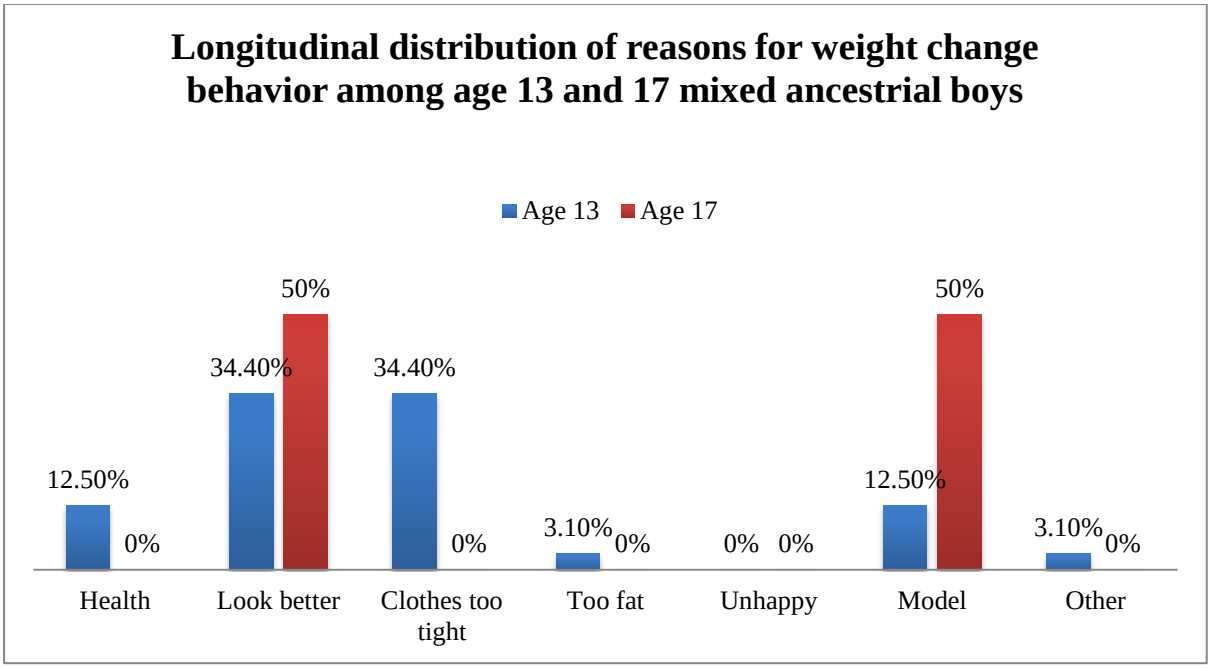


Figure 17: Longitudinal distribution of reasons for weight change behavior among age 13 and 17 mixed ancestral boys

5.3.3 Part 1c: Longitudinal change in eating attitudes, body esteem and weight control behaviors between 13 and 17 years of age (n=1,435)

Table 20 presents the longitudinal changes in the prevalence of BMI categories (underweight, normal weight, overweight and obese), EAT-26 (> 20), body-esteem (low, average or high), weight loss practices (yes or no) and muscle gain practices (yes or no) in black and Mixed ancestry males and females between the ages of 13 and 17 years. There was no significant change in BMI category, EAT-26 score>20 or the prevalence of muscle gain practices across the four groups over time. The prevalence of low body esteem increased significantly in mixed ancestry boys and girls. In addition there was a significant increase in the prevalence of weight loss practices in the black African females and an increase in healthy weight control behaviors in the black African males. In contrast there was a 13.1% decrease in healthy weight control behaviors in the mixed ancestry males.

Table 20: Longitudinal change between 13 and 17 year old adolescents

Variables	Black boys	P-value*	Black girls	P-value*	MA boys	P-value*	MA girls	P-value*
BMI cutoff Underweight Normal Overweight Obese	↑6.2% ↑4.9% ↓10.3% ↓0.8%	0.07	↑2.3% ↑12.5% ↓10.8% ↓4.1%	**0.002**	↑7.9% 0 ↓6.2% ↓1.6	0.467	↑7.1% 0 ↓5.7% ↓1.4%	0.500
EAT-26 > 20	↑4.6%	0.529	↓4.9%	0.211	↓2.3%	0.822	↓0.6%	0.851
Body esteem Low Average High	↑3.3% 0% ↓3.3%	0.09	↑3.4% ↓1.5% ↓2.0%	0.134	↑10.9% ↓9.7% ↓1.2%	**0.002**	↑12.3% ↓10.1% ↓2.2%	**0.001**
Weight loss practices Yes	↓2.3%	0.670	↑13.9%	**0.018**	↑4.9%	0.376	↓4.4%	0.61
Muscle gain practices Yes	↓4.6%	0.67	↓0.1%	0.586	↓15.3%	0.066	↓7.3%	0.284
Weight control behavior Healthy	↑23.4%	**0.001**	↓1.2%	0.885	↓13.3%	**0.045**	↑7.3%	0.322

P-value*- P value for the longitudinal change in each ethnic and gender group

Part 3: Female body silhouettes

There was agreement between the boys and girls for most of the attributes with the majority of males and females associating the normal silhouettes with being the 'best', 'getting respect' and being the 'happiest', while the obese silhouette was associated with the 'worst' and the 'unhappiest', and the underweight silhouette with the "weakest". There was a significant difference between the males and the females with regard to the silhouette that represented "clumsy" and the "strongest", although both groups associated these attributes with the obese silhouette. A bimodal pattern was observed for 'the less respect' attribute i.e. both boys and girls associated the underweight and the obese silhouettes with 'less respect'.

5.4 Discussion

We have shown in the cross-sectional component of our study a high prevalence of overweight and obesity among Black African girls, reaching 27.5% in the 17 year old girls. In both age groups, the prevalence of weight loss attempts was higher in girls, and muscle gain attempts were higher in boys, when compared to the opposite sex. At age 17 years both mixed ancestry boys and girls had lower body esteem than their black African peers, and the longitudinal data confirmed an increase in the prevalence of low body esteem in the mixed ancestry boys and girls with age. In addition, the desire to look better was the most common reason reported for engaging in weight control behaviors for all adolescents. Longitudinally, the prevalence of healthy weight control behaviors increased in the black African adolescent boys, but decreased in the mixed ancestry boys, while in the black African girls there was an increase in the prevalence of weight loss practices.

In low-middle income countries (LMICs), there has been a reduction in the prevalence of underweight and an increasing concern around the increase in the prevalence of overweight and obesity in childhood and adolescence (367-369). Compared to previous South African studies, our study had a lower prevalence of overweight/obesity, two studies from rural and urban areas found a prevalence of >5% (61, 370). Our findings are consistent with results from previous studies in other developing countries undergoing rapid socio-economic, cultural and nutritional transitions, and experiencing both under nutrition and over nutrition (36).

Our study showed an increase in muscle gain practices among the boys and weight loss practices among girls. This may be linked to the socio-cultural transition occurring in South Africa with adolescent boys working towards being leaner and more muscular, and girls

wanting to be leaner to meet the societal expectations of an ideal body. Results from studies conducted in high-income countries (HICs) observe a similar trend with men engaging in muscle gain practices to achieve a male ideal V-shaped figure and girls engaging in weight loss practices to attain an ideal lean body shape with an emphasis on slim hips, bottom, and thighs (83).

The prevalence of low body esteem increased between 13 and 17 years of age in both the mixed ancestral boys and girls, and at the age of 17 years the prevalence was higher in the mixed ancestral group compared to their black African peers. This could be as a result of the mixed ancestral adolescents not feeling like they belong to a particular ethnic group resulting in a lack of identity. Our findings suggest that adolescents become more aware of themselves and their bodies, resulting in more negative perceptions, thoughts and feelings about their own body with increasing age. Previous studies have found that when persons of different cultural backgrounds internalize the Western norms of thinness as the ideal, a greater degree of disordered eating is observed (323, 371). Weight control behaviors were prevalent among the study sample. Although the use of healthy weight control practices was common at 13 and 17 years of age, a significant proportion of 13 and 17 year olds engaged in unhealthy weight control behaviors. The prevalence of unhealthy weight control behaviors in our study was higher than those found in HICs by Neumark-Sztainer and others (15% in males and 37% in girls) (289), and it is likely that South African adolescents are increasingly being subjected to societal pressure to meet the ideal body size or shape as the country continues to move through an epidemiological transition. An increase in weight loss practices occurred among black African girls between 13 and 17 years of age. This could be a result of conflict between traditional cultural beliefs and ‘Western’ expectations, with black African urban teenagers embracing Western norms to fit in with the

demands of Western culture. This suggests that acculturation is slowly gaining hold among black African adolescent girls and eroding the more traditional/cultural concepts of an overweight female being beautiful, healthy and affluent.

Our study found that late adolescent boys and girls associated an obese silhouette with negative attributes such as the "worst, clumsy and unhappy". This suggests that there is a degree of social stigma associated with female obesity among males and females in urban South Africa. This indicates a greater pressure for adolescent girls to be thinner in order to meet the social expectations associated with leanness including beauty and attractiveness. Previous international studies have shown that weight stigma invokes psychological stress that might lead to depression, low self-esteem and body dissatisfaction (372-374). Similarly, boys and girls associated more positive attributes with normal weight silhouettes. This might be as a result of increased Westernization that facilitates a shift in the societal expectations of its adolescents. In line with Brink's findings, in Western culture leanness is associated with being healthy, attractive and in control whereas, overweight and obesity is associated with poor health, laziness and lack of personal will (375).

Our study also found that an underweight silhouette was associated with weakness, which might reflect an association with HIV/AIDS and tuberculosis (conditions that are very common in South Africa).(376). Consistent with previous studies, (36-40), our study found no significant difference in eating attitudes across gender and ethnicity, suggesting that the Western culture is cross cutting in the South African population and that all ethnicities are becoming more exposed to each other's cultures. This may be attributed to increased urbanization post-apartheid. Bilali and others found girls to be more at risk of internalizing messages sent by media, which idealizes an ultra-thin body size and shape. These results in adolescent girls having a negative

body image and coming up with unrealistic goals that they want to attain so as to gain the "ideal" body shape and size. In the process of achieving these, they engage in unhealthy and extreme weight control behaviors (377).

The study has several strengths. We present data that is able to illustrate the longitudinal change of psychosocial behaviors during adolescent maturation. Few studies in South Africa have included boys in their samples, thus our data on boys is unique and of value in helping to understand societal changes in adolescent attitudes. Further, the tools used in this study (EAT-26, body esteem and body silhouette) have been validated both internationally and within South Africa. This study also explored multiple methods i.e. EAT-26, body esteem and weight control behaviors, to assess adolescents' behavior.

This study has several limitations; 1) the study only included black African and mixed ancestral participants due to the small numbers of responses from the other ethnic groups. It would be of value to investigate eating attitudes, body esteem and weight control behaviors across all the ethnic groups in South Africa. 2) The EAT-26 and body-esteem tool were self-reported and thus were dependent on participants' honesty and accuracy. Social desirability bias may occur during the interviews due to interactions with the participants who may then over-report desirable behaviors and underreport undesirable behaviors. Recall bias may also occur in the interview setting due to the immediacy of the response required and the respondent alone has to judge whether the information they have recalled is relevant to the question and how best to respond.

Conclusions

Black African girls had a higher BMI and an increased risk of developing eating disorders than girls of mixed ancestral origin. More adolescent girls engaged in weight loss practices than

boys, whereas more boys engaged in muscle gain practices than girls. Weight control behaviors are prevalent among South African adolescents. In addition, low body esteem was prevalent in mixed ancestry adolescents. Adolescent boys and girls of both ethnic groups shared similar views on many of the female body silhouette attributes, which are similar to those expected in a western community.

CHAPTER SIX: DISCUSSION

6.0 Introduction

This chapter starts by summarizing the research findings, and then discusses the two emergent themes identified in this research. The theoretical relevance of the thesis will be outlined and a revised conceptual framework proposed. The relevance of the research findings specific to the South African context will be discussed. Finally, the research limitations will be highlighted, future research opportunities identified, and an overall conclusion drawn from the research.

6.1 Consolidated findings

This research aimed at examining five research questions with regard to eating attitudes, body image, self and body esteem and weight control behaviors among South African boys and girls of different ethnic groups, at different time points during adolescence. Each objective was achieved through empirical studies that were carried out as outlined in chapters 3, 4 and 5. Table **21** shows a summary of findings obtained for each research question.

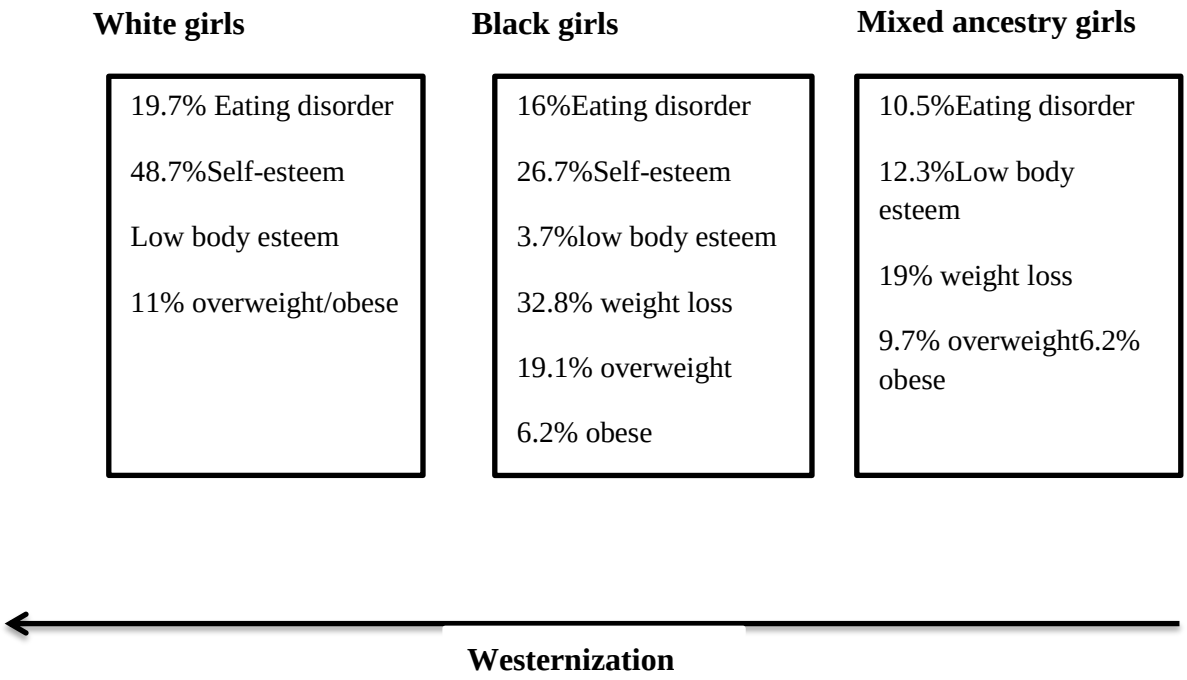
Table 21: Consolidated findings of this thesis

Papers	Objective	Chapter	Thesis findings
Paper 1	1) To examine age and ethnic differences between black and white female adolescents in eating attitudes, body image dissatisfaction, and self-esteem, and the association of these with BMI	3	- White girls had a higher BMI, and significantly more white girls were overweight and obese, and had a low self-esteem, than black girls. -More black girls had an EAT-26 score >20, and had high body image dissatisfaction, than white girls -More white than black girls desired to be thinner whereas, black girls exhibited a greater tendency to control what they ate. - BMI was inversely associated with body image dissatisfaction in black and white girls.
Paper 2	1) To examine ethnic differences in eating attitudes, body image satisfaction and self-esteem in South African adolescent boys, and to determine whether these differences are influenced by age. 2) To determine adolescent boys' perceptions of girls' body silhouettes.	4	- BMI and the prevalence of overweight and obesity was higher in the white adolescents -Prevalence of a high EAT-26 score and a low self-esteem was higher in the black boys compared to the white boys - Perception of female silhouettes was significantly influenced by ethnicity with the white adolescents associating positive characteristics

			with silhouettes of a lower BMI than the black adolescents.
Paper 3	1) Ethnic and gender differences in eating attitudes, body esteem, BMI and weight change behaviors in 13 and 17 year old adolescents 2) The change in eating attitudes, body esteem, BMI and weight change behaviors between the ages of 13 and 17 years. 3) Ethnic differences in the perception of female body silhouettes by male and female 17-year-old adolescents.	5	-A high prevalence of overweight and obesity in black girls -In both age groups, the prevalence of weight loss attempts was higher in females than males, and muscle gain attempts in males compared to females. - The longitudinal data showed a significant increase in low body esteem in the mixed ancestry boys and girls, and at age 17 years the prevalence of low body esteem was higher in the mixed ancestry boys and girls compared to their black peers -The desire to look better was the most common reason reported for engaging in weight control behaviors for all adolescents. - There was an increase in the

	prevalence of weight loss practices in the black girls between 13 and 17 years of age - The prevalence of health weight control behaviors increased in the black boys but decreased in the mixed ancestry boys between 13 and 17 years of age.

In summary, our study revealed a shift from traditional to Western norms among South African adolescents, with white girls being our reference group. Black and mixed ancestry girls are adapting the unhealthy habits such as eating disorders and engaging in unhealthy weight control behaviors. Cultural diversity and increased urbanization in South Africa are the main fueling agents for body image dissatisfaction and low body esteem/ self-esteem, which lead to the development of eating disorders and engaging into weight control behaviors. Exposure to conflicting messages from media, parents and peers pressure also play an important role in the development of eating disorders, low self-esteem and engaging in weight control behaviors.



6.2 Ethnicity differences

6.2.1 Non-cohort study (Chapter 3 and 4)

We have shown ethnic differences in eating attitudes, body image dissatisfaction in our sample of black and white adolescents between the ages of 13 and 17 years. We hypothesized that white South African adolescent girls would demonstrate a greater tendency to engage in disordered eating linked to their greater desire for thinness than black girls, however our study demonstrates that although the white girls had a higher BMI and reported a greater preference to be thinner than their black peers, they were less predisposed to a future eating pathology. Even though white girls did demonstrate a greater desire for thinness than their black peers, it does not appear to manifest as an abnormal attitude towards eating or influence their BMI. A higher BMI in the white girls in this study and a recent South African YRBS could be influenced by either high SES (78), early maturing or greater exposure to unhealthy lifestyle behaviors (such as; sedentary behaviors, increased physical inactivity and consumption of foods that are high in sugars, salt and oil) which are fuelled by environmental changes experienced by urban societies undergoing

transition (68). However, according to a study that was done by Jones and colleagues, in an urban area in South Africa to determine differences in pubertal development found no differences in development between black and white adolescent girls (378)

Black girls in the study had a greater predisposition to abnormal eating pathology, in particular, controlling what they eat, than their white counterparts. This supports previous research in South Africa, which showed that black girls are at a higher risk of developing eating disorders than white girls (6, 194). This could be as a result of conflict between traditional cultural beliefs and 'Western' expectations, with black urban teenagers embracing Western norms to fit in with the demands of Western culture. This suggests that acculturation is occurring and the influence of the more traditional/cultural concepts of an overweight female being beautiful, healthy and affluent may be decreasing among black South African adolescent females. Our findings revealed a higher prevalence of low self-esteem but higher prevalence of body image dissatisfaction among black girls. These findings are novel and their meaning is not immediately clear. It could be as a result of cultural differences emphasizing or de-emphasizing appearance as the basis of self-evaluation.

Similar to our finding in the black girls, black boys also reported higher scores in EAT-26 score as well as the EAT-26 subscales (oral control, dieting and bulimia and food preoccupation), compared to white boys. It might be that black boys are using binge eating as a body building strategy as suggested by other researchers (333-335). Our findings are in agreement with other Western and non-Western studies that observed more binge eating among blacks (boys and girls) compared to whites (6, 179). Black boys had a lower BMI and a high prevalence of low self-esteem, this could be because of delayed pubertal maturation.

6.2.2 Cohort sample (chapter 5)

In the cohort sample at the age of 13 and 17 years, black boys and girls had a higher BMI than mixed ancestral participants. This is in line with the most recent Youth Risk Behavior Survey (YRBS), the prevalence of obesity among the blacks was 7.3% compared to 4.9% mixed ancestry adolescents and young adults (age 15-24 years). (78) The high prevalence of overweight and obesity might be because some blacks are still holding on to their cultures that view an ideal body to be overweight and obese. Among black girls overweight/obesity may still be associated with beauty, affluence, healthy body and being HIV/AIDS negative as shown in other South African studies (79). In addition, research has revealed that family and community plays a vital role in influencing body shape/size satisfaction mainly in women. In most African communities, children and women are encouraged to gain weight as this signifies that the father/husband is sufficiently providing for the family. (49)

The prevalence of low body esteem increased during adolescence in the mixed ancestry boys and girls, and was significantly higher than their black peers at 17 years of age. This would be attributed to cultural differences between South African ethnic groups for example, majority of black Africans associate overweight with affluence, health and HIV/AIDs free compared to other cultures which associate it with being lazy, clumsy and less attractive.

6.3 Gender difference

We hypothesized that there would be gender differences in BMI, eating attitudes, self and body esteem, and body image dissatisfaction, with girls being at a higher risk for eating disorders, and having a lower body and self-esteem, and high BMI than boys. As expected girls had a higher BMI compared to boys throughout adolescence. This is in line with recent South African study, the 2013 SANHANES-1 (aged 15 and above) found females (mean 29 kg/m^2) to be significantly

heavier compared to males (mean 23.2 kg/m^2). (379) There was no difference in the prevalence of risk for eating disorders between the boys and girls. Lack of gender differences in our study, suggests that eating disorder is homogeneous i.e. it is not restricted to gender during adolescence. In fact, a number of studies have shown a higher prevalence of eating pathology in girls than boys (104, 180). In addition, we did not show any gender differences in body esteem, however the prevalence of weight loss practices was significantly higher in the girls, and muscle gain practices in the boys, compared to the other gender. Studies have shown that overweight adolescent females tend to have a low body-esteem, experience body dissatisfaction and tend to engage more in unhealthy weight control behaviors compared to those that have a normal body weight (46, 215). We also reported under-nutrition among adolescent boys, and thus this group is more like to experience body dissatisfaction. Under-nutrition in boys is more likely associated with lack of muscle bulk, this may result in the use steroids, overeating and use of food supplements to attain the ideal muscular body.

6.4 Age differences

We hypothesized that late adolescents would be less likely to be at risk for future eating pathology, and would have lower self-esteem compared to early adolescents. Contrary to what other studies found, our study showed no significant differences in eating attitudes and body esteem between the different age categories. However, an increase in low body esteem prevalence w age was noted among the mixed ancestry, a possible explanation for the increase in body esteem could be that as the adolescents get older they become more aware of themselves and their perceptions, thoughts and feelings about their body becomes more negative (237, 310). However, a study in China revealed that the older the adolescent the higher their body esteem (380).

In the non-cohort sample, the prevalence of low self-esteem was higher in the early adolescent boys compared to the older adolescents, even though other studies have shown that self-esteem declines with age due to body image and pubertal associated issues (137). In our sample the improvement in self-esteem with age may be attributed to puberty maturation with early adolescent boys feel less confident about themselves i.e. body less muscular. It could also be that the early adolescents are more confused about where they belong i.e. traditional, cultural beliefs versus Western ideals.

Among the girls, no age differences were observed in eating attitudes, body dissatisfaction or self-esteem. This does not mean that age is not associated with these psychosocial factors, it could be because of the small sample size, differences in study periods or our sample homogenous as compared Hoare's study. In fact, Hoarse and Cosgrove found abnormal eating attitudes, low self-esteem and more body dissatisfaction more in late adolescent girls as early adolescent girls (312).

6.4 Emerging themes

6.4.1 Acculturation

Cultural transition occurs when an individual's attitudes, beliefs, values and behavior change as they adapt to other cultures. Cultural transition involves changes that take place as a result of continuous and direct contact with other individuals who have different cultural origins (381). Previous studies have found that when persons of different cultural backgrounds internalize the Western norms of thinness as the ideal, a greater degree of disordered eating is observed (323, 371).

In our studies we have demonstrated this concept of acculturation. We found black girls were more predisposed to eating pathology and displayed greater body dissatisfaction compared to white girls. Our analysis of the longitudinal data showed both mixed ancestral boys and girls displayed an increase in the prevalence of low body esteem and in their boys an increase in unhealthy weight control behaviors. This suggests that adolescents are facing conflicting messages from their traditional culture and Western culture, resulting in a higher risk of abnormal eating pathology, greater body dissatisfaction and low body esteem which leads to engagement in weight control behaviors.

We also showed a higher risk of eating pathology and a lower self-esteem in the blacks compared to the white boys and low body esteem in the mixed ancestry boys compared to black boys. This could be as a result of increased urbanization in South Africa which is associated with elevated pressure to meet the societal expectations which idolizes a leaner body for females and a muscular body for males. Furthermore, more underweight black than white boys were reported to be at high risk for eating disorders, specifically binge eating, this was thought to be as a result of low muscle bulk hence resorted to eating more to gain more muscle bulk. This suggests that cultural transition not only affects girls but also boys.

6.4.2 Overweight and obesity

The study revealed a high prevalence of overweight and obesity in both cohorts, and particularly in the black girls who are representative of urban, black adolescents. This is in agreement with previous studies in LMICs, Kimani-Murage et al (2010) found 16% of the girls to be overweight (61), In Uganda and Ghana 10.4% girls were overweight or obese (aged 13-15years) compared with boys (3.2%) (382). The national South African Youth Risk Behavior Survey (YRBS) 2002,

the combined prevalence of overweight and obesity among adolescent aged 13-19 years was 7% in boys and 25% in girls (36). Previous studies attributed this coexistence to be as a result of the nutrition transition (68, 383). Our study reported high prevalence of overweight/obesity among adolescent girls, suggesting a relatively higher risk of them transitioning into adulthood overweight/obese, this in the long run exposes them to the risk of developing metabolic diseases such as type 2 diabetes, CVDs and cancer (297).

Entering pregnancy overweight or obese is associated with increased risk of complications for preeclampsia and gestational diabetes mellitus. According to a study that assessed birth outcomes among non-obese and obese mothers, a higher prevalence of congenital anomalies was documented among offspring born to obese mothers suggesting that maternal adiposity plays a major role in embryo development (384). In South Africa, more than 50% of adult women are overweight and approximately 30% are obese, maternal adiposity has been shown to increase the risk of experiencing hypertension, diabetes, urinary tract infection, caesarean delivery, perineal damage and perinatal death (385). There is need to address overweight/obesity in during childhood and adolescents in South Africa to prevent future development of metabolic diseases and complications.

6.5 Theoretical relevance

Following from the summary of the research findings and an exploration of the emerging themes, the conceptual frameworks/models that were introduced at the beginning of the thesis will now be revisited. This study confirms that there are ethnic, age and gender differences in the emergence of disordered eating attitudes indicating that it is multifaceted. The models contributed to this research in the following ways.

6.5.1 Bio-psychosocial model for adolescents

Based on our findings and evidence of association from previous studies two modifications were made on the bio-psychosocial model previously designed for our adolescents, in order to accommodate factors that influence girls and boys risk of eating disorder pathology. Bi-directional arrows (highlighted) were added to the model (**Figure 18**) between socio-cultural factors, and psychosocial and biological factors to show the bi-directional nature of these factors in our population of adolescent boys and girls of different ethnicities. Our study found white girls and boys had a higher BMI (biological) compared to blacks whereas our cohort study found ethnicity (sociocultural) and body image, body esteem and self-esteem to be significantly associated.

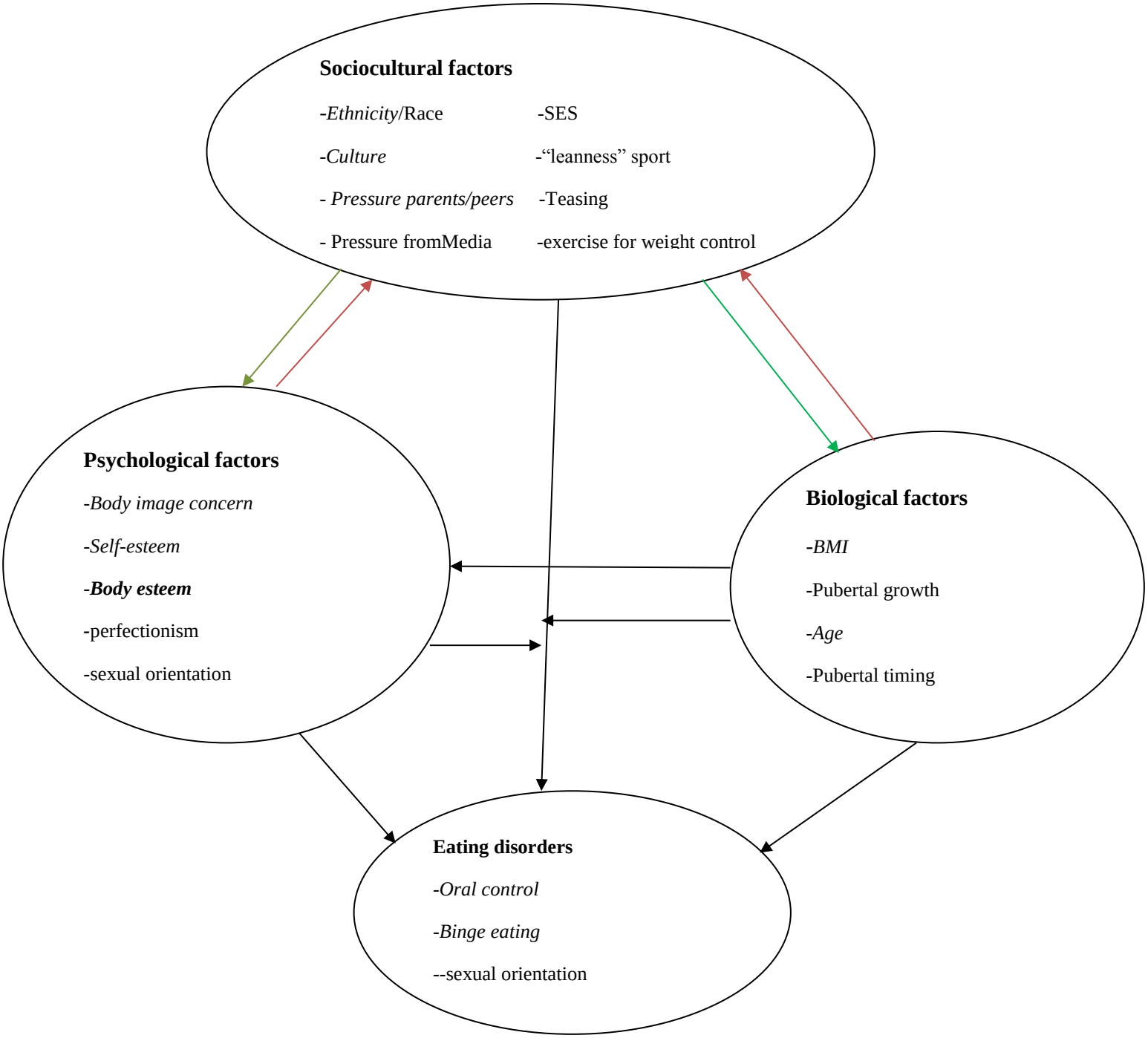


Figure 18: Modified bio-psychosocial conceptual framework for adolescent boys and girls

6.6 Contextual relevance

The relevance of our study findings to South Africa and other LMICs will be discussed.

6.6.1 Local and other LMICs

This study makes an important contribution to our understanding of factors associated with adolescents' well-being in a society that is undergoing rapid economic and cultural transition. This study highlighted eating attitudes, body image, self-esteem, overweight/obesity and underweight patterns in South African boys and girls (blacks, whites and mixed ancestral) using both cross-sectional and longitudinal data.

Our research reveals that black boys and girls are at a higher risk of future eating disorders than their white and mixed ancestral peers, the co-existence of underweight and overweight/obese, and engagement in weight control behaviors in girls compared to boys. Our work supports the findings of previous South Africa studies, which have examined ethnic differences as shown in **table 1 and table 2**. Based on our findings the following insights were deduced and can be used by policy makers in improving the wellbeing of South African adolescents:

1. This current study examined both genders cross-sectional and longitudinally and therefore provides much needed data in an under-researched group (adolescent boys), and confirms acculturation in Urban South Africa. Boys must also be considered when implementing policies around psychosocial disorders in South African adolescents.

2. The present study demonstrated significant ethnic differences in various psychosocial measures (eating attitudes, body esteem, self-esteem and body image). Increasing Westernization of LMICs and the acceptance of the norm of thinness and muscularity among girls and boys is obvious from these findings i.e. looking at the perceptions of the

female silhouettes. These findings are highly relevant to all African countries undergoing socio-cultural transitions and important in the development of interventions geared towards improving adolescent health prior to transition into adulthood.

3. This research reported a high prevalence of overweight/obesity prevalence among South African adolescents; the government needs to develop policies that promote physical activity and healthy eating habits.

6.7 Limitations

The empirical papers in this study (Chapter 3, 4 and 5) have discussed the limitations encountered within their respective discussions. This section discusses the overall limitations for the study.

Cause-effect relationships

This study has a limitation in that cause-effect relationships are difficult to establish in a cross-sectional study and a longitudinal study with only two time points. It is imperative that these factors be examined longitudinally, at regular time points throughout adolescence in order to identify precursors and trends in eating related pathology.

Measurement bias

Within our studies there is the potential for recall bias as the data collected depended on self-report and therefore entirely relied on the participants' honest and accuracy. However due to the relatively large sample size the potential for recall bias is minimized.

Generalizability

For study one (non-cohort) the study sample was obtained through convenience sampling and was restricted to the city of Johannesburg only. For findings to be applicable to a general South African adolescent population, a representative sample including multiple rural and urban settings is necessary as various cities have different backgrounds and cultures. However, as Johannesburg is the economic hub of South Africa, most transitioned, and the most integrated, we can assume that along the continuum of urbanization and acculturation Johannesburg will represent the greatest of these as compared to other South African cities, and may serve as a proxy for a trend that may evolve in other communities over time. Even though we did not measure household socio-economic status (SES) directly, the schools were selected to provide SES diversity and the ethnic differences observed in the study are unlikely to be due to differences in SES as we found no statistical differences between public and private school participants.

FUTURE RESEARCH

These studies have identified the following areas that require future research;

1. There is need to conduct longitudinal studies that will follow up children through adolescence and into adulthood to document the trends in eating attitudes, body image, body esteem, self-esteem and weight control behaviors and possible future health outcomes in adulthood.

2. Studies should examine eating attitudes, body image concerns and weight control behaviors in all ethnic groups, since the majority of the studies have looked at only black,

white and mixed ancestry groups. This will provide more generalizable findings on adolescent health.

3. Future studies should explore reasons for the ethnic differences in perceptions of different body silhouettes in male and female adolescents. How this is associated with weight change behaviors should also be explored.

4. Male body silhouettes need to be developed and validated for South African adolescents to evaluate males' and females' perceptions of male body silhouettes.

CONCLUSION

The purpose of this study was to examine the presence of gender and ethnic differences in eating attitudes, body image dissatisfaction, self-esteem, BMI and weight control behaviors in South African adolescent boys and girls. In addition we examined boys and girls perceptions of female body silhouettes.

Our results showed ethnic differences in the risk for future eating disorders, self-esteem and body image dissatisfaction in adolescent males and females. This suggests that black girls and boys are adopting Western norms, which emphasize leaner body shape/sizes in girls and more muscular body shapes in boys, hence encouraging inappropriate weight control behaviors such as dieting and oral control.

However our findings suggest that cultural perceptions of ideal body shape/size still play a significant role as among the black girls there was an even spread amongst those wanting to be thinner (38.8%), fatter (29%) and those who were content (32.2%), while in the white girls two thirds (65.4%) wanted to be thinner and only 10% wanted to be fatter. Similar to black girls, black boys associated positive characteristics with female silhouettes that have high BMI, this emphasizes that culture still plays a significant role in South Africa.

Almost half of the black boys were classified as underweight while nearly 30% of the white boys were overweight or obese, thereby illustrating that under-nutrition and over-nutrition exist in South Africa.

Gender, ethnicity and age play a significant role in adolescents' eating attitudes, body esteem and weight control behaviors. The risk of disordered eating patterns and low body esteem were more prevalent in older adolescence than early adolescence suggesting that with increasing age there is

an awareness about themselves and their perceptions, thoughts and feelings about their bodies become more negative (237, 310).

In addition our study found that the main reason for adolescent females wanting to lose weight and males wanting to gain more muscle was for aesthetic reasons, suggesting that adolescent boys and girls, irrespective of ethnicity, are experiencing societal pressure that wants them to "look good" and they are conforming to that.

The researcher recommends the need to;

1) Put up cognitive behavioral therapy programs to support adolescents in changing their negative perceptions about themselves and their bodies.
2) Integrate small group counselling sessions and extracurricular activities in schools to educate students on the importance of having a healthy body image and positive self-esteem/body esteem.
3) Educate community members on the importance of living a healthy lifestyles and the role they play in shaping adolescents lives.
4) There is need for a qualitative study to complement these quantitative descriptive finding.

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Appendix 1: Ethical clearance certificate

Appendix 2: Non-Birth-to-Twenty participants' questionnaire

Appendix 3: Year 13 Birth-to Twenty Questionnaire

Appendix 4: Year 17 Birth-to Twenty Questionnaire