Physical fitness, body composition and body image in female adolescents: The PAHL-study

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It all starts here ™

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SUMMARY

A vicious circle exists between decreased physical fitness (PF), increased body composition (body mass index and body fat percentage) and body image (BI) dissatisfaction. The media and westernised culture persist in promoting the "thin ideal". Some confusion seems to exist in the black culture of South Africa due to the belief that "bigger is better" for females but with urbanisation, globalisation and modernisation, the "thin ideal" is becoming more apparent in the black culture. Parents and peers are misled, and consequently conform to unhealthy ideals such as being underweight or overweight. The body develops as age progresses and undergoes a stage of development known as adolescence, which causes the shape of the body to change significantly due to hormonal activity. Body image dissatisfaction increases during adolescence because of body shape shifting away from the "thin ideal". Adolescence is also a period associated with a decrease in physical activity; therefore physical fitness dissipates. Body composition (body mass index and body fat percentage) continues to increase due to the lack of physical activity, which leads to heightened BI dissatisfaction. The consequences thereof are poor mental development, social angst (Davison & McCabe; 2006:27), depression (Murray *et al.*, 2011:275), an increased prevalence of risk for non-communicable diseases (NCDs) and chronic diseases of lifestyle (Barrett & Huffman, 2011:271). Arising from the statements made above, the following research question was posed: what are the differences between physical fitness, body composition, current body image and ideal body image, and secondly how are these aspects related to each other in black and white female adolescents?

To answer the research question, a cross sectional study design was performed on the data collected during the **P**hysical **A**ctivity and **H**ealth **L**ongitudinal **S**tudy (PAHL study). A total of 156 female learners attending six different high schools within the Tlokwe Local Municipality were recruited to participate in the observational longitudinal PAHL study. A letter of informed consent was signed by parents/guardians of the participants and privacy was assured during measurements. A figure rating scale of Stunkard *et al.* (1994) consisting of nine different silhouettes was used to determine the current and *ideal* BI of the participants. Furthermore body fat percentage (BF%), body mass index (BMI) and physical fitness ($\dot{V}O_{2\,max}$) were measured by means of skinfold measurements and the Bleep Test. The statistical analyses consisted of independent *t*-test (first objective) to determine the difference between PF, BC, current BI and dependent *t*-tests (second objective) to determine the differences among the variables as well as

non-parametric Spearman rho correlations (third objective) to determine the relationship between the variables in two different groups that consisted of black and white participants separately.

The results reflected no statistically significant difference between the two ethnicities (black and white) pertaining to the PF, BC and BI. Further, due to small sample sizes, especially in the white female group, Cohen's effect size (ES) was calculated to give an indication of practical significance. A medium practical significance was suggested for the effect size (d = 0.37) of BF% between black and white adolescent females of this study. Moreover, a large practical significance was suggested according to Cohen's effect size value (d = 0.70) and statistically significant difference ($t(114) = -2.83$, $F(1,114) = 0.39$, $p \leq 0.01$) in body image dissatisfaction between black and white adolescent females was found, which was the one variable that showed a major difference between the cultures within this study. Furthermore, a strong positive correlation was found between BMI ($r_s = 0.64$, $p<0.01$) and BF% ($r_s = 0.5$, $p<0.01$) with BI dissatisfaction in black female adolescent participants only. Both groups presented with a negative relationship between PF and body dissatisfaction although only the black female participants showed a statistically significant correlation (black adolescent females: $r_s = -0.21$, $p<0.05$).

Based on the findings of this study the research question can be answered by stating that there is no significant difference between black and white female adolescents for PF, BC and current BI. However, there is a definite difference between body image dissatisfaction (current – *ideal* body image) among black and white female adolescents. Furthermore, the findings do however allude to a relationship between body image dissatisfaction and body composition. This positive relationship means that as the BMI and BF% increase, the body image dissatisfaction also increases. As for the black female adolescents' of this study, the inverse relationship reported between physical fitness and body image dissatisfaction indicate that the fitter they are the more satisfied they are with their body image. Fitness may possibly be a useful method to damper the vicious circle of BI dissatisfaction that is being fed into everyday by miscellaneous influences such as media, peers and parents.

Keywords: Body Image, body image dissatisfaction, body composition, body fat percentage, physical fitness, *ideal* body image, current body image, adolescents, females

OPSOMMING

'n Bose kringloop bestaan tussen 'n afname in fisiese fiksheid (FF), 'n toename in liggaamsamestelling (liggaamsmassa-indeks en liggaamsvet-persentasie) en liggaamsbeeld- (LB) ontevredenheid. Die media en verwestersde kultuur volhard daarin om die "skraal ideaal" te bevorder. 'n Mate van verwarring blyk om voor te kom in die swart kultuur van Suid-Afrika weens die opvatting dat "groter beter is" vir vroue, maar met verstedeliking, globalisering en modernisering word die "skraal *ideaal*" meer opvallend in die swart kultuur. Ouers en die jongmense se portuurgroep word mislei; gevolglik konformeer hulle met ongesonde ideale soos om oorgewig of te skraal te wees. Die liggaam ontwikkel namate ouderdom toeneem en ondergaan dus 'n ontwikkelingstadium bekend as adolessensie, wat meebring dat die vorm van die liggaam aansienlik verander weens hormonale aktiwiteit. Liggaamsbeeld-ontevredenheid vermeerder tydens die liggaamsvorm wegbeweeg van die "skraal *ideaal*" af. Adolosensie is ook 'n tydperk wat bekend is vir 'n afname in fisieke aktiwiteit; gevolglik neem fisieke fiksheid ook af. Liggaamsamestelling (liggaamsmassa-indeks en liggaamsvet-persentasie) neem dus grootliks toe weens die gebrek aan fisiese aktiwiteit, wat gevolglik lei tot 'n groter LB-ontevredenheid. Die gevolge hiervan is swak verstandelike ontwikkeling, sosiale angs (Davison & McCabe; 2006:27), depressie (Murray *et al.*, 2011:275), 'n toenemende voorkoms van 'n risiko vir nie-oordraagbare siektes (NOS's) en kroniese siektes. Na aanleiding van bostaande stellings het die volgende navorsingsvraag ontstaan: wat is die verskille tussen FF, LS, huidige liggaamsbeeld en *ideale* liggaamsbeeld en tweedens hoe is hierdie aspekte verwant aan mekaar in swart en wit vroulike adolosente?

'n Dwarsdeursnit studieontwerp was op die data uitgevoer wat tydens die ***P**hysical **A**ctivity and **H**ealth **L**ongitudinal **S**tudy (**PAHLS**)* ingesamel is om die navorsings vraag te beantwoord. Eenhonderd ses en vyftig vroulike leerders in totaal, wie ses verskillende hoërskole binne die Tlokwe Plaaslike Munisipaliteit bygewoon het, was gewerf om aan die waarnemings-longitudinale PAHL-studie deel te neem. 'n Toestemmings brief wat volledige inligting bevat oor die studie, was deur die deelnemers se ouers/voogde onderteken en privaatheid tydens metings is gewaarborg. 'n Figuurgraderingskaal van Stunkard *et al.* (1994), wat uit nege verskillende silhoeëtte bestaan, is gebruik om die huidige en *ideale* LB van die deelnemers te bepaal. Voorts was liggaamsvet-persentasie (LV%), liggaamsmassa-indeks (LMI) en fisieke fiksheid ($\dot{V}O_{2\,max}$) gemeet met behulp van velvou-metings en die Bleep-toets. Die statistiese analises het bestaan uit onafhanklike (eerste doelwit) en afhanklike (tweede doelwit) *t*-toetse met

die oog daarop om die verskille tussen die veranderlikes asook nie-parametriese Spearman rho-korrelasies vir die resultate van die verhoudings te wete te kom tussen die wit en swart groepe apart.

Die resultate het geen statistiese verskille tussen die twee etnisiteite (swart en blanke) met betrekking tot die FF, LS en LB weerspieël nie. As gevolg van klein steekproewe, veral onder die wit groep, was Cohen se effek grootte bereken om praktiese betekenisvolheid te toon. Liggaamgsvet-persentasie het ‘n medium praktiese betekenisvolle verskil voorgestel tussen wit en swart deelnemers volgens Cohen se effek grootte (d=0.37). ’n Groot statistiese betekenisvolle verskil (t(114) = -2.83, F(1,114) = 0.39, $p\leq$0.01) in liggaamsbeeld-tevredenheid was gevind tussen wit en swart vroulike adolosente wat die enigste groot verskille tussen die etniese groepe getoon het. Vêrder het Cohen se effek grootte (d = 0.70) ‘n groot praktiese betekenisvolle verskil voorgestel. Voorts was daar slegs ‘n sterk positiewe korrelasie in die swart vroulike adolosente gevind tussen LMI (r_s = 0.64, p<0.01) en LV% (r_s=0.5, p<0.01) met liggamsbeeld-ontevredenheid. Albei groepe het negatiewe korrelasies getoon tussen FF en liggaamsbeeld-ontevredenheid maar slegs die swart deelnemers se resultate was statisties betekenisvol : r_s =-0.21, p<0.05).

Volgens die bevindinge van hierdie studie kan die navorsingvraag beantwoord word deur te stel dat daar is geen beduidende verskil is tussen swart en wit vroulike adolesente in verband met FF, LS en huidige liggaamsbeeld nie. Daar is tog ‘n verskil tussen swart en wit deelnemers se liggaamsbeeld-tevredenheid (huidige liggaamsbeeld – *ideale* liggamsbeeld). Voorts dui die bevindinge aan dat daar verwantskappe is tussen liggaamsbeeld-ontevredenheid en liggaams samestelling. Hierdie positiewe verwantskap beteken beteken dat wanneer die LMI en LV% styg, styg liggaamsbeeld-ontevredenheid ook. Vir die swart vroulike adolosente van hierdie studie is daar ‘n omgekeerde verwantskap tussen FF en liggaamsbeeld-ontevredenheid dus hoe fikser hulle is, hoe minder is hulle liggaamsbeeld-ontevredenheid. Fiksheid het dus moontlik die potensiaal om as goeie gereedskap te toon om die bose kringloop van LB-ontevredenheid te demp wat deur talle mense beïnvloed word op ‘n daaglikse basis soos die pers, jongmense se portuurgroep en ouers.

Sleutelwoorde: Liggaamsbeeld, liggaamsbeeld-ontevredenheid, liggaamsamestelling, liggaamsvet-persentasie, fisiese fiksheid, *ideale* liggaamsbeeld, huidige liggaamsbeeld, adolessente, vroulike persone

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LIST OF ABBREVIATIONS

BI = Body Image

BC = Body Composition

PF = Physical Fitness

PA = Physical Activity

BMI = Body Mass Index

BF%= Body Fat Percentage

$\dot{V}O_{2max}$ = Maximal Oxygen Uptake

WHO = World Health Organisation

CHAPTER 1

INTRODUCTION

1.1 Introduction

"Girls develop into women with poor body image" (Bowker, 2006:226). Higgins (1987:336) accredits poor body image to a discrepancy between current and *ideal* body image, result in dissatisfaction of one's current body image. This statement by Bowker is a major concern as body image (BI) represents the self-evaluative constituent of self-esteem of which the core is physical characteristics and outward looks, contributing to development of personality (Cash *et al.*, 2004:1081). Numerous studies have recognised that health imperilling risks such as obesity; anorexia nervosa, depression, social anxiety and chronic diseases may develop into women with BI dissatisfaction (Cash & Morrow, 2004:1087; Jones, 2004:831; Bauer & Kirchengast, 2006:326; Barrett & Huffman, 2011:271). The above-mentioned health risks are a result of unhealthy weight control behaviours such as dieting, binge eating, less fruit and vegetable intake and low physical activity, which in all is associated with subordinate levels of body satisfaction (Cash & Morrow, 2004:1087; Neumark-Sztainer & Goeden, 2004:134; Kelly *et al.*, 2005:394; Ata *et al.*, 2006:1033; Bauer & Kirchengast, 2006:327; Neumark-Sztainer & Paxton, 2006:248; Wang *et al.*, 2009:612). Hence it is important not to neglect the finding that BI dissatisfaction is associated with negative outcomes both physiologically and psychologically (Neumark-Sztainer & Paxton, 2006:248).

Body image is generally affected by cultural beliefs, media, peers, family, weight-related teasing and physical activity (Mellor *et al.*, 2004:295; Clay *et al.*, 2005:470-471; Ata *et al.*, 2006:1033; Bearman *et al.*, 2006:238; Newman *et al.*, 2006:289; Dorak, 2011:558). Cultural pressure is regarded as an immense indicator of body image discrepancies (Simeon & Rattan, 2003:161). Not only do female adolescents from various ethnicities form a misconception in their minds such as the "thin ideal" (they wish to be skinny in order to be socially accepted as being attractive), but they also believe that it portrays good health (McArthur *et al.*, 2004:812). Lubans and Cliff (2011:218) found a negative relationship between body fat percentage (BF%) and current BI in female adolescents. According to Newman *et al.* (2006:290), body image can be viewed as a major source of personal and social capital and when it is at healthy levels, it can enrich the lives of the individuals themselves, as well as that of their communities.

In the past adolescent black females preferred larger body shapes than did whites (Hebl & Heatherton, 1998:423). This preference of black female adolescents could be a result of positive reinforcement from the community and the diverse array of body images they are exposed to in the media (Mabry *et al.*, 2003:314-315). In contrast, white female adolescents have to deal with peer acceptance, pressure from the family to be thin, and constantly being exposed to skinny white women in the media (Mabry *et al.*, 2003:315; Kelly *et al.*, 2005:394). African American female adolescents felt that they had a broader acceptance of miscellaneous body shapes and therefore a better self-image than white girls (Mabry *et al.*, 2003:315). Bhuiyan *et al.* (2003:796) found that blacks perceive themselves to have at a lower weight compared to whites. This common misconception could cause blacks to be a larger target for the development of risk factors related to obesity (Bhuiyan *et al.*, 2003:796). Nollen *et al.* (2006:299) found that white adolescents were more in tune with how their guardian(s) said they should appear, whereas black adolescents strive to bear a resemblance to their friends and pressure from family and friends could have a stronger influence on female adolescents than is the case with the media (Kelly *et al.*, 2005:394).

The purpose of this dissertation is to understand the differences and relationship among physical fitness, body composition and body image in a cohort of black and white adolescents of the North West Province of South Africa. This chapter will present the identified problem and present the objectives and hypotheses this study will be based on. Finally the structure of the dissertation will be presented.

1.2 Problem Statement

The present mainstream preference in the industrialised world is a more trim body contour, irrespective of previous cultural norms (Bauer & Kirchengast, 2006:329). Banitt *et al.* (2008:990) substantiated the previous statement when they found that an aspiration to lose weight begins with all “normal weight” black and white subjects participating in the study, even though a higher Body Mass Index (BMI) was still found among the black population.

Neumark-sztainer *et al.* (2003:809) reported that female adolescents who had a higher acceptance of their bodies participated in more physical activities. Physically active female adolescents were more concerned about their fitness and health than those who were physically inactive (Peltzer, 2003:215). A concern with individuals suffering from BI dissatisfaction is that participation in physical activity (PA) becomes an obstacle (Olafson, 2002). According to Prentice, (2006:98), higher body mass is associated with low PA levels/participation. Females

with a higher body shape satisfaction, more strength and virtuous physical condition are more inclined to exercise, also at a higher level and or greater intensity (Neumark-Sztainer & Paxton, 2006:249; Smart *et al.*, 2012:91&93). Fitzgerald *et al.* (2012:956) concluded that peers are the "main draw", with an unswerving influence in the lives of adolescents to participate in PA.

Physical activity is a primary component of obesity prevention programs. Body satisfaction is therefore instrumental as a preventative aid for lowering the incidence of risky weight control practices (Neumark-Sztainer & Goeden, 2004:134). Physical activity is said to be the possible long-term solution for maintaining a healthy weight and promotion of a healthy lifestyle (Neumark-Sztainer & Paxton, 2006:250). In female adolescents, relative strength ("absolute strength divided by body weight") has been associated with a decrease in BI dissatisfaction (Lubans & Cliff, 2011:217–18). According to (Ginis *et al.*, 2005:370) an increase in muscle mass, hence functional capacity, and reduction of body fat percentage due to exercise, increase body image in female adolescents.

Malina *et al.*, (2004) views PA as a requirement for healthy physical and psychological maturation. Adolescents mostly view homework, jobs or their social lives as of higher priority than participation in regular PA, even though they have knowledge of the health advantages PA compromises. The community and schools may therefore have a positive influence on BI if they advocate and highlight the priority of regular participation in PA by adding school gyms and/or sport activities, as well as encouraging social support by friends and families (Mabry *et al.*, 2003:315; Kelly *et al.*, 2005:394). Shepler & Lupfer-Johnson (2011:188) confirms the above-mentioned and adds that the emphasis should be on enhancing the body's functional capacity rather than focusing on its appearances.

Carraça *et al.*, (2012:1611) found that PA plays an imperative role in improving BI, but the actual $\dot{V}O_{2\max}$ values of the subjects were not measured or taken into account; measures that actually are necessary for determining whether PA alone is sufficient to improve BI dissatisfaction or whether one should rather explore the increase in physical fitness (PF) to a certain level before being able to see the results of PA on BI. Dunton *et al.* (2006:248) mentioned that cardiovascular fitness and BF% have a much larger influence on BI than merely being physically active.

Upon an investigation including body image, body composition (%BF and BMI), and physical fitness ($\dot{V}O_{2max}$) in a cohort of black and white female adolescents the following research questions arose: What are the differences between physical fitness, body composition, current body image and ideal body image and secondly how are these aspects related to each other in black and white female adolescents? Findings from this study will assist in gaining insight into the complex relationship between physical fitness, body composition, current and *ideal* body image of female adolescents in the North West Province of South Africa, as well as the diversity between ethnic groups. The outcomes of this study may be valuable information for, participants of this study, the surrounding community and fellow researchers in this field.

1.3 Objectives of the Study

The objectives of this study are to determine:

1. The difference in physical fitness, body composition (body mass index and body fat percentage) and current body image between black and white female adolescents of the Tlokwe Local Municipality.

2. The difference in body image dissatisfaction between black and white female adolescents of the Tlokwe Local Municipality.

3. The relationship between physical fitness, body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

1.4 Hypotheses

The study is based on the following hypotheses:

1. Physical fitness is significantly lower whereas body mass index, body fat percentage and current body image will be significantly higher in black females compared to white female adolescents of the Tlokwe Local Municipality.

2. Body image dissatisfaction will differ significantly between black and white female adolescents of the Tlokwe Local Municipality.

3. A significantly negative relationship exists between physical fitness and body image dissatisfaction whereas a significantly positive relationship exists between body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

1.5 Structure of the Dissertation

This study forms part of the **P**hysical **A**ctivity and **H**ealth **L**ongitudinal **S**tudy (**PAHLS**), which tracks growth, maturation and physical activity patterns using periodic standardised data collection in selected urban and rural areas of six high schools within the Tlokwe Local Municipality over a period of 5 years. As specified in the objectives of this dissertation the focal point of this study is on body image of different ethnicities and how they are influenced by body composition state and physical fitness. This study will use the data collected in 2013 when ages of participants ranged between 15 and 18 years of age. Data will be collected using a Body Image Figure Rating Scale, skinfold measurements and Beep Test.

The dissertation will consist of five chapters. All references will be presented at the end of the dissertation. References will be noted in accordance with the Harvard-style prescribed by the North-West University.

Chapter 1 serves as the introduction to the dissertation and introduces the topic of body image, how it is affected and what the negative outcomes of body image dissatisfaction entail. The chapter presents the problem statement, research question and the objectives and hypotheses derived from the research question. In Chapter 2 will consist of an in-depth literature review to deliver a broad perspective on the current literature available discussing body image, body mass index, body fat percentage and physical fitness in female adolescents. Factors influencing the interaction between BI, BMI and fitness will be included. Chapter 3, the methods section, will include the study design, participants and the research methodology of the study. The results of the study (Chapter 4) will be reported and discussed according to the objectives presented in Chapter 1. In Chapter 5 a summary of the research and the conclusions drawn from the results will be stipulated. The limitations of the study and future recommendations will also be added to Chapter 5. The reference list will follow Chapter 5. The appendices will comprise the Informed Consent form, Ethics Approval, Body Image Figure Rating Scale and Acknowledgement of language review letter.

CHAPTER 2

LITERATURE REVIEW: PHYSICAL FITNESS, BODY COMPOSITION AND BODY IMAGE IN FEMALE ADOLESCENTS

2.1 Introduction

Body Image (BI) is influenced by various factors such as; the media (Hardit & Hannum, 2012:473), parents (Ata *et al.*, 2006:1024–1037) and peers (Carey *et al.*, 2013:250–263). Thompson *et al*. (1999) remarked that the above-mentioned factors are the predominant influences of BI dissatisfaction. Females grow up with the idea that they have to fit the profile of the "ideal image" in the eyes of the world (Murnen & Don, 2012:128). They are exposed to this "ideal image" from a young age through toys like Barbie dolls, video games, television programs like Bratz, internet games and role models (Smolak, 2011:68). Current BI continually alternates and is not constitutive but taught by means of culture and is corroborated by friends and family (Croll, 2005:155).

Another alternating factor that influences body image is body composition (Lubans & Cliff, 2011:219). Females think they will have the "ideal image" when they have a low body fat percentage (BF%) and appear thin while males prefer having more muscle mass and desire to appear larger (Vilhjalmsson *et al.*, 2011:377). These body composition preferences are a result of the "thin ideal" for females and males who desire physical superiority (Brixval *et al.*, 2012:129).

Physical fitness has proven to be one of the major precursors in predicting a healthy body image (Hausenblas & Fallon, 2006:40). The existing problem is that physical activity decreases significantly during adolescence (Wallace, 2008). The combination of pressure to conform to the expectations of an *ideal* body image and low levels of physical activity, leads to the unrealistic "thin ideal" (low BF%) which most females seem to strive for as they mature (Derenne & Beresin, 2006:258; Todd *et al.*, 2013:4). Thirty-three percent of adult diseases originate from risk behaviours that started during adolescent years, which amongst others include low physical activity (Wallace, 2008).

Body image dissatisfaction was found to be directly associated with a low self-esteem (Phares *et al.*, 2004:427; Verplanken & Velsvik, 2008:136; Van den Berg *et al.*, 2010:295; Murray *et al.*,

2011:277; Burke *et al.*, 2012:365). This outcome is initiated by habitual negative thinking of one's body (Verplanken & Velsvik, 2008:136; Van den Berg *et al.*, 2010:295). Body image dissatisfaction may lead to stress (Murray *et al.*, 2011:277), risky sexual activities (Littleton *et al.*, 2005:197), self-mutilation (Muehlenkamp & Brausch, 2012:6) and eating dysfunctions (Ackard *et al.*, 2002:134; Lepage *et al.*, 2008:427; Verplanken & Velsvik, 2008:139).

The main focus of this literature review will be on body image and what influences BI, in particular the role of physical fitness and body composition on BI.

2.2 Body Image

Paul Ferdinand Schilder, neurologist, psychiatrist, and early influential theorist, was the first to mention the term Body Image (BI) in his book "The Image and Appearance of the Human Body" which was released in the year 1935 (Psychology Today, 2014), since then BI has been studied globally and shown to have a greater influence on females than on males (van den Berg *et al.*, 2010:294; Xu *et al.*, 2010:162; Burnett *et al.*, 2011:1662; Franzoi *et al.*, 2011:104; Bucchianeri *et al.*, 2013:5).

Body image is defined as the self-evaluative constituent of self-esteem of which the core is physical characteristics and outward looks, all of which contributes greatly to the development of personality (Cash *et al.*, 2004:1081). Body image is furthermore explained to be an "inside view" of oneself and it encompasses one's body-related self-perceptions and self-attitudes, including thoughts, beliefs, feelings and behaviours (Cash, 2004:1). The Merriam-Webster dictionary (2013) defines BI as a subjective picture of one's own physical appearance established both by self-observation and by noting the reactions of others. Burke *et al.* (2012:365) defines it as "self-evaluation of appearance". Nordqvist (2012) suggests it is the level on which you see yourself as physically appealing; it involves how you feel emotionally, what you believe about your body and how you see your physical self. The image you form happens through age, illnesses and your state of emotions. Body image is defined as the cerebral embodiment of all body sagacity classification in the parietal cortex as well as the concept formed in your mind about your body shape or how you think other people see you ("Medilexicon's Medical Dictionary.," 2006). The BI state involves the discernment of body shape, the current dimensions of the body, the degree of discontentment of the body, and the existing concerns about the dimensions of the body (Shisana *et al.*, 2013:15).

Body image dissatisfaction is explained by using terms such as body dissatisfaction or body image disturbance (Burke *et al.*, 2012:365). Body image dissatisfaction is seen in people who

compare themselves to others and the media and are not satisfied with how they see themselves or how they think other people see them; it is often found that these people's views are not viable (Nordqvist, 2012). Low self-esteem caused victims to be effortless targets for bullies (Brixval *et al.*, 2012:129). Body image dissatisfaction is additionally said to be associated with depression (Phares *et al.*, 2004:427; Schinke *et al.*, 2008:193; Murray *et al.*, 2011:275). Davison & McCabe (2006:27) disagrees with the previous statement and argues that no self-determining association was found between the two variables but continue saying that BI dissatisfaction may add to a dysfunctional psychological state, deprived one of one's skills and cause societal angst. When BI dissatisfaction is adopted it may trigger suicidal thoughts which is quite a common occurrence (Brausch & Muehlenkamp, 2007:211). Furthermore, the way people react to their performance in life emotionally could subsequently influence their motivation to achieve certain goals (Weiner, 1986).

Wood-Barcalow *et al.* (2010:112) defines positive BI as being in love with and respecting the body and its physical abilities; unconditional acceptance and admiration of the body; a feeling of beauty, comfort, confidence and happiness towards it that radiates from them; talking positively about one's body; is mindful of, listens to the body and eats nutrient rich food; disregards negative reports and internalises the positive reports of their body. Positive BI is foundational of an evaluation of an inner feeling of beauty (Dalley & Vidal, 2013:467). Fenton *et al*. (2010:195) states that BI is associated with outward i.e. "gender, age and household composition" and inward factors i.e. "family communication, teacher interest and feeling intelligent". Furthermore, females possessing a positive BI judge their bodies by its functionality (Frisén & Holmqvist, 2010:210).

According to Wood-Barcalow *et al.* (2010:106) a key factor in understanding positive BI is to be aware that having a positive BI is not only due to having positive feelings about one's body, but also to be able to minimise the effect of negative feelings about one's body. Individuals' whose positive feelings outweigh the negative feelings and see them as amenable, are the ones regarded as subjects with a positive BI (Dalley & Vidal, 2013:467).

2.2.1 Internalisation of Social Standards of Attractiveness

According to Higgins' self-discrepancy theory, people's emotional susceptibilities and drives are a result of discrepancies according to what they believe about themselves (Higgins, 1987:336). Moreover, the theory suggests that body image dissatisfaction is a result of the difference between the actual self and the *ideal*/ought to self (see Figure 2.1).

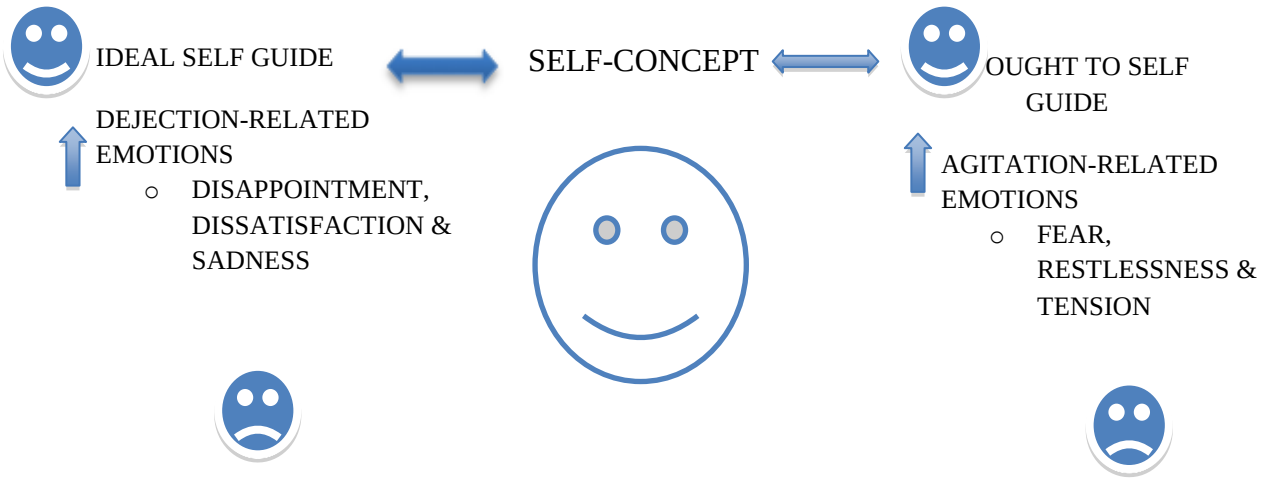


Figure 2.1: Illustration of Higgins' self-discrepancy theory compiled from the literature

To fully understand how body image is influenced, one must take note of what internalisation entails. Internalisation, according to the Merriam-Webster Dictionary (2015) is "to make something a part of your identity". Females who have a low sense of identity are easily influenced by society's idea of what a female should look like in an attempt to find some kind of identity (Vartanian, 2009:108). Internalising a false image of what a female should look like is often triggered by the media which strongly promote the "thin ideal" (Myers & Crowther, 2007:305). Attitude plays a major role during the exposure to the "thin ideal" – if females positively relate to media images they seem to have a stronger internalisation of the "thin ideal" (Ahern *et al.*, 2008:305). Females then tend to adapt the habit of comparing themselves to other females in order to find some form of identity (Vartanian & Dey, 2013:498). Conformity may be another risk factor for "thin ideal" internalisation because when females are not associated to a social group they may be more inclined to conform to the ideals of society in order to fit in (Vartanian & Hopkinson, 2010:88).

It is important to make females aware of the dangers of internalising negative thoughts about themselves that originate from social standard of attractiveness, educate them about the media's objectives and that they may learn not to value themselves according to societal ideals of outward looks (Warren *et al.*, 2005:246; Myers & Crowther, 2007:305). The various measurements of body image are compiled based on the theoretical framework of self-discrepancy of Higgins (1987).

2.2.2 Measurement of Body Image

The measurement of body image poses to be complex due to various factors that influence it, such as the individuals current state of being as well as different other stimuli which constantly play a role on how people feel about themselves (Cash, 2011:131 & 149). There are also many

aspects of BI to assess; such as how people feel about BI, what they believe about their outward looks and what they think about different parts of their bodies (Cash, 2011:129). This review is solely concentrated on satisfaction or dissatisfaction of the body, thus how individuals perceive/see their bodies currently.

A person's body image satisfaction-dissatisfaction can be deduced by making use of a questionnaire such as a figural or schematic scale. The benefit of a questionnaire is mostly economical and can be completed in a brief period, for example the Body Image Disturbance Questionnaire (Cash *et al.,* 2004:363–372). There is a vast majority of questionnaires which have been developed and validated to assess BI such as Appearance Schemas Inventory – Revised (Cash *et al.,* 2004:309), Body Image State Scale (Cash *et al.,* 2002:107), Photographic Figure Rating Scale (Swami *et al.,* 2008:1752–1761) and the Multidimensional Body-Self Relationships Questionnaire (Hrabosky *et al.,* 2009:157), all of which have a Cronbach's alpha score of between 0.75 and 0.90.

Stunkard, Sørensen and Schulsinger's Figure Rating Scale which was developed in 1983 (Stunkard *et al.,* 1983:115–120) enables individuals to associate a picture/silhouette with what they feel is the best portrayal of their perceived current body shape. This chosen picture in turn provides the researcher with a figurative view of what individuals internalise as their body shape. This method is simple to use and easy to understand and does not require language skills. The questionnaire generally asks which figure represents their body shape best and where would that person like to be on that scale to determine dissatisfaction (Cash, 2011:155). Body satisfaction is then obtained by calculating the difference between the two answers (Cash, 2011:155). The figure-rating scale developed by Stunkard *et al.* (1983) consists of nine similar figures, ranging in appearance from emaciated to obese. The reliability of this questionnaire ranges between 0.71 and 0.92 which makes it one of the most reliable figure-rating scales (Cash, 2011:159). Table 2.1 provides a summary of BI questionnaires often used in research.

Table 2.1: Body Image Questionnaires compared (summary of Cash, 2011: 154-167)

QUESTIONNAIRE	PROS	CONS
Appearance Schemas Inventory – Revised (Cash *et al.*, 2004:309)	Comprehensive view of BI, updated and improved, considers self-evaluative and motivational prominence, IC & TR: above 0.70	Time consuming (20 items) and not tested on adolescents, language skills required
Body Image Disturbance Questionnaire (Cash *et al.*, 2004:363–372).	Comprehensive view of BI, medium length, includes *ideal* body image, IC & TR: above 0.80	Does not predict current BI state, language skills required
The Body Shape Questionnaire (Rosen *et al.*, 1996:315–319)**,**	Investigates all general concerns about one's body shape and weight	Unnecessary items, very long, language skills required, unknown IC & TR
Body Image State Scale (Cash *et al.*, 2002:107),	Covers 6 aspects of body image, medium length, foresees for current state, very specific, IC & TR: above 0.80	Language skills required, no perceptual component, only accounts for current state
Photographic Figure Rating Scale (Swami *et al.*, 2008:1752–1761)	Resembles real women, resembles certain BMI, female specific, easy to use, no need for verbal skills, visual appeal &TR: above 0.88	Only for adults, not controlled for leg-body length discrepancies, only for women

Multidimensional Body-Self Relations Questionnaire (Hrabosky *et al.*, 2009:157)	Covers 5 aspects of body image: Appearance Evaluation, Appearance Orientation, Overweight Preoccupation, Self-Classified Weight, and the Body Area Satisfaction Scale, IC & TR: above 0.70	Language skills required, no perception component, only for 15 years and older
Figure Rating Scale (Stunkard *et al*, 1983)	Does not depend on language skills, simple and easy to use, not time consuming, gender specific, previously used for national research in South Africa (SANHANES:2013), can add *ideal* body image & TR: above 0.70	Not age matched, does not account for different body shapes (larger hips, smaller mid-section or larger waist, smaller hips), falls short of thorough psychometric measurement

IC = internal consistency TR = test retest

2.2.3 Factors that influence Body Image

Numerous factors were found in the literature, which each play a role regarding the internalisation of societal standards of attractiveness and therefore influence body image (see Figure 2.2).

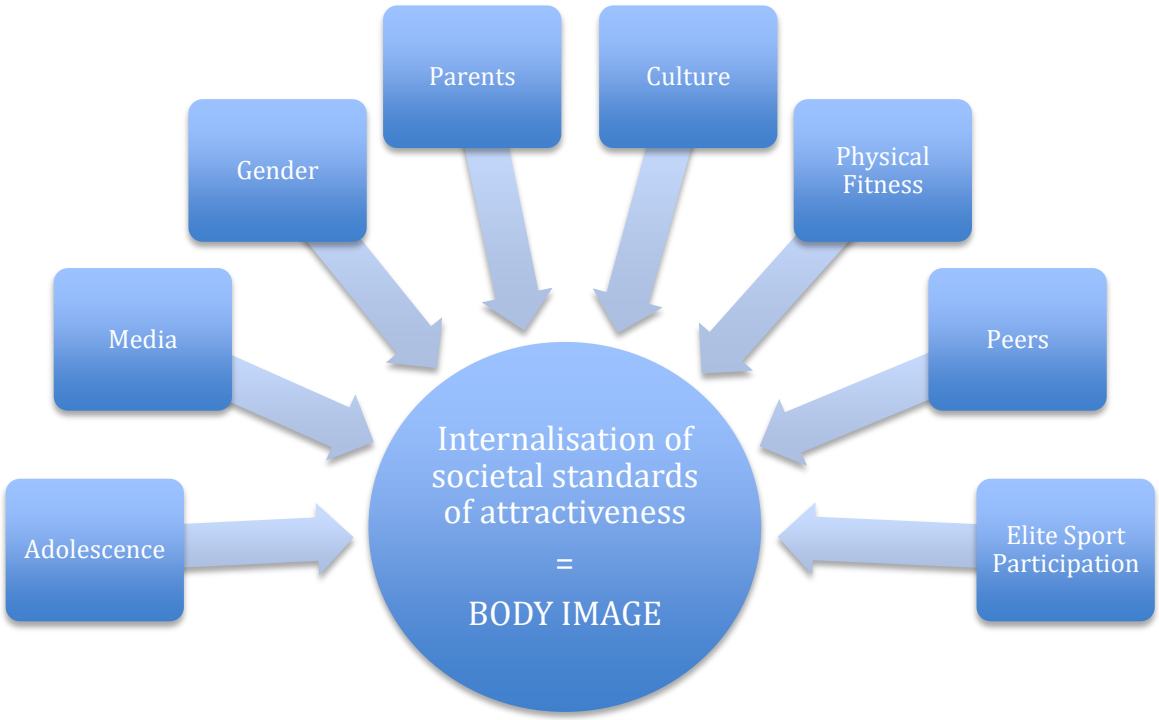


Figure 2.2: Factors that influence Body Image

2.2.4 Media

Numerous studies suggested that the media is a very tenacious presage of body image dissatisfaction not only in heavier women but in women of various body types (Fallon & Hausenblas, 2005:71; Hardit & Hannum, 2012:473; Hargreaves & Tiggemann, 2004:357; Markis & McLennan, 2011:425). Fernandez and Pritchard (2012:324) stated that an urge to be thin has convincing forces with media representations. It is suggested that women who are at risk (i.e. misbeliefs of body malleability) of having body image dissatisfaction are more likely to be affected by the "thin ideal" media images (Arciszewski *et al.*, 2012:339). In contrast to these findings, short-term exposure to idyllic body images induced positive body change behaviours, although this intervention lasted only ten days and the possibility of

discouragement in the long run should not be ignored (Knobloch-Westerwick & Crane, 2011:95).

Illusory media images might lead to social and self-comparison which may cause body image dissatisfaction amongst female adolescents (Hargreaves & Tiggemann, 2004:357). This effect is more profound in females than in males (Myers & Crowther, 2009:691). Women with both low and high self-esteems are influenced when it comes to media illustrations (Bell *et al.*, 2007:143–44). Although not all females are always influenced by images in the media (Fernandez & Pritchard, 2012:324), the necessary care is advised to be taken and the immersing power of the media on BI should not be underestimated.

According to Hargreaves and Tiggemann (2004:358) females experience an immediate and stronger impact on BI after exposure to media images than do males. In this day and age there is a constant flow of media images bombarding individuals' through the internet and social networks, all of which negatively affect BI (Tiggemann & Slater, 2013:632). Therefore, it may be helpful for adolescents to be taught not to compare their bodies with these illustrations in the media but rather to question the reality of these illustrations; this can be done through media literacy (Botta, 2003:398).

The media is making some effort to create awareness amongst adolescents warning them about the negative influence these idealistic images may have on BI (Bell *et al.*, 2007:144). Despite these efforts, a general trend of BI dissatisfaction is prevailing, according to recent studies (Ridolfi *et al.*, 2011:491–505; Fernandez & Pritchard, 2012:321–325; Holmqvist & Frisén, 2012:388–95; Todd *et al.*, 2013; Boersma & Jarry, 2013:200–9; Viviani *et al.*, 2013:95; Bruns & Carter, 2015:33–36).

Myers and Crowther (2009:692) exude the efforts of the media and state that the media are still guilty of portraying false images and therefore criticise the media of triggering BI dissatisfaction among adolescents; they suggest that a more aggressive approach is required. Fernandez and Prichard (2012:324) suggest that parents, teachers and school counsellors need to join forces and confer with pupils in order to help them create realistic body images.

2.2.5 Parents/Guardians

Parents are regarded as one of the most prominent influences with regard to the development of adolescents' BI (Field *et al.*, 2001:58; Barker & Galambos, 2003:160; Phares *et al.*, 2004:426; Kelly *et al.*, 2005:394; Smolak, 2004:24; Ata *et al.*, 2007:1033). This is mostly

because of what adolescents perceive their parents think of them, pressure from parents to be thin or become toned (McCabe & Ricciardelli, 2001:232 & 236), teasing (Keery *et al.*, 2004:237–51), exemplification of parents (i.e. dieting, shape dissatisfaction or "thin ideal" internalisation) (Field *et al.*, 2001:59; Littleton & Ollendick, 2003:56; Keery *et al.*, 2006:110; Cooley *et al.*, 2008:60) as well as criticism received from parents (Phares *et al.*, 2004:426). Adolescents who are vehemently close to their parents are at even greater risk to this effect (Ata *et al.*, 2007:1033).

In contradiction to the above-mentioned, Shroff and Thompson (2006:21) propose that no relationship exists between parents and the BI of adolescents but state that the influence of parents might be larger in children who have not yet reached adolescence. McCabe and Ricciardelli (2005:664) also agree that parents do not have an influence on BI because they argue that BI is a stable component of a piece of the broader self-image puzzle, which very seldom varies when exposed to socio-cultural influences.

Ricciardeli and McCabe (2001) and Cooley et al. (2008), on the contrary, believe females are more prone to their parents' influence than any other socio-cultural influences, this happens especially when mothers agree with the media's idea of what a female should look like, have BI dissatisfaction themselves, as well as fall into the trap of regular unhealthy dieting (Ricciardelli & Mccabe, 2001:332–336; Cooley *et al.*, 2008:559). Friends seem to not judge body shape as harshly as do mothers (Mchiza *et al.*, 2011:6), which is of concern since mothers have a strong influence on their children. Field *et al.* (2001:59) dismiss a mother's influence but instead state that fathers' perception plays a more significant role in the lives of children. The presence of a father figure in the life of an adolescent was seen to be a prognosticator for sustenance of a positive body image throughout adolescence (Fenton *et al.*, 2010:195).

Children see their parents as role models, therefore parents play a vital role in adapting their lifestyle in order that regular physical activity and healthy eating forms part of their everyday lifestyle habits (Field *et al.*, 2001:59; Keery *et al.*, 2006:111). Support from parents to adopt a physically active lifestyle may aid in the development of children and adolescents with healthy body images (Littleton & Ollendick, 2003:57). Emphasis should be placed on being healthy and fit rather than to endorse the beliefs of the Westernised culture pertaining to the "thin ideal" (Kelly *et al.*, 2005:396).

2.2.6 Peers

Webster dictionary (2013) defines a peer as someone who is equal to you and particularly of the same age, grade or status and a friend as someone with whom you have an emotional connection. Comments about each other's bodies are often directed towards peers but friends often reassure each other that their bodies are acceptable (Hutchinson & Rapee, 2007:1573).

The outward look of a person is the first thing people see; hence the initial aspect upon which someone may make a prejudgement (Lunde & Frisén, 2011:313). Dohnt and Tiggemann (2006:148) established that at a young age of about 6 years, socio-cultural pressure plays a significant role in the lives of males and females alike. The pressure increases as children mature and are especially visible during adolescence, specifically among females due to the "appearance culture" (Barker & Galambos, 2003:159; Davison & McCabe, 2006:25; Jones & Crawford, 2006:265). Children and adolescents tend to conform more and more to the "thin ideal" of society and lose weight no matter the status of their body mass index (BMI) (McCabe & Ricciardelli, 2001:237). In the general adolescent society, peers believe that in order for females to be "good looking", they should be classified as underweight (Van den Berg *et al.*, 2007:264). Overweight girls in particular believe that they need to conform to this societal "thin ideal" in order to be accepted by their peers (Jones & Crawford 2006:265).

Peer influence concerning BI is also conducted by weight-related teasing (Ata *et al.*, 2007:1034) or victimisation (Barker & Gallambos, 2003:160; Lunde & Frisén, 2011:312). Females seem to internalise whatever comments they may hear from their female friends and especially their inner circle of female friends (McCabe & Ricciardelli, 2001:232 & 237). They continually compare themselves with other female peers and friends (Krayer *et al.*, 2008:900) and "micro cultures" are easily formed which contribute to BI dissatisfaction when they employ a culture of comparison between peers (Hutchinson & Rapee, 2007:1572; Carey *et al.*, 2013:261). Females make opposing, judgmental comparisons as and when their moods fluctuate and may not feel accepted at the time or when they are continually focused on outward appearance (Krayer *et al.*, 2008:900). Ridolfi *et al.* (2011:501) disagree that these comparisons could cause BI dissatisfaction among female adolescents but do admit that it could be psychologically harmful, especially when the female compares herself with someone close to her.

It may decrease the influx of negative peer influence on BI if females are taught to be more acceptant of miscellaneous body types (Littleton & Ollendick, 2003:57-58). Sparking

healthy interactions between peers by encouraging them to discuss pressures they face through the media and analyse whether these media pressures are realistic, as the media is often the central topic of conversation among females may decrease unhealthy conversations (Krayer *et al.*, 2008:900-901; Carey *et al.*, 2013:261). Females could easily be influenced by peers and therefore healthy interaction between peers, prompted by education regarding the benefits of a healthy lifestyle, may be used as a tool to change unhealthy habits and unrealistic body shape ideals (Mueller *et al.*, 2010:75).

2.2.7 Body Image during Adolescence

The start of adolescence earmarks an era of physical, psychological, socio-cultural growth as well as a change in hormones such as oestrogen levels that influence body shape, which could well pose a threat to mental health problems (Oldehinkel *et al.*, 2011:78).

As females advance in age throughout the adolescent period they develop a greater dissatisfaction towards their physical self and therefore BI dissatisfaction (Meland *et al.*, 2007:348; Vilhjalmsson *et al.*, 2011:375; Bucchianeri *et al.*, 2013:5). Myers and Crowther (2009:692), however, found that BI is lower at the beginning of adolescence and states that it might be reasoned that adolescents spend a longer period of time with their peers enrolling with social comparison and can therefore easily plummet into body dissatisfaction.

Ultimately what happens during early adolescence is the onset of puberty, which happens at different ages for females which causes an increase in body weight, of which a portion is fat, resulting in them lingering further away from the "thin ideal" (McCabe & Ricciardelli, 2005:663; Tiggemann, 2005:133; Meland *et al.*, 2007:348; Cousineau *et al.*, 2010:299; Bucchianeri *et al.*, 2013:5). Puberty is therefore highly correlated with a change in BMI (Ginsburg *et al.*, 2013:101), which in turn is highly correlated with BI dissatisfaction. Meland *et al.* (2007:348) explains that BI dissatisfaction is related to the perception of an unhealthy body among adolescents who were taught that being overweight or living an inactive life is harmful to the body. Therefore the mere perception of overweight or being classified as overweight could well lead to BI dissatisfaction (Tiggemann, 2005:133; Vilhjalmsson *et al.*, 2011:376). The onset of puberty causes an influx of weight gain and therefore changes the perception of one's body image (Jones & Smolak, 2011:80).

Pubertal timing is therefore an important factor to consider since females who experience early puberty might feel alienated and are at higher risk of developing BI dissatisfaction

(Michaud *et al.*, 2006:175; Cash, 2011:87; Natsuaki *et al.*, 2009:520; Copeland *et al.*, 2010:1223; Oldehinkel *et al.*, 2011:78-79). Females who experience early or late onset puberty may end up internalising their struggles, having no friends who experience the same body changes, and therefore BI dissatisfaction comes to light (Natsuaki *et al.*, 2009:520; Cash, 2011:87). The effect of weight gain and increased BMI during puberty becomes even more adverse when early onset of puberty takes place, of which the cause is unknown (Kaplowitz, 2008:S214; Tu *et al.*, 2015:70). Guzman and Nishina (2014:70) disagree and state that pubertal timing has no effect on the BI of female adolescents. Jones and Smolak, (2011:80) do not agree that there is no mental effect on individuals because of pubertal timing but states that BMI and weight gain has a much larger effect on mental health compared to pubertal timing.

The decrease in BI during early adolescence may be a result of female adolescents who slip into a mind-set where they are increasingly cognisant of the pressure from a socio-cultural point of view to follow a trend and peruse a false *ideal* (McCabe & Ricciardelli, 2005:663). Female adolescents who pursue social maturity may well employ in harmful behaviours to demonstrate dominion in order to gain approbation of peers (Oldehinkel *et al.*, 2011:78). Females in a later stage of adolescence are said to spend more time conversing about diets, physical fitness and comparing themselves to each other than younger females (Jones & Crawford, 2006:266).

The cause of this social epidemic could be accounted to the fact that the social brain, which exists of an intricate set of connections between the medial prefrontal cortex of the brain and the temporo-parietal junction which involves thoughts on mental condition as well as the posterior superior temporal sulcus which is triggered when examining faces and movement of living things (Blakemore, 2008:268). These parts of the brain take part in the reasoning and interaction caused by a societal driving force such as peers, parents and media, which expands throughout adolescence (Burnett *et al.*, 2011:1662). Exposure to continuous negative comments at an early age are therefore embedded in the brain and triggered during the sensitive stage of adolescence.

The growth of the social brain takes place during adolescence and is therefore sensitive to a harmful social environment but also provides an opportune time to cultivate the ability to recover more easily from unpleasant experiences (Burnett *et al.*, 2011:1662). This may assist females in having to deal with maturation of the body during adolescence. Encouraging

females to accept that they may gain weight during maturation (Barker & Galambos, 2003:160) and should live a healthy, balanced lifestyle to ensure wellness (Bucchianeri *et al.*, 2013:6) may assist them to achieve a healthier BI. Schools can be the centre of major influence concerning BI during adolescence and may be encouraged to promote self-assurance (Meland *et al.*, 2007:349). False ideals of the human body to which females may aspire, can be countered by the community, by involving schools, and educating females about the transformation, which their bodies will undergo during puberty, and about them having to accept miscellaneous body shapes (Tiggemann, 2005:134; Mulasi-Pokhriyal & Smith, 2010:348).

2.2.8 Cultural Beliefs/Ethnicity

Body image dissatisfaction was regarded a trend mostly associated with Western society and communities not in contact with them were not influenced, but due to the media industry upsurge, remote places all over the world are now being reached (Swami *et al.*, 2010:320; Burke *et al.*, 2012:365). Research by Nam *et al.* (2010:234) found that females from Western societies had the highest rating among all cultures for being illustrated as a female stereotype with images involving nudity and lust. As people tend to become more familiar with popular culture, a healthy body image is placed in jeopardy (Barker & Galambos, 2003:158).

Body image dissatisfaction is found across every race, ethnic group and culture – in some more than others (Fitzgibbon *et al.*, 2000:587; Kelly *et al.*, 2005:394; Mciza *et al.*, 2005:515; Puoane *et al.*, 2005:14; Toro *et al.*, 2006:564; Dev *et al.*, 2009:77; George & Franko, 2010:238; Swami *et al.*, 2010:319; Bucchianeri *et al.*, 2013:5; Viviani *et al.*, 2013:95). Arriaza and Mann (2001:313) disagree with the above statement and found that by controlling for body mass the differences disappear between the ethnic groups and rather suggest that body mass may be the centre of these differences; ethnic standards about beauty could potentially originate from body weight norms within an ethnic group. It seems that African Americans are more accepting of miscellaneous body types and therefore have a lower rate of BI dissatisfaction than others (Kelly *et al.*, 2005:394; George & Franko, 2010:236; Bruns & Carter, 2015:35). Not all literature agrees that African Americans have a healthier BI. In fact, a recent study done in America states that white American adolescents have a more positive BI than African Americans (Epperson *et al.*, 2014:8).

In South Africa most black ethnic groups do not follow the Western “thin ideal” but instead believe that a larger female body is healthy, happy, important, wealthy and well looked after

by the husband (Mciza *et al.*, 2005:515; Venter *et al.*, 2009:20; Puoane *et al.*, 2010:33; Swami *et al.*, 2010:319; Matoti-Mvalo & Puoane, 2011:44; McHiza *et al.*, 2011:6; Ogana & Ojong, 2013:117). These beliefs in certain cultural groups are prescribed to the fact that thinness is a sign of positive HIV status or may be a physical portrayal of difficult, stressful times mostly because of financial problems where an abundance of food cannot be afforded (Mvo *et al.*, 1999:30; Faber & Kruger, 2005:243; Puoane *et al.*, 2010:33; Matoti-Mvalo & Puoane, 2011:44). Faber and Kruger (2005:243) suggest that it might not be thinness but rather weight loss that brings concern and makes husbands in particular unhappy with their wives because it may reflect badly upon them for not caring for their wives or financial problems in the family. This is the complete opposite to what is believed among the westernised communities where health and wealth is associated with a thinner figure (Venter *et al.*, 2009:20).

This mind-set is a major risk factor for black females in South Africa because overweight and obesity are large contributors to non-communicable diseases (Faber & Kruger, 2005:242; Puoane & Hughes, 2005:228; George & Franko, 2010:238). However, a recent study in KwaZulu-Natal by Ogana and Jong (2013:116) found that some Zulu adolescents are starting to aspire more and more towards the "thin ideal" in order to lower these risk factors but they are still conscious of their ethnic background that believes that thin females are considered HIV victims. The "African elite" as referred to by Coetzee *et al.* (2012:5) are black Africans who have access to better health care systems, houses, earnings and are exposed to Western media and have converted to the "thin ideal". Black females between ages 9 and 12 years are thinner but prefer a larger body shape, their mothers who are larger, prefer thinner body shapes. Even though black females are generally dissatisfied with their body shape, their *ideal* is just as drastic as the "thin ideal" preferred by westernised, white females in South Africa (Mchiza *et al.*, 2011:6). A shift towards the "thin ideal" because of exposure to media causes confusion because of their ethnic roots and therefore BI dissatisfaction is the result (Puoane *et al.*, 2005:14, 2013:92; Viviani *et al.*, 2013:95). For example, in a study of Gitau *et al.* (2014:473) done in South Africa, most black female adolescents strive to be thin but 30% of them still prefer a larger body shape. Body image dissatisfaction among black females is rising at a faster rate than amongst other races because of ethnic messages and conflicting media (Bucchianeri *et al.*, 2013:5).

A solution to this problem may be to belong to a cultural group that accepts miscellaneous body shapes and encourages optimal nutrition (Littleton & Ollendick, 2003:58). It may be

helpful to include the whole family in assistance of disposal of beliefs and to educate them accordingly in a diverse South African context (McHiza *et al.*, 2011:6). Globally, humanity now faces the urgent challenge of promoting realistic and healthy body mass ideals, by confronting suggestions that the "thin ideal" and being feminine, successful, and healthy go hand in hand (Swami *et al.*, 2010:321).

2.2.9 Gender Differences

A person's gender is clearly engraved on the exterior of the human body (Calogero & Thompson, 2010:174). External influences (media, peers and parents) drive both genders towards stereotypes. Females strive towards the "thin ideal" and males want to display power and muscularity (McCabe & Ricciardelli, 2001:235, 2005:666; Vilhjalmsson & Kristjansdottir, 2003:376; Murnen & Don, 2012:133). Males are more concerned about the dimensions of their upper bodies whereas females view their figures as a whole (Ata *et al.*, 2007:1033). Conflicting with the previous statement, females tend to judge all the different compartments of their bodies whereas males view their bodies as a whole, especially in terms of functionality (Calogero & Thompson, 2010:154). Various researchers state that females are generally more dissatisfied with their bodies than are males (Davison & McCabe, 2006:25; Ata *et al.*, 2007:1033; Grossbard *et al.*, 2008:205; Jones *et al.*, 2009:120; Bucchianeri *et al.*, 2013:5;). Jones and Crawford (2006:266) disagree with the previous statement but rather suggest that both genders are equal pertaining to facade concerns. Mellor *et al.* (2010:393) also substantiates this finding and further states that males work harder to change the morphology of their bodies than females (McCabe & Ricciardelli, 2005:663). Murnen and Don (2012:133) found the opposite and argue that females are more devoted to improve their appearance (Davison & McCabe, 2006:26) and that their wellness is more essential to them. They also found that more than 50% of females strive to be leaner whereas only 30% of males seem to desire to have a leaner body (Banitt *et al.*, 2008:987). It seems that as females mature they are increasingly aware of their figures and outward appearance (Butt *et al.*, 2011:1081).

In terms of influences on these gender stereotypes, the media seems to be the primary component and influences females in a higher degree than males (Botta, 2003:397; Hargreaves & Tiggemann, 2004:358). Both genders internalise these media ideals (Murnen & Don, 2012:133) but it was not an indication of BI dissatisfaction among males (Knauss *et al.*, 2008:641). The gender stereotypes are exhibited through diverse fashions displayed in

the media. The ideas of the media are supported by means of socio-cultural environments and particular functions/roles people believe a female or male body must do or be. Each person is then placed in a box that essentially declares what and who they are to the world (Calogero & Thompson, 2010:174). The effect the media has on females is stronger compared to that on males, the reason being that females tend to engage more in social comparison than do males (Davison & McCabe, 2006:25; Myers & Crowther, 2009:691).

Swami *et al.* (2010:320) state that males prefer women who have a considerably larger body shape than females perceived might be "good-looking" to men across nine regions in the world. Social pressure was found to have a more powerful impact on females than on males, but friends seem to have a similar impact on both genders and only males were found to have a fear of being rejected by peers (Helfert & Warschburger, 2011:107). Males and females react differently to interpersonal stressors (Natsuaki *et al.*, 2009:521). Females are more likely to engage in body checking and be ashamed of their bodies than are males (Knauss *et al.*, 2008:640).

The above-mentioned results are alarming for females because more health-related risk factors are evident at low fat percentages in females (Barker & Galambos, 2003:159). The associated risk factors are discussed in section 2.8. Females tend to become consumed in the world of eating disorders (Ata *et al.*, 2007:1033) and have been found to engage in these activities as much as eight times more than males (Murnen & Don, 2012:133).

Both genders seem to engage in physical activity in order to achieve the "ideal" body; males participate because they feel manlier with the sweating and improvement in masculinity whereas females become more popular among peers and thereby increase their BI (Butt *et al.*, 2011:1080). Haugen *et al.* (2011:54) found that the result of the influence of physical activity influence on self-esteem/BI was significantly more beneficial to female adolescents than to males. Females mostly engage in physical activity in order to lower BF% or maintain their figure (Phares *et al.*, 2004:426), whereas males try to build muscle mass (Murnen & Don, 2012:129). Body fat percentage and Muscle Mass (MM) are components of body composition and can be measured using different measurement methods, which will be discussed in the following section.

2.3 Body Composition

Body Composition (BC) can be described by using a "two-component model": the approximate fraction of body fat and fat-free tissue (ACSM, 2010:62). Body fat entails fat that is distributed all over the body i.e. brain, skeleton and adipose tissue, whereas fat-free tissue consists of skeletal muscles, water, bone, and essential visceral fat (3-12% of body fat), bone marrow and nerves (Mahan & Escott-Stumo, 2008:532).

2.3.1 Measurement

Body composition can be measured by applying laboratory and field methods which have a variety of pros and cons (see Table 2.3) pertaining to expenditure, complication and accurateness (ACSM, 2010:62). Take note that all listed methods below (see Table 2.2) are indirect methods because density of fat (hydration of fat) cannot be determined unless tested on a cadaver, especially in children where their bodies are chemically immature (Slaughter *et al.*, 1988:709–723). Slaughter *et al.* (1988:719) listed equations to be used to calculate the body fat percentage of adolescents that does account for chemical immaturity.

Table 2.2: Methods of measurement for Body Composition (as cited by de Ridder, 2013)

Method	Classification
Hydro densitometry	Laboratory
Plethysmography	
DXA (Dual-energy X-ray absorptiometry)	
Skinfold Measurement	Field
BIA (Bioelectrical impedance)	
WHI indexes (including BMI)	

Table 2.3: Pros and Cons of Skin Fold Measurements (as cited by de Ridder, 2013)

Pros	Cons
Low Cost	Particular technique that needs to be exercised in order to obtain accurate results
Applicable, dependable, and good accuracy if proper technique is followed	It is very difficult to accurately measure obese and morbidly obese subjects
Can test large groups in a short period of time	The validity and reliability needs to be reassessed on a regular basis
Uncomplicated	
Adding the skinfold measurements together gives one a result that is directly related to BF% and inversely related to total body density	

Skinfold thickness and DXA measurements are labelled as gold standard when predicting weight status (underweight or overweight) (Mei *et al.*, 2002:982).

2.3.2 Body Composition World Wide

The variety of genetic coding, pertaining to adipose and non-adipose tissue of different ethnic backgrounds may influence fatness of the body and muscle mass (Wulan *et al.*, 2010:318). It is evident that there are definite variations among races and ethnicities when referring to BC, particularly between bone mass or density (Deurenberg & Deurenberg-Yap, 2003:248), muscle mass and adipose tissue (Sampei *et al.*, 2003:1118; Lohman & Going, 2006:315; Rush *et al.*, 2007:1237; Camhi *et al.*, 2011:407). According to Kohli *et al.* (2010:2183) South Asians have significantly more adipose tissue around the abdominal area than Europeans of the same age and BMI. In African-American women higher overall bone mass was found in white women (Gasperino *et al.*, 1995:32).

Additional to previously mentioned differences, such as race and ethnicity, a difference in body composition can be observed among different ages and genders (Veldhuis *et al.*,

2005:131; Lohman & Going, 2006:315). Women who are post-menopausal have higher visceral fat than those who have not yet reached menopause Janssen *et al.*, (2010:608); South Asians seem to have less musculature even at the same percentage body fat compared to other ethnic groups (Lear *et al.*, 2009:4700).

2.3.3 Body Mass Index (BMI)

BMI assesses body weight relative to height by division of weight (kg) by height (m^{-2}) and is often used to evaluate disease risk (among sedentary or within the normal population, not sportsmen- and women) (ACSM, 2010:63). Lohman and Going (2014:318) explain that the measurement of height is used to record linear growth and weight to indicate the increase in body weight during growth which gives us an idea of the muscle, bones, organs and fat in the body and is useful to measure nutritional status.

2.3.4 BMI Guidelines According to the WHO

These guidelines are presented on a z-score chart which correspond with growth chart percentiles, which is a useful guide when tracking relative body mass during growth; these z-scores are properly regulated for gender and age (Must & Anderson, 2006:591). Cole *et al.* (2000:1242) proposed new guidelines, the CDC growth charts, which are the same as adult guidelines for obesity and overweight; the overweight guideline is 25 kg/m^{-2} and the obesity guideline is $30kg/m^{-2}$ – these curves are also adjusted for females during puberty. The WHO released these new z-scores in 2007 (see Figure 2.3) to assist countries in tracking the prevalence of obesity in children as well as adolescents because it is a major increasing problem worldwide (de Onis *et al.*, 2007:664). Both the above-mentioned charts have their flaws and each could be more accurate with various research goals in mind. Both, however, represent the same guidelines for obesity and overweight (de Onis *et al.*, 2007:146-147).

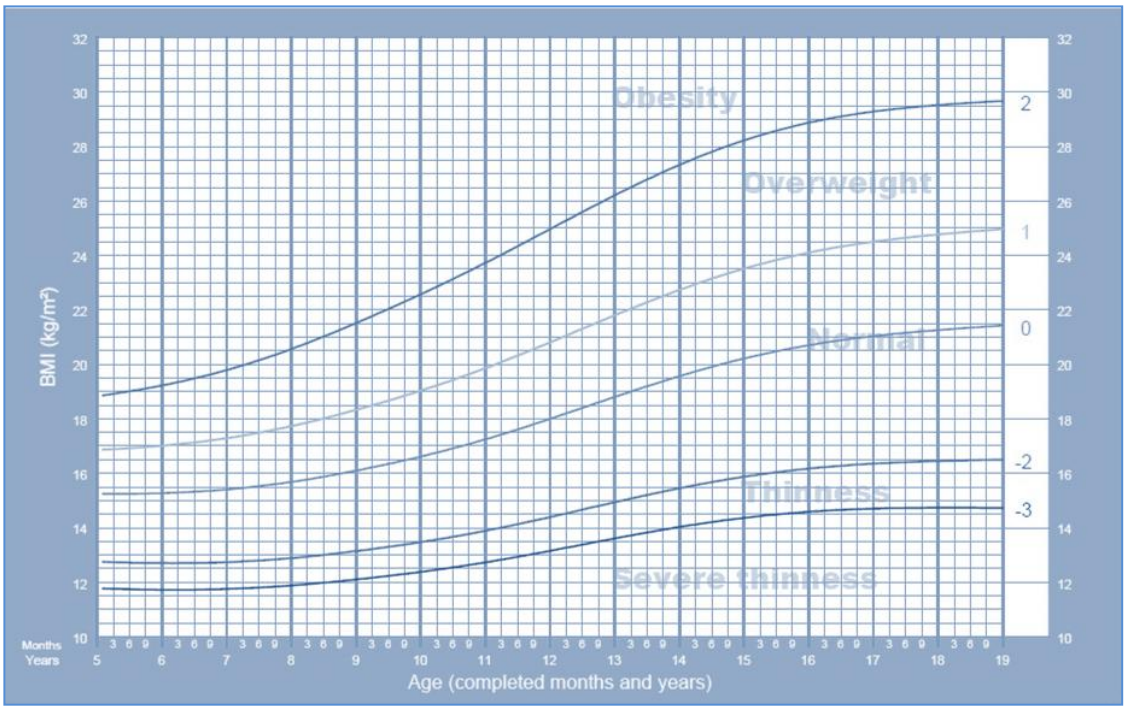


Figure 2.3: BMI-for-age GIRLS: 5-19 years, z-scores (adapted from WHO, 2007)

2.3.5 BMI to Determine Overweight and Obesity

The predicament we face when using BMI is the fact that it does not distinguish between the actual amount of fat and the amount of weight accounted for by lean tissue (Ehrman *et al.*, 2009:211). Various quantities of fat-free body mass and adipose tissue can present elevated BMI figures and therefore cannot be used as a determinant of body composition (Lohman & Going, 2006:319).

Sluyter *et al.* (2011:40-41) concluded that BMI couldn't be used to determine BF% throughout a variety of ethnic groups because all present a different BF% at the same BMI level. These results are due to varieties of skeletal mass, muscle mass and adipose tissue distribution. Moreover, these results can already be observed during adolescence (Sluyter *et al.*, 2011:43). Black South Africans have a higher bone mass than white South Africans do, but currently this is starting to decline due to urbanisation (McVeigh *et al.*, 2004:1010). Those with more petite bodies do not necessarily have lower weights but may also have less muscle mass (Sampei *et al.*, 2003:1119). Mei *et al.* (2002:984), however, sees the value of using BMI as a predictor of over- and underweight between the ages of 2 and 19 years. Contrarily it is known that the chemical components of lean body mass is ever changing during maturation of the body and therefore BMI could well overestimate relative adipose tissue of the body before adulthood (17-20 years of age) (Hills *et al.*, 2001:2).

2.3.6 Body Composition in South Africa

In South Africa we encounter high body fat percentages starting from younger than 10 years (10% overweight) to adulthood (18% overweight) and low muscle tone due to high-energy diets and inactivity. This is a result of rapid urbanisation taking place (Kruger *et al.*, 2005:497). An example of this is the high influx of empty calorie food and drinks into South Africa based on sales of such items that are relatively low in cost and high in calories (Chopra *et al.*, 2002:952–958). There are differences among South African ethnicities pertaining to body composition, for example black children at 9 years of age having a higher bone mass compared to their white South African counterparts although no variations in BMI were seen among the two groups (McVeigh *et al.*, 2004:1010). Another example is differences among the ethnicities pertaining to BMI as well as BF%, muscle and fat distribution; it was found that abdominal obesity was more prevalent among white South African females between ages 18 and 60 years than among black South African females (Rush *et al.*, 2007:1237). However, the differences in BC due to malnutrition (over-, under-nutrition or coexistence thereof) are well documented and often result in double-burden disease which is a high risk to non-communicable diseases (Jinabhai *et al.*, 2003:364; Steyn *et al.*, 2005:12; Kruger *et al.*, 2006:357; Prentice, 2006:98; Rossouw *et al.*, 2012:6).

Naudé *et al.* (2009:686) found differences in body mass, height, arm-, waist- and hip circumference as well as lean body mass when evaluating stunted and non-stunted children. Stunted children 13-18 years old had less lean body tissue and more adipose tissue. In South Africa there is a much higher and currently increasing prevalence of stunting among black children compared to white and mixed ancestry children 8-11 years old, even though stunting has decreased by almost two-thirds (Armstrong *et al.*, 2011:838). Although there is no association linking overweight and stunting (Jinabhai *et al.*, 2003:364; Mukuddem-Petersen & Kruger, 2004:850) older females do seem to have more abdominal adipose tissue (Mukuddem-Petersen & Kruger, 2004:850) and run double the risk of becoming overweight (Steyn *et al.*, 2005:12).

Furthermore, in a study of Mamabolo *et al.* (2007:1054) conducted in a township in the North West Province of South Africa, it was found that stunting is a major problem in children 12 – 18 years of age where body fat is found to be higher and lean body mass lower; fat around the lower body was also found to be more common. Females living in the rural areas of

South Africa are mostly leaner than those in the urban areas and the lower social economic citizens also prove to be leaner (Zeelie *et al.*, 2010:1062).

2.3.7 Body Fat Percentage of Female adolescents

Not all fat is "bad"; fat cells serve various important roles in the body, for instance insulation, and cushioning of the vital organs (Breskin *et al.*, 2008:126). Fat cells are also referred to as "the body's storehouse of energy-giving nutrients" which is there to provide energy to the body when needed (Guyton & Hall, 2006:12). The fats we find in food and in our bodies are used by our bodies in order to form membranes for all the cells in our bodies as well as for certain cell related functionalities (Guyton & Hall, 2006:840). Most importantly fat cells are related to hormonal activities during growth and maturation when puberty takes place and has an influence on programming of the metabolic system which takes account of energy disbursement and insulin resistance (Siervogel *et al.*, 2003:43).

Female adolescents experience an automatic change in body composition during puberty (Stang & Story, 2005:1), with fat percentage showing a rapid increase starting at the growth spurt up to menarche (can be up to 125% which more or less amounts to 11 kilograms and is equal to 99 000 calories) (Frisch *et al.*, 1973:480). When menarche initiates in females their weight starts increasing because of normal growing that takes place. Structural as well as adipose tissue which starts to incline because of higher oestrogen and progesterone levels is the major cause of weight gain (Sampei *et al.*, 2003:1119). All this evidence leads to a higher BF% for females and therefore to a significant change in body composition. Please refer to Table 2.4 to cite differences of male and female body fat percentages that have been described as normal by Heyward and Wagner (2004:6).

In order to estimate BF% for female adolescents the formula of Slaughter *et al.* (1988:709-723) was used. Skinfold measurement is an indirect measurement of body fat percentage; the triceps skinfold gives an indication of limb adipose tissue and the subscapular skinfold of overall body fat. Percentage of body fat charts for children was produced by Heyward & Stolarczyk (1996) to indicate high or low body fat percentage for children (see Figure 2.4).

TRICEPS + SUBSCAPULAR SKINFOLDS

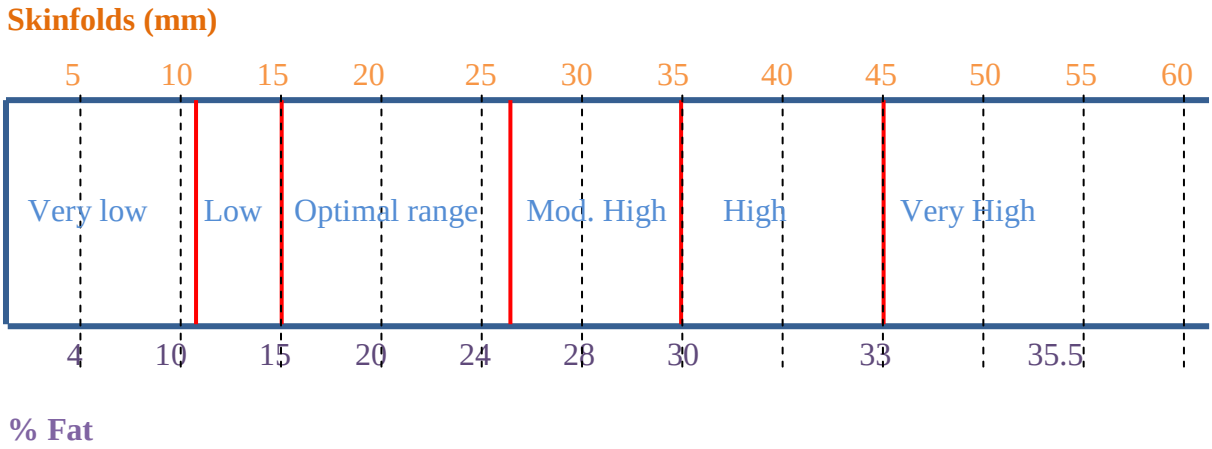


Figure 2.4: Percentage of body fat charts for children (reproduced from Heyward & Stolarczyk, 1996).

Table 2.4: Recommended BF% levels for children and adolescents (Heyward & Wagner, 2004:6)

AGE 6-17YRS	NR*	LOW↓	MID	HIGH↑	OBESITY
MALES	<5	5-10	11-25	26-31	>31
FEMALES	<12	12-15	16-30	31-36	>36

NR* = Not Recommended

2.3.8 Prevalence of Obesity

A recent study that investigated the prevalence of obesity discussed the decline in childhood obesity in the United States and incline of obesity in older populations (Ogden *et al.*, 2014:809). Although this might be true, 40 million children younger than 5 years were classified as obese worldwide in 2011 (WHO, 2008). South Africa for instance is one of the countries with the fastest growing childhood obesity recorded between the years 1990 and 2010 (Rossouw *et al.*, 2012:2). Children of lower socio-economic status have lower prevalence in obesity (Jinabhai *et al.*, 2003:362) but in areas of higher socio-economic status the risk of overweight is a lot higher (Steyn *et al.*, 2005:12). This is mainly caused by urbanisation taking place in South Africa as previously discussed in this chapter. There has

been a significant elevation in overweight and obesity numbers among children and adolescents in South Africa (Armstrong *et al.*, 2011:839). Age, gender and population faction (Rossouw *et al.*, 2012:6) as well as education (Steyn *et al.*, 2005:12), physical activity, earnings and household size (Mukuddem-Petersen & Kruger, 2004:850) seem to be the factors influencing overweight and obesity.

Statistics showed that males and females between ages 12 and 19 are equally affected by obesity and was on a steady incline starting at 17.4% in 2003 and ending at 20.5% in 2012 (Ogden *et al.*, 2014:808). These statistics don't include the overweight population that is also exposed to risk factors. The WHO (2008) reports that 65% of the people in the world reside in nations where overweight and obesity cause more deaths than underweight. In 2002, 10% of South African females between ages 15 and 24 years where obese (Puoane *et al.*, 2002:1045).

The prevalence of obesity is twice as much in females in countries where the average income is lower than in other countries (WHO, 2008). This is clear in South Africa; the prevalence of obesity among females is much higher than among males (Steyn *et al.*, 2005:12; Reddy *et al.*, 2008:206). Females are more prone to overweight and obesity during menarche where the prevalence increases after 14 years of age and is at its highest by 17-18 years of age (Cameron & Getz,1997:779; Reddy *et al.*, 2008:206; Kimani-murage *et al.*, 2010:11).

2.3.8.1 Risks of Overweight/Obesity

Overweight and obesity is associated with a decline in metabolic health resulting in elevated blood pressure, cholesterol and triglyceride fluctuations as well as insulin resistance (WHO, 2008). Overall wellbeing and quality of life may also be compromised by the prevalence of obesity by significantly increasing the risk of contracting the following diseases; diabetes, hypertension, dyslipidaemia, breathlessness, sleep apnoea, gall bladder disease, as well as a less significant risk of contracting coronary heart disease or heart failure, osteoarthritis of the knees, hyperuricemia and gout, complications of pregnancy, cancer, impaired fertility or polycystic ovary syndrome, lower-back pain, increased risk of anaesthesia and fatal defects arising from maternal obesity (Ehrman *et al.*, 2009:218).

Excess fat around the waist area is a high risk factor for the development of cardiovascular and metabolic diseases and is referred to as android obesity. Ganoid obesity occurs when the fat is more evenly spread across the body and is less severe with regard to health risk (WHO,

2000). Abdominal obesity is associated with insulin resistance, dyslipidaemia, increased blood pressure, and endothelial dysfunction (see Figure 2.5).

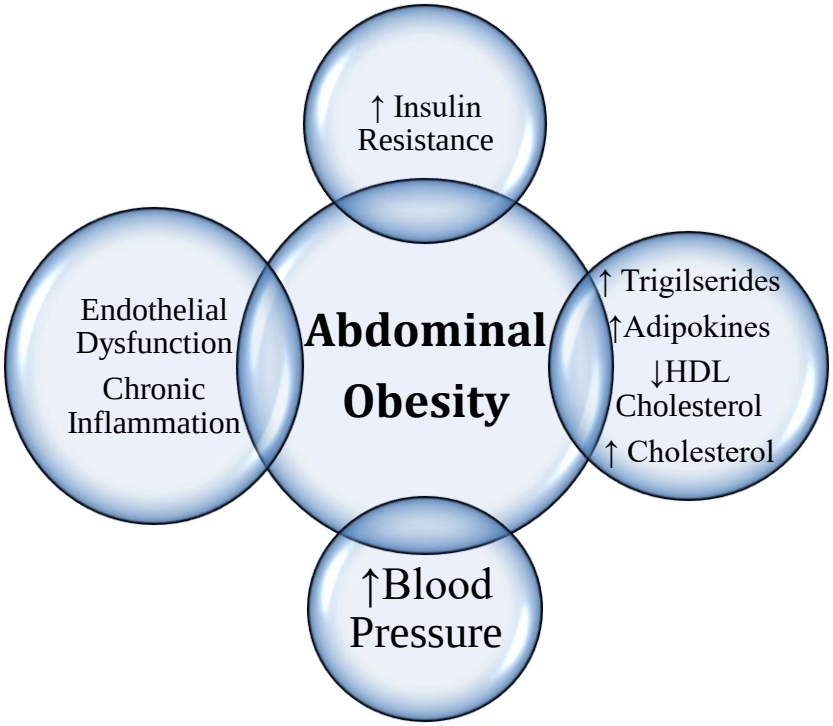


Figure 2.5: Signs and symptoms of Metabolic Syndrome

2.3.9 Association between BMI and Physical Activity

Although BMI and PA seem to be related there is still a lot of contradiction around the subject. For example, the relationship between BMI and PA of 9- to 15-year-old children is not consistent when considering all the different percentiles; the association seems to be stronger the higher the BMI (Mitchell *et al.*, 2013:57). Zhang *et al.* (2012:348) found that the association between the 2 variables are significant for Chinese boys 12/18 years but not for girls. However, when sedentary time increases the relationship is also significant for girls. When looking at older generations above 40 years of age no relationship was found between BMI and PA but this may well be because of the small sample size of the study (Anderson *et al.*, 2005:7).

Even though more studies need to be conducted to determine the relationship between the two variables it is clear that there is a relationship although not consistent, when BMI increases sedentary behaviour time doubles (Zhang *et al.*, 2012:348) and when PA decreases, BMI increases (Yu *et al.*, 2011:352). There is a larger significance found when higher BMI,

as described above, is found and it may be worth looking at body fat percentage instead of BMI.

2.3.10 Association between Body Composition and Physical Fitness

Lohman *et al.* (2008:1168) believes that BC influences PF. Metcalf *et al.* (2011:946) concludes that adiposity is a major cause of physical inactivity and not the other way around. PA did not prove to necessarily change BC in children but rather increased PF and was a primary factor of obesity prevention (Thivel *et al.*, 2011:1442). Increased PA has been shown to improve longevity in spite of favourable BC changes (Lee *et al.*, 1999:379).

A study conducted in the North West Province of South Africa found that PA/PF and body composition resembles a strong negative association, especially among females, where large percentages of females were found to be overweight (Monyeki *et al.*, 2005:882, 2012:6). Overweight coupled with malnutrition is a common phenomenon in developing countries such as South Africa and is associated with increased body fat deposits during adolescence; therefore it is strongly suggested that special care be focused on pre-female adolescents to lower this occurrence (Kruger *et al.*, 2006:357).

BI is significantly affected by body fat percentage which strongly influences physical activity levels during the onset of puberty (Davison *et al.*, 2007:2401). It is therefore suggested that appropriate interventions be designed, which may provide a balanced approach to assist undernourished children and adolescents to obtain muscle mass and overweight persons to lose fat mass (Monyeki *et al.*, 2012:6) with the focus on ensuring the development of or sustainability of a healthy BI during adolescence.

Along with PF being a health marker for adolescents as well as an indication of future cardiovascular health, body mass index (BMI) is also used to evaluate disease risk within the normal population (Ruiz *et al.*, 2011:521-523).

2.4 Physical Fitness

Physical activity (PA) includes all forms of bodily movement that increases heart rate and activates large muscle groups. Regular physical activity at the appropriate intensity, duration and frequency results in an increase of physical fitness, as determined by means of relative maximum oxygen consumption during exercise ($\dot{V}O_{2\max}$). Female adolescents who are physically active enjoy the benefit of becoming physically fit, which increases functionality,

as well as provides an increase in mental health, particularly pertaining to BI (Sabo *et al.*, 2004:25; Hausenblas & Fallon, 2006:40; Prichard & Tiggemann, 2008:864; Butt *et al.*, 2011:1081; Haugen *et al.*, 2011:54; Kelly *et al.*, 2011:35). On the contrary, it was speculated that no relationship exists between physical activity (PA), physical fitness (PF) and BI. This lack of association might be explained by the low intensity PA performed (Goldfield *et al.*, 2011:161).

Female adolescents reported preferring participation of PA in a gym rather than being part of other sporting activities (Slater & Tiggemann, 2011:461). Research that focus on the influence of different exercise settings, however, reported a negative relationship between PA and BI when compared with being active away from the gym environment (Prichard & Tiggemann, 2008:864). Activities such as cardiovascular exercise in a gym (Prichard & Tiggemann, 2008:864), teasing (Slater & Tiggemann, 2011:461) and aesthetic PA (Slater & Tiggemann, 2011:462) all correlate negatively with BI. Unfortunately marketing for health clubs often revert to promoting weight-loss in their marketing campaigns accompanied by the display of *ideal* body shapes. Therefore, the results indicate that a healthy body image is once again challenged within a gym environment (Prichard & Tiggemann, 2008:864).

Different types of physical activities such as vigorous PA (Goldfield *et al.*, 2011:160; Kelly *et al.*, 2011:35), Yoga (Prichard & Tiggemann, 2008:864), resistance exercise (Depcik & Williams, 2004:297) as well as organised sport participation (Sabo *et al.*, 2004:25) have all displayed a positive effect on BI. Physical fitness may only be an influential factor pertaining to body image because it alters body composition, which in turn alters body shape, to a more socially acceptable state (Thompson *et al.*, 1999; Lubans & Cliff, 2011:219). Duncan *et al.* (2004:256) reported less PA in participants of lower social economic status and among female adolescents. Although males expend more energy when they exercise due to higher training volumes and absolute muscle mass (Butt *et al.*, 2011:1080), physically active female adolescents show a more cohesive bond relating to positive changes in BI compared to males (Haugen *et al.*, 2011:54).

PA participation regresses at the start of and during female adolescence (Kimm *et al.*, 2002:711; Sabo *et al.*, 2004:25; Hills *et al.*, 2007:538) and was found to be twice as high among black female adolescents, a major factor in black adolescents being due to pregnancy and smoking in white adolescents (Kimm *et al.*, 2002:711). PA levels are reported to reduce by up to 4% each year during early adolescence (Pate *et al.*, 2009:280). This could be

because of a change in priorities during adolescence (Hills *et al.*, 2007:538). A lifestyle with no physical activity could be a prognosticator for BI dissatisfaction (Webb *et al.*, 2012:4).

An increase in urbanisation also contributes to regression in PA participation because of changed environmental factors which include; violent behaviour, danger on roads due to traffic, poor quality of air, smoking, no/too little parks, sidewalks and facilities where recreational sport can take place (WHO, 2008). Urbanisation is swiftly inclining in South Africa (SAinfo reporter, 2013); therefore precautionary action may be helpful in order to prevent increases in sedentary lifestyles, alarming obesity rates and body image dissatisfaction among the youth of South Africa.

Campaigns to promote PA, which may lead to a healthy BI is suggested in order to educate adolescents about the benefits of physical fitness regarding a healthy BI rather than using PA to lose weight which seems to be the current trend (Teixeira *et al.*, 2006:187). It is also believed that properly equipped schools, which provide a venue where adolescents are able to participate in PA could have a positive effect on PF, since it could well be the single place where adolescents are exposed to PA (Dagkas & Stathi, 2007:381). Physical activity can be used as a tool to convey interaction between peers and friends at schools, which may provide a shield of protection against outside pressures which they face daily (Littleton & Ollendick, 2003:57-58).

If adolescents are given a variety of PA to choose from in order to elect an activity they enjoy rather than seeing it as a burden may be helpful to get more females to be active (Dunton *et al.*, 2007:939; Gibbons & Humbert, 2008:180; Thul & LaVoi, 2011:231). These PA settings, be it in schools or the community, are advised to steer clear of any type of judgment of outward looks but rather endorse self-reflection and the way you feel inside your body (Lubans & Cliff, 2011:218).

Frisén and Holmqvist (2010:210) found that exercise alone might not be enough to attain a healthy BI; adolescents may be encouraged to comprehend that the motivation behind PA is to elicit mental health and to enjoy a healthy, functional body rather than concentrating on improvement of looks and weight loss. Parents also play a significant role in their children's lives, especially through supporting physically active lifestyles and leading by example (Edwardson & Gorely, 2010:532 & 533). It is highly recommended to motivate adolescents

to possess an inherent stimulus as the superlative cogent to be physically active (Power *et al.*, 2011:597).

2.4.1 Elite Levels of Sport Participation

Recent research focusing on body image and female elite sports participation states how eating disorders are present in elite female athletes and are associated with but fails to address a poor BI being directly associated with elite sports participation (Torstveit & Sundgot-Borgen, 2005:184–193; Sundgot-Borgen & Torstveit, 2010:112–121; Sundgot-Borgen & Garthe, 2011:S101–S114; Francisco *et al.*, 2013:1082–1091). Most of the high risk sports are assessed by a panel of judges, for example: dancing, figure skating, gymnastics swimming diving and horse riding (Ehrman *et al.*, 2009:151) and require an extra lean body shape, emphasising a low body fat percentage.

Sports that require females to wear tight fitting costumes often produces a poorer BI for instance volleyball, where players are known to have larger quadriceps, hamstrings and gluteus muscle groups, which is contradictory to the thin *ideal* and then on top of that wear revealing costumes (Thomsen *et al.*, 2004:277). Elite female athletes are also often isolated and objectified by the media, so even though it might enhance performance to have larger thighs, the sociocultural aspect still requires thinness (Varnes *et al.*, 2013:421–432). Certain sports (combat sports and modern dancing) do, however, leave room for healthier BI although their body shape is not associated with the "thin ideal" (Costarelli & Stamou, 2009:109; Langdon & Petracca, 2010:362).

It is important to differentiate between daily BI and BI during sport participation as it was found that athletes may pose to have a daily healthy BI but this transforms to BI dissatisfaction when participating in their sport (De Bruin *et al.*, 2011:211). Parents and coaches are advised to be aware of how they address body shape issues when talking to adolescent athletes because they are a major influence and may cause BI dissatisfaction (Langdon & Petracca, 2010:362; Francisco *et al.*, 2013:1089). Athletes (gymnasts) that are physically fit are a lot more satisfied with their bodies than non-athletes or elite athletes (de Bruin *et al.*, 2007:517); therefore exercise to improve fitness may be a great way of achieving a healthy BI.

2.4.2 Measurement of Physical Fitness ($\dot{V}O_{2max}$)

The maximum oxygen uptake capacity of the body which is equal to the maximum cardiac productivity (ℓ blood/min^{-1}) plus (oxygen in the arteries minus oxygen in the veins, mℓ O_2/ℓ blood) is referred to as $\dot{V}O_{2max}$; this is associated with the efficiency of the heart (American College of Sports Medicine, 2010:72). It can be measured directly or indirectly; the gold standard measurement is the direct measurement of oxygen uptake during maximal heart rate, this can be done through use of a gas analyser (Ruiz *et al.*, 2008:234 & 236, 2011:521).

A variety of variables influence $\dot{V}O_{2max}$ such as culture, ethnicity, age, gender and female hormones (Mota *et al.*, 2002:710; Matsuzaka, 2004:121; Harms, 2006:129; Hui & Chan, 2006:47; Ruiz *et al.*, 2008:242; Rowland, 2009:1–9; Chillón *et al.*, 2011:421; Ortega *et al.*, 2011:577). Chillón *et al.* (2011:421) also found that adolescents living in the rural parts of Spain had a higher $\dot{V}O_{2max}$than those living in the urban parts. Ethnicity could be another variable that needs to be considered; the Japanese for example were found to have overall shorter legs which negatively influences the ability to run as efficiently as taller people (Matsuzaka *et al.*, 2004:121).

Gender exerts one of the major influences on $\dot{V}O_{2max}$ due to differences in weight – more weight requires more energy to move (Ortega *et al.*, 2011:577) and body composition (females typically have more adipose tissue and males more muscle mass, as previously discussed) – muscle mass is strongly associated with improved performance and during puberty the gender differences are major (Mota *et al.*, 2002:710-711; Ruiz *et al.*, 2008:242). Female hormones for reproduction as well as lung capacity could further negatively influence performance (Harms, 2006:129) and therefore $\dot{V}O_{2max}$ results. Hence the average male has a higher $\dot{V}O_{2max}$ value the average female (Hui & Chan, 2006:47). Another factor that influence $\dot{V}O_{2max}$ is stage of maturation and therefore biological age (Ruiz *et al.*, 2008:242). According to Harms' findings (Rowland, 2009:1–9), the oxidative enzymatic capacity of children is lower because of the size of their muscles than that of adults and therefore may not be able to attain such a high $\dot{V}O_{2max}$ as can adults. Due to these differences in $\dot{V}O_{2max}$ capacities among different ages and genders, cut-off points were established to accommodate for these general differences (ACSM, 2010:84).

2.4.3 $\dot{V}O_{2max}$ Cut-off Points

Cut off points for $\dot{V}O_{2max}$ (mℓ/kg^{-1}/min^{-1}) were established by categorising values particularly according to age and gender which provides an indication of the physical activity factor of a person's daily lifestyle and in turn could indicate the risk toward cardiovascular disease (ACSM, 2010:84). Mota *et al.* (2002:7011) suggested that a $\dot{V}O_{2max}$ value between 42mℓ/kg^{-1}/min^{-1} and 38 m ℓ /kg^{-1}/min^{-1} is acceptable $\dot{V}O_{2max}$ for male and female adolescents respectively. After the age of 14 years the $\dot{V}O_{2max}$ value of females decline to 32 mℓ/kg^{-1}/min^{-1}.

2.4.4 Why Measure $\dot{V}O_{2max}$ as Physical Fitness Status?

Ortega *et al.* (2008:7-8) suggests that physical fitness (PF), measured as a $\dot{V}O_{2max}$ value should be used as an indicator of wellness due to numerous positive effects associated with aerobic fitness such as lowering risks to cardiovascular disease, enhanced skeletal health, mental wellbeing as well as enhanced scholastic performance. There is a significantly strong negative correlation between aerobic fitness ($\dot{V}O_{2max}$ value) and obesity in adolescents, whereas PA and BMI hardly show any correlations (Aires *et al.*, 2010:58). Furthermore, the relationship between PF and PA is weak during adolescence (Kristensen *et al.*, 2010:272); therefore vigorous training might be more beneficial in order to significantly increase PF and total wellness (Ortega *et al.*, 2008:8).

A study conducted in Europe reported a definite increase in PF during the period of 12-18 years among adolescents. However, despite this increase an average of only 60% of males and females could be classified as aerobically fit after completing the 20 m shuttle run (Ortega *et al.*, 2011:22). In a similar age group in the United States, 33% of participants were categorised as having low PF (below the 20th percentile according to the NHANES fitness assessment manual) (Carnethon *et al.*, 2005:2984). Limited research was found in South Africa that measured the PF of an adolescent population; the Physical Activity and Health Longitudinal Study (PAHL-Study) done in the North West Province on a group of black and white adolescents found higher PF test-scores amongst underweight females and males, in both ethnic groups, with a significant difference among females (Monyeki *et al.*, 2012:4).

2.6 Summary

There exists a gap in the literature concerning current BI and PF. Merely talking about self-reported PA is not enough reason being that it does not necessarily determine PF, which has been shown to be strongly associated with current BI compared to self-reported PA. A healthy BI for female adolescents is frequently a result of optimal PF, which further is associated with enhanced mental health, optimal scholastic performance, functional health of the body and improved body composition. When adolescents are physically active in such a way that PF and functional health improves, they experience an improvement in self-confidence and BI. Physically fit adolescents demonstrate a lowered risk for the development of depression and are more likely to reach their full potential.

The global pandemic we face is a rapidly growing, sedentary youth associated with the onset of overweight and obesity at a young age, which is accompanied by detrimental health outcomes and BI dissatisfaction. Body image dissatisfaction often leads to living an enhanced sedentary lifestyle due to feelings of discomfort when participating in sports or going to a gym. This cycle continues to spiral downwardly and becomes a great health risk as body composition changes to a higher BF%. Sedentary behaviour has been identified as a major risk factor in non-communicable diseases such as chronic respiratory disease, cardiovascular diseases, diabetes and cancer.

The “thin ideal” is widely encouraged due to socio-cultural influences and beliefs. These beliefs are strongly rooted within cultures and encouraged by media, parents and peers. Although the “thin ideal” is mostly globally accepted, especially among white populations, South Africa has experienced a complex situation where various black cultures seem to believe that a larger body shape where BF% is high is a sign of health and wealth. This is especially noticed in areas where urbanisation has not yet taken its toll. Be it the “thin ideal” that often results in adolescents demonstrating BI dissatisfaction or the belief that “bigger is better”, both these perceptions are harmful to health. Negative feelings toward one’s body shape, due to not fitting into societal ideals, may spark emotions that cause the pain of rejection. Risk behaviour such as risky sexual behaviours, self-mutilation and eating disorders may originate from such feelings in order to possibly feel accepted again.

According to Holmqvist and Frisén (2012:393) individuals are advised to be taught that it is of greater importance to have a virtuous personality than to be of supreme beauty outwardly in the eyes of the world. People who think in a positive manner about themselves; improve their self-esteem (Dalley & Vidal, 2013:467) and guard their minds from internalising negativity that comes their way about their bodies (Frisén & Holmqvist, 2010:210). Therefore it is vital to establish awareness among people about their habitual thoughts and teach them to capture negative thoughts and allow alternative thinking (Verplanken & Velsvik, 2008:139).

Various studies have been conducted in which PA, PF, BC and BI were investigated. These studies mostly rely on recall of physical activity and measurements of BMI. Future studies may aim at including measurements such as PF (which provides us with an objective understanding of the functional ability of the body) and BF% (which more accurately states a healthy or unhealthy BC). No studies were found that state the validity and reliability for the use of Stunkard's Figure Rating scale to determine BI in South Africa; therefore should also be investigated. These measurements may assist with the development of guidelines for physical fitness programs or interventions in order to positively influence BI. Educating female adolescents to be more physically active and therefore becoming physically fit will assist in having a healthy BC and BI since these factors are closely intertwined. It might also be helpful for female adolescents' BI if they could be made aware of the changes that are due to happen in their bodies during puberty and to abstain from measuring their self-worth against the unrealistic "thin ideal" widely portrayed by the media.

CHAPTER 3

METHODS

3.1 Introduction

Body image is an important aspect of the psychology of female adolescents who feel compelled to fit into a certain profile to achieve social acceptance (Jones & Crawford, 2006:265; Murnen & Don, 2012:128). Numerous studies concluded that health imperilling risks such as obesity, anorexia nervosa, depression, social anxiety and chronic diseases often develop in females with body image dissatisfaction (Cash *et al.*, 2004:1087; Jones 2004:831; Bauer & Kirchengast, 2006:326; Barret & Huffmann 2011:271). The objectives of this study were firstly, to determine the difference in physical fitness, body composition (body mass index and body fat percentage) and current body image between black and white female adolescents; secondly, to determine the difference in body image dissatisfaction between black and white female adolescents; and thirdly, to determine the relationship between physical fitness, body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

Female adolescents experience a natural change in their body composition during puberty (Stang & Story, 2005:1). Body fat percentage increases rapidly from the growth spurt up to menarche (Frisch *et al.*, 1973:481;Talwar *et al.*, 2012:77;). Females who experience these rapid changes in body composition often perceive themselves as becoming overweight which could easily lead to BI dissatisfaction (Tiggemann, 2005:133;Vilhjalmsson *et al.*, 2011:376).

Research indicates that during adolescence sedentary behaviour predisposes adolescents to develop BI dissatisfaction (Webb *et al.*, 2012:4; Nihill *et al.*, 2013:5). This behaviour is often due to increased screen time (Must *et al.*, 2007:1780; Nihill *et al.*, 2013:5), increased study time (Zhang *et al.*, 2012:348), transportation (Larouche *et al.*, 2014:223), and feelings of uneasiness in response to body changes (Davison *et al.*, 2007:2401). Female adolescents who are physically active enjoy numerous and multi-level benefits, such as increasing physical fitness ($\dot{V}O_{2max}$), which increases functionality and improves mental health in particular BI (Sabo *et al.*, 2004:25; Hausenblas & Fallon, 2006:40; Prichard & Tiggemann, 2008:864; Butt *et al.*, 2011:1081; Haugen *et al.*, 2011:54; Kelly *et al.*, 2011:35).

In order to address the objectives stated in this study, a simple to administer and time effective questionnaire was used to determine the current and *ideal* BI of each individual (Stunkard *et al.*, 1994; Kronenfeld *et al.*, 2010:132). Body composition (BMI and BF%) was determined using accurate measurements of height and weight as well as skinfold measurement, an accurate and low-cost method for determining body composition in large groups. Physical fitness tests were conducted to accurately and objectively estimate $\dot{V}O_{2max}$ values. The test protocols and all formulas used were age, gender and ethnic specific for each of the study groups.

3.2 Empirical Investigation

3.2.1 Research Design

A cross sectional study design was performed on the data collected during the **P**hysical **A**ctivity and **H**ealth **L**ongitudinal **S**tudy (**PAHLS**). The PAHL study tracked adolescents' growth, maturation and physical activity patterns using periodic standardised data collection in selected urban and rural areas of the Kenneth-Kaunda district. Data was collected from six high schools within the Tlokwe Local Municipality over a period of five years. An equal number of schools both from towns and the township were asked to participate in the study, consisting of eight high schools in total. Of the selected eight schools, six schools consented to participation in the study from both high and low socio-economic conditions (Monyeki *et al.*, 2012:3). Two of the schools from town reverted from participation in the study. The study's baseline measurements were obtained in 2010 with follow-up measurement waves annually until 2014. For the purpose of this study, data collected in 2013 were used.

3.2.2 Participants

A total of 256 learners attending six different high schools within the Tlokwe Local Municipality were recruited to participate in an observational longitudinal the PAHL-study. The following inclusion criteria were set:

- Parents who consent
- Between 15-18 years of age
- Healthy with the absence of a temperature above 37 degrees Celsius
- Starting grade 10 in one of the selected high schools
- Female gender

Participants were excluded from the study if they met any of the following criteria:

- Presented with any diagnosed condition
- Did not fit the age criteria
- Absence of orthopaedic limitation that will prevent performance of the fitness test

In 2010 there were 156 females at baseline of which 119 females participated in the 2013 data collection. Only 116 females completed all three variable measurements specifically for the objectives of this study (anthropometric measurements, current and *ideal* body image and physical fitness test). Not all participants were able to attend the days on which the assessments took place and therefore were excluded from the study. Ninety-eight of the participants were black and 18 were white female adolescents. Demographical information was acquired from the participants by means of a questionnaire that collected information on gender, race, locality (i.e. town or township) and age.

3.2.3 Ethical Issues

The District Manager of the Department of Education approved the PHAL-study. Ethical approval was obtained from the Ethics Committee of the Potchefstroom Campus of the North-West University **(*Ethics no.:* NWU–0058-01–A1).** Subsequently, participants for the study were recruited from the class lists of the schools that were randomly selected for participation in the project. A letter of informed consent was sent to the parents and the scope of the project explained to the parents during a parents meeting at the various schools. It was required of each parent/guardian to sign a written consent form for scholars to be included in the study. The pupils were also requested to give consent for participation in the study. The participants hereby agreed to provide accurate information, participate voluntarily, and gave consent to the researchers to use the data collected for scientific purposes.

Privacy was assured during the completion of the questionnaires by placing the pupils in a private room where they sat at a table, with a seat open in between each participant. Each participant was given a plastic sleeve with her name and participant number on which contained the questionnaire. Each questionnaire only had the participant number on to ensure anonymity after completion of the questionnaire on BI. All questionnaires were placed in a central holder after completion.

During the body composition test, females went to a private room to have their anthropometric measurements measured by female researchers. Their privacy was assured by allowing one person, who is being tested, at a time into the cubicle where the measurements were done, along with a female researcher and a female scribe. Throughout the Bleep Test the Polar Heart Rate Transmitter Belts were sterilised after every test done to ensure optimal hygiene. Each participant was clearly informed that they might opt out of the test at any time they wish to do so.

In keeping the questionnaires anonyms, the likelihood of any psychological harm, for instance embarrassment, was reduced. This also compelled participants to be honest when answering the questions.

The risks of doing these tests are little to none. The only real risks are during the Bleep Test where musculoskeletal injuries may happen and cardiac risks may be exposed during prolonged vigorous exercise. The Bleep Test has a built-in warm up (it starts with a slow jog) but further caution can be taken by stretching beforehand and filling out a risk evaluation form. The benefit of knowing the results to the physical fitness, body composition and body image tests is that participants will have a broader understanding of their current state of physical and mental health. This will hopefully motivate them to improve in the areas where needed.

3.2.4 Materials and Methods

3.2.4.1 Figure Rating Scale of Stunkard, Sørensen and Schulsinger's (1994)

Perceived current body shape was determined using the Figure Rating Scale of Stunkard *et al.* (1994). In this study we refer to "perceived current body shape" as the individual's "current body image". In this figure-rating scale there are nine silhouettes; each figure representing a different body weight (Stunkard *et al.*, 1994). Images one and two represent an underweight female; images three and four represent a female of normal weight; image five resembles a slightly overweight female; images six and seven resemble a moderately overweight female; images eight and nine represent an obese female. Participants were first asked to complete section A, where they had to rate how they perceive their body shape by marking 1 of the 9 silhouette figures (see Figure 3.1).

SECTION A / AFDELING A

Mark (x) the figure that mostly represents yourself at this moment in your life.

Merk (x) die figuur wat die meeste soos jy lyk in hierdie stadium van jou lewe.

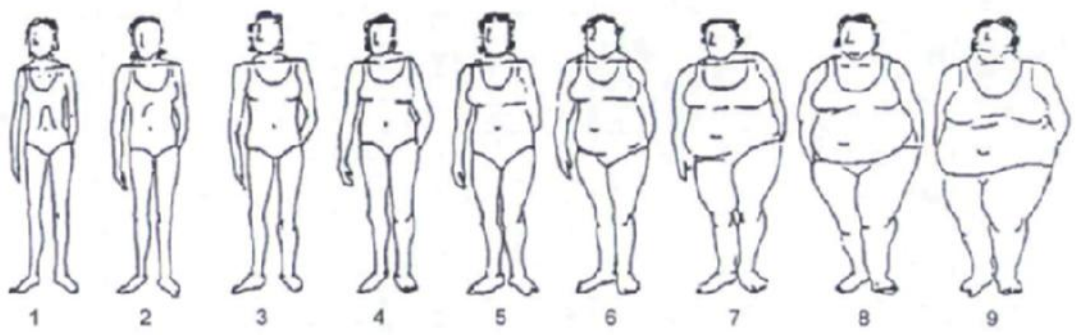


Figure 3.1: Figure rating scale (Stunkard *et al.*, 1994).

The questionnaire entailing the silhouette scale was specifically adapted for this study by adding a section B in which participants were additionally asked to mark the silhouette indicating their *ideal* body shape (see Figure 3.2). In accordance to the previous question we then call the second choice or silhouette "*ideal* body image". The purpose was to determine whether a discrepancy exists between the current body image and the *ideal* body image. Participants were advised that they might choose the same figure in section A and B if they perceive their current and *ideal* body image to be similar.

SECTION B / AFDELING B

Mark (x) the figure you would like to look like. (If it's the same figure – you can mark the same one again)

Merk (x) die figuur soos jy graag wil lyk. (Indien dit dieselfde figuur is – kan jy dit weer 'n keer merk)

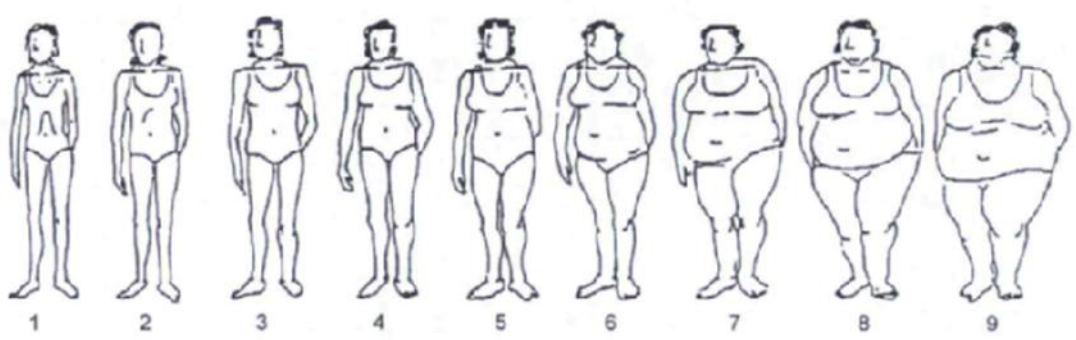


Figure 3.2: Figure rating scale adapted from Stunkard *et al.* (1994).

The participants were seated in a room where the questionnaire was explained to them in English and Setswana. Participants were seated in such a way that they couldn't read each other's questionnaire sheets. If at any time they were uncertain about what was expected of them in order to complete the questionnaire, an individual explanation was given to the participants in the language they best understood: English, Afrikaans or Setswana. No time limit was set for completion of the questionnaire. The participants were requested to place the questionnaires in a central holder in order to ensure anonymity. Making use of participant numbers ensured anonymity.

The body image selected by each participant was recorded for sections A and B separately. In order to determine the average body image for the different race groups the frequency of the various silhouettes were calculated.

The difference between section A and section B was determined by making use of a dependant *t*-test during which the two, in section A and section B respectively, were subtracted and compared with each other. Differences between section A and B's data indicated dissatisfaction between *ideal* and current body image. Only current body image was used in the analyses to determine the relationship between fitness, current BI and body fat percentage.

3.2.4.2 Body Composition

The body composition of the participants was measured according to ISAK (International Society for the Advancement of Kinanthropometry) Full Profile criteria. The ISAK Full profile consists of forty-two measurements, the basic measurements include: body mass, body stature, sitting height and arm span. Eight skinfolds, thirteen girths, eight segment lengths and nine skeletal breadths were measured (Steward *et al.*, 2011:19). Please refer to Appendix C for the ISAK Full Proforma data sheet.

To follow proper procedure each participant was land marked for each skinfold measurement to be taken on the correct sites. Thereafter all the participants moved to the location where a Level Two ISAK certified anthropometrist took all the measurements twice according to the ISAK Full Proforma data sheet (see Appendix C). If the second measurement showed a difference of 10% from the first measurement, a third was taken, the mean of all three measurements were then used for the formula which can be seen in section 3.2.4.4. For the purpose of this study only mass, height, tricep and subscapular skinfolds were used to determine the BMI and BF% levels.

3.2.4.3 Body Mass Index (BMI)

Stature (Height) - a stadiometer with a range between 60 cm and 220 cm and an accuracy of 0.1 cm was used (Steward *et al.*, 2011:8). The heels (bare feet), buttocks and upper back had to touch the scale. The head had to be in the Frankfort Plane and the feet had to be together. The subject was instructed to breathe in and hold while the measurement was taken. The headboard must be pressed down onto the head in such a way that the hair was compressed.
Body Mass (weight) - a weighing scale (Krupps®) that weighs subjects weighing up to 150 kg was used to weigh the body mass of each participant to the nearest 0.05-kilogram. The participants were requested to wear minimal clothing and be bare foot.

Body Mass Index (BMI) = mass (kg) ÷ (height (m))^2.....[Equation 1]

BMI will only be used as descriptive data seeing that it is not a very accurate marker for body composition when race and BF% is taken into consideration (Hills *et al.*, 2007:39). Mei *et al.* (2002:984), however, sees the value of using BMI as a predictor of over- and underweight between ages 2 and 19 years.

3.2.4.4 Body Fat Percentage

For the purpose of this study the two skinfold (triceps and subscapular) equation of Slaughter *et al.* (1988) for female adolescents was used to determine the body fat percentage. The **triceps** skinfold was taken parallel to the long axis of the posterior surface of the arm, perpendicular to the mid acromiale-radiale landmark (Steward *et al*., 2011:61). The **subscapular** skinfold was taken two centimetres obliquely downwards with the natural fold lines of the skin from the Subscapular landmark at the most inferior tip of the scapula (Steward *et al*., 2011:62).

Body fat percentage PFDWB (body density, water and bone mineral) = 1.33 (triceps + subscapular) - .013 (triceps + subscapular)² - 2.5 .....[Equation 2]
If the sum of the tricep- and subscapular skinfold is larger than **35 mm**, the following equation should be used:
PFDWB = .546 (triceps + subscapular) + 9.7.....[Equation 3]

3.2.4.5 Aerobic fitness ($\dot{V}O_{2max}$)

The "Bleep Test" of the Australian Sports Commission (1998) procedures was used to measure aerobic fitness using a progressive multi-shuttle run test (Australian Sports Commission, 1998). The test consists of a 20-meter, multi-stage shuttle run. Each participant had a Polar Heart Rate Transmitter Belt (Polar Electro, Kempele, Finland) strapped to his/her chest that made use of a Polar Team² Pro Electro system (Kempele, Finland), which was also connected to a laptop to store the data. Participants continuously ran between two turning points, in a synchronised manner. The turning points were clearly marked 20 meters apart on a level plain of grass. Intervals were set out by pre-recorded beeps on a compact disk (20-m Shuttle Run Test CD, Australian Sports Commission, 1998). The time between the beeps decreased forcing the participants to increase their running speed. Each participant was clearly instructed that their one foot must touch the marked line at the turning point when or before the beep sounds in order to complete the level. Marshals monitored the lines to ensure that no participant missed a beep. All the participants ran without shoes. When the participant was unable to complete a shuttle at the sound of the beep, the test was terminated and the most recent level that was completed was recorded as the final score.

The participants were motivated verbally to ensure utmost performance. There are 21 'levels' in the Bleep Test; the duration of each level is 62 seconds and increases by 0.5 km/h. The starting speed was 8.5 km/h and the next level was indicated by three fast beeps. The equipment needed for the Bleep Test was a tape measure, CD player, Bleep test CD and markers. An approximate $\dot{V}O_{2max}$ (ml/kg/min) value was calculated by making use of the instructions in the booklet made available with the 20-m SRT CD. The results of the Bleep Test are therefore an indirect calculation of the participant's relative $\dot{V}O_{2max}$.

3.3 Procedure

After obtaining informed consent, the demographic information was collected from all the participants. Upon arrival at the North-West University by arranged transport, the participants were all led to a private room where they could quietly sit and complete the whole questionnaire of the PAHL-study. The body image silhouette scale questionnaire was handed out to the participants and the instructions of the questionnaire were clearly communicated to the group. After completion of the questionnaire, participants were taken to a private area where the body composition measurements were accurately measured using the ISAK Full Profile and measured by Level 2 anthropometrists. Same-gender researchers separately measured females and males. Once all the measurements were completed, the participants performed the Bleep Test. Each participant received a score for the level completed, which was used to estimate the indirect $\dot{V}O_{2max}$ value of each individual. The participants received lunch and were transported back to their school.

3.4 Statistical Analyses

Statistical analyses were done using SAS PROC SURVEYREG (SAS Institute, Cary, NC). Descriptive analyses were performed to determine the baseline characteristics of the participants. Data was eyeballed by means of Q-Q plots and straight-line relationships, which indicated that the data showed a normal distribution for both groups. There was also homogeneity of variance as assessed by Levine's Test for Equality of Variances. In this regard mean values, standard deviations, median values and interquartile ranges were reported for all variables.

The first objective of this study was determined through independent *t*-tests reporting the mean values and 95% confidence intervals (CI) to indicate the differences in physical fitness,

body composition variables and current body image between white and black groups. In addition Cohen's effect sizes (ES) were calculated to determine the practical significance in the above-mentioned variables between black and white female adolescents. According to Rosenthal *et al.* (2000:5) one might overlook a difference between groups due to small sample sizes and therefore Cohen's effect sizes were calculated. Rosenthal *et al.* (2000:5) further states "*it is incorrect to say that it is not significant and therefore should be investigated with a larger sample size"*.

Effect size = Population SD's σ_1 and σ_2 not necessarily equal.

Take $s_{\max}$ = maximum of s_1 and s_2, the sample SD's.

$$d = \frac{|\bar{x}_1 - \bar{x}_2|}{s_{\max}} \quad \text{.....[Equation 4]}$$

Furthermore for the second objective, a dependent *t*-test was performed to determine if a difference exists in body dissatisfaction (*ideal* BI – current BI) within black and white groups. The third objective was determined by computing the correlation co-efficient for BC (BF% and BMI), BI dissatisfaction and PF in black and white female adolescents. The non-parametric Spearman rho correlations were used with significance level set at ($p \leq 0.05$).

The results obtained are presented in chapter 4.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

Female adolescents of South Africa are considered to be a population at high risk with regard to body image dissatisfaction, body composition (Mchiza *et al.*, 2015:8) and physical fitness (WHO, 2015). This is largely due to influences of the western culture, industrialisation and media infiltrating the homes of female adolescents. The media often portrays controlling images of what a female's body should look like (Cash, 2011:248). Additional to the false *ideal* of what the female body should look like, as fed to the public by the media, internalisation of the process is further fuelled by parents (Cooley *et al.*, 2008:60), peers (Hutchinson & Rapee, 2007:1573), age/adolescence (Bucchianeri *et al.*, 2013:5), pubertal timing (Guzman & Nishina, 2014:70) and cultural beliefs (Burke *et al.*, 2012:365).

Body image differences are often reported among different ethnicities due to cultural beliefs, for instance; black South Africans are reported to believe that "bigger is better" and that a larger body shape represents health and wealth (Mciza *et al.*, 2005:515; Venter *et al.*, 2009:20; Puoane *et al.*, 2010:33; Swami *et al.*, 2010:319; Matoti-Mvalo & Puoane, 2011:44; McHiza *et al.*, 2011:6; Ogana & Ojong, 2013:117); whereas white South Africans believe that a slender body represents a person of power and success (Brixval *et al.*, 2012:129). The process of urbanisation, which continues to swiftly infiltrate South Africa, contributes to the body disturbances observed, since black ethnic groups are more exposed to the westernised "thin ideal", this influence may result in conflict with cultural beliefs (Puoane *et al.*, 2005:14, 2013:92; Viviani *et al.*, 2013:95).

Moreover, urbanisation and industrialisation are commonly associated with changing nutritional patterns (Kruger *et al.*, 2007:497). These changes lead to communities experiencing a nutritional transformation with both over-nutrition and under-nutrition present (Rossouw *et al.*, 2012:7). The change in nutrition inevitably leads to changes in body composition (Armstrong *et al.*, 2011:835), which causes the individuals to move further away from the *ideal* body shape that is presented by the media. A double-burden becomes apparent due to an unhealthy body composition caused by malnutrition (over-, under-nutrition or coexistence thereof), which may additionally lead to non-communicable diseases (NCDs) in

South Africa (common in low to middle income countries) (Jinabhai *et al.*, 2003:364; Steyn *et al.*, 2005:12; Kruger *et al.*, 2006:357; Prentice, 2006:98; Rossouw *et al.*, 2012:6). The magnitude of this double-burden of disease leads to an underdeveloped social economy due to deaths, disabilities, stunted mental health and physical stunting (WHO, 2015). In addition to unhealthy body composition, a sedentary lifestyle is estimated to be the cause of 6-10% of NCD's globally (Lee *et al.*, 2012:227).

When female adolescents are physically active they become physically fit through repetition of activities, which increases functional health, improves body composition as well as provides an increase in mental health, particularly pertaining to BI (Sabo *et al.*, 2004:25; Hausenblas & Fallon, 2006:40; Prichard & Tiggemann, 2008:864; Butt *et al.*, 2011:1081; Haugen *et al.*, 2011:54; Kelly *et al.*, 2011:35). Kelly *et al.* (2011:35) found that physical activity levels are significantly positively related to body image and physical fitness, regardless of weight loss or changes in body composition. However, a limited understanding exists with respect to the relationship between physical fitness, body composition and body image among South African female adolescents (Monyeki *et al.*, 2012:1).

In this chapter, the results of an observational cross-sectional study on physical fitness, body composition and body image, as well as the discrepancies between black and white ethnicities with regard to BI, will be presented and discussed.

The results will be presented of the descriptive statistics for all variables; demographic characteristics of the participants as well as those pertaining to the objectives of this study. A discussion of the results will follow the results section in an order similar to that in which the results were presented.

4.2 Results

4.2.1 Participants

The number of participants recruited for the PAHL-study in 2010 amounted to 256 pupils, 100 males and 156 females (Monyeki *et al.*, 2012:3). For the purpose of this study only data of the female participants of 2013 who gave informed consent and had full data sets were analysed. Thirty-six of the females were absent and 120 present of whom 116 completed all tests and questionnaires. All the females were apparently healthy, between ages 15 and 18 years and started grade 10 in 2013. Black (N=98) and white (N=18) female adolescents

completed the measurements with four females unable to finish all the measurements (see Figure 4.1).

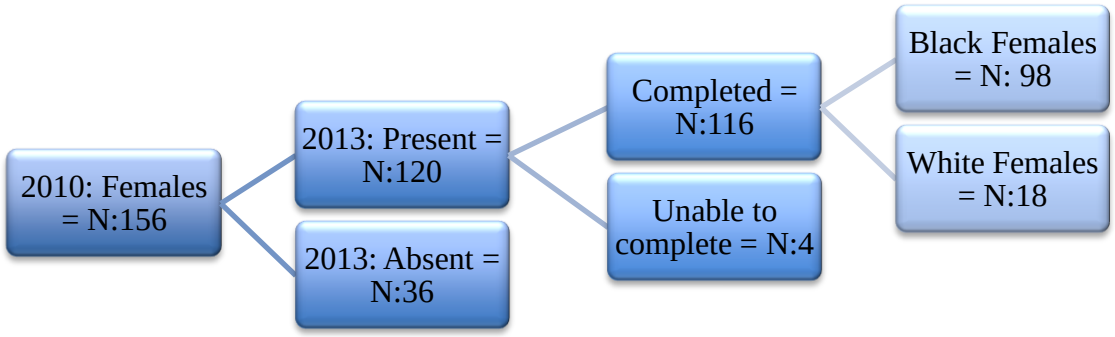


Figure 4.1: Flow diagram of participants in the study on Body image as a sub-study in the PAHL-study

The demographic information of the participants (Table 4.1) indicates that the median age of the participants was 17 years.

Table 4.1: Demographic information of the participants reporting the mean, inter quartile range, average and standard deviations

Variables		N	Mean	SD	Median	25th Percentile	75th Percentile
Age (years)	Black	102	16.6	0.7	17	16	17
	White	18	16.6	0.6	17	16	17
Weight (kg)	Black	102	55.2	11.5	52.1	47.9	60.4
	White	18	65.5	12.5	64.3	56.4	73.8
Height (cm)	Black	102	157.4	6.1	156.6	153.3	161.6
	White	18	166.5	5.6	164.9	162.2	171.6

The distribution of race within this study (see Figure 4.2) indicates that the majority of the participants were black. These percentages are in agreement with the representation of South Africa's population. African females were estimated to make up 80.4% of South Africans females and only 8.3% were estimated to be white (Statistics South Africa, 2015:2). The median reveals that both black and white participants were mostly the same age but weight and height difference was large.

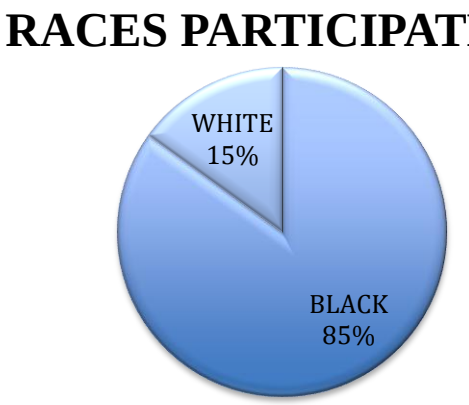


Figure 4.2: Distribution of race groups within the sub-study on body image in the PAHL-study

The social economic statuses (SES) of the participants were based on the school they attended (Monyeki *et al.*, 2012:3). In Figure 4.3 the locality of the schools attended by the participants shows that the bulk of the participants originated from the township areas.

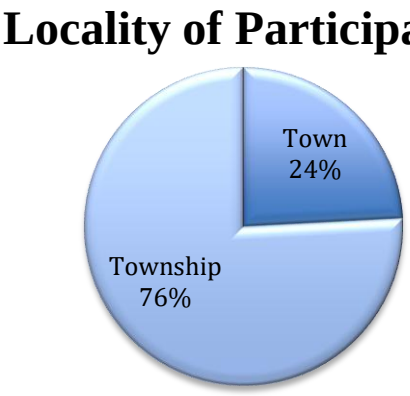


Figure 4.3: Locality (Town/Township) of the participants within the sub-study on body image in the PAHL-study

The number of school children, who participated in the study from each school, is displayed according to the school numbers 1-6. Figure 4.4 displays the distribution of the number of participants from each school, which participated in the study. Schools 3 and 4 were from town and the rest were all from the township around the greater Tlokwe Local Municipality.

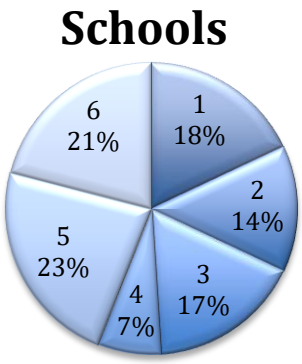


Figure 4.4: Distribution of student participants among schools (1-6) within the sub-study on body image in the PAHL-study

4.2.2 Difference in Physical Fitness, Body Composition and Current Body Image between Black and White Female adolescents

The results of the first objective; the difference in physical fitness ($\dot{V}O_{2\max}$), body composition (BMI and BF%) and current body image between black and white female adolescents are presented in Table 4.2. The results from testing for normality with the Q-Q plots indicated a normal distribution of the data.

Table 4.2: Difference in Physical Fitness, Body Composition and Body Image between Black and White Female adolescents

Variables		N	Mean	SD	Median	25th Percentile	75th Percentile	[95% CI] of the difference		Sig. (*p*-value)	Effect Size
								Upper Bound	Lower Bound		
$\dot{V}O_{2\,max}$ (mℓ/kg^{-1}/min^{-1})	**B**	97	39.8	3.0	39.8	38.2	41.8	-1.07	2.23	0.78	0.06
	W	18	39.6	4.0	39.6	37.4	42				
BMI (kg/m^2)	**B**	103	22.2	4.5	21.3	19.2	24.7	-3.54	0.96	0.24	0.30
	W	18	23.6	4.1	22.8	20.6	25.8				
BF%	**B**	103	24.9	6.5	24.1	20.8	29.4	-5.5	0.88	0.14	0.37
	W	18	27.3	5.4	26.5	23.9	31				
Current BI	**B**	98	3.2	1.4	3	2	4	-0.93	0.47	0.52	0.17
	W	18	3.4	1.4	3	2.8	4				

Practical Significance according to Cohen's ES: <0.2 = Small; >0.4 = Medium; >0.8 = Large

B=Black / W=White

Med = Median

CI = Confidence interval

Table 4.2 reflects that no statistically significant differences were found between the white and black female adolescent participants, for any of the variables tested. The results of Cohen's effect size value suggested a small practical significance for BMI (d=0.30) and medium practical significance for BF% (d=0.37). Moreover, according to the median values all the results for the black participants were slightly lower than those of the white participants except for current BI.

The median result of the participants' current body image (perceived current body shape), which was tested on a silhouette scale displaying nine different body shapes, indicated no statistical significant difference between how black and white participants currently perceived themselves with Cohen's effect size value (d=0.17) only suggesting a small practical significance (Table 4.2). The median current BI chosen on the Silhouette Scale, for both black (BI score = 3) and white females (BI score = 3) represent a healthy weight class for adolescents according to Stunkard *et al.* (1994).

The average silhouette chosen by the adolescents can be seen in Figure 4.5.

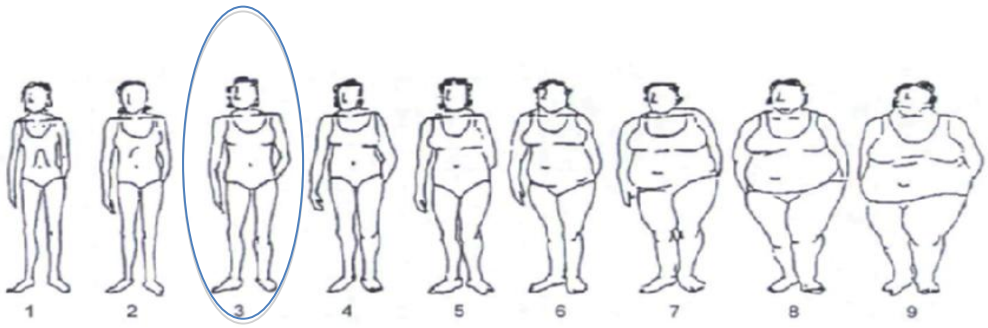
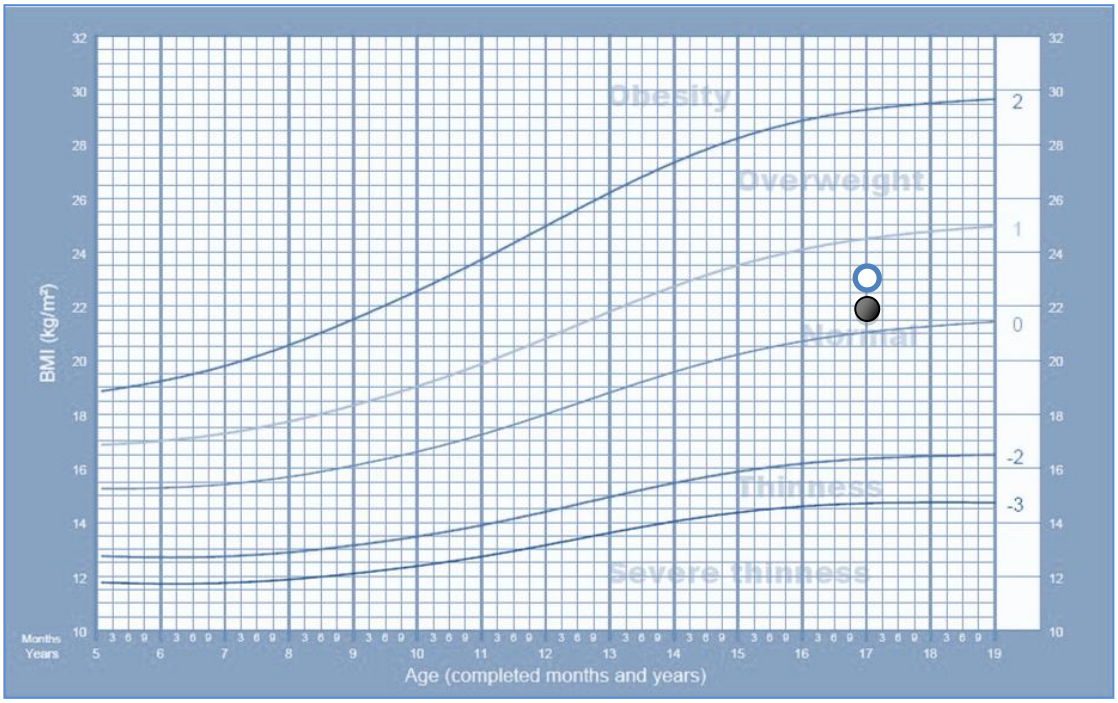


Figure 4.5: Figure rating scale (Stunkard *et al.*, 1994)

Results from the standardised anthropometric measurements used to determine body composition, body mass index (BMI) and body fat percentage (BF%), are also indicated in Table 4.2. The white participants' results revealed a slightly higher but non-significant difference for BMI (23.6 ± 4.13 kg/m^2 and median 22.8 [interquartile range {IQR} 20.6-25.8 kg/m^2]) compared to the black participants' BMI (22.2 ± 4.49 kg/m^2; median 21.3 [IQR 19.2-24.7 kg/m^2]); (t (118) = -1.14, F(1,118) = 0.9, ns) with a independent t-test difference of -1.29 (95% CI, -3.54 to 0.96) kg/m^2 and Cohen's effect size value (d=0.30) suggested a small practical significance. According to the median values the BMI results reveal that the black and white participants fall within the normal category on the BMI-for-age z-score lines

indicated in Figure 4.6. The median of the BMI of the black and white participants as a group was taken along with their median of age and plotted on the graph as presented below by the World Health Organization (2007). Therefore, this result of "normal BMI" is merely the median of the entire white and black groups separately and does not individually represent each participant.



Black Participants

White Participants

Figure 4.6: BMI-for-age GIRLS: 5-19 years, z-scores (adapted from WHO, 2007)

According to the BF% results, the white participants' average (27.3±5.4%) and mean BF% (M=26.5% [IQR 23.9-31%]) showed a higher value although not statistically significantly different ($t(118)=-1.43$, $p = 0.14$) with a difference of -2.31(95% CI, -5.5 to 0.88)% from the black participants' average (24.9±6.5%) and median BF% (M=39.8% [IQR 20.8-29.4%]). Furthermore, Cohen's effect size value ($d=0.37$) suggested a medium practical significance. The average BF% of black participants and white participants, in this study, fall within the mid-range for female adolescents (Table 4.3) according to Heyward and Wagner (2004:6). However, for the white group the interquartile range reveals that from the 75 percentile and above the females in the white group has a high BF%.

Table 4.3: Recommended Body Fat Percentage Levels for Children and Adolescents (Heyward & Wagner, 2004:6)

6-17 years	NR*	LOW↓	MID	HIGH↑	OBESITY
FEMALES	<12	12-15	16-30	31-36	>36

NR* = Not Recommended

Physical fitness was determined with the Bleep Test (Australian Sports Commission: 1998) and indicated no statistical or practical significance between the $\dot{V}O_{2max}$ values of the black and white female adolescents. The average physical fitness ($\dot{V}O_{2max}$) for female adolescents are approximately 40 ml/kg/min according to Mota *et al.* (2002:7011), therefore the participants of this study tested at an average PF according to the following results: black participants (M=39.8ml/kg/min [IQR 38.2-41.8]) and white participants (M=39.6ml/kg/min [IQR37.4-42]); ($t(112) = 0.69$, $F = 0.9$, ns) with a difference of 0.58(95% CI, -1.07 to 2.23) ml/kg/min .

In summary the results indicate that there is no statistically significant difference between the PF, BC and BI when comparing the results of the black and white participants. A small practical significance between BMI and current BI was suggested accoriding to Cohen's effect size value. With regards to BC, a medium practical significance was suggested for BF% between black and white groups.

4.2.3 Differences in Body Image Dissatisfaction between Black and White Adolescents

The second objective aimed at determining the difference in body image dissatisfaction between black and white female adolescents of the Tlokwe Local Municipality.

Table 4.4: Dissatisfaction of body image as determined by the difference between current body image compared to *ideal* body image

Variables		N	Mean	SD	Median	25th Percentile	75th Percentile	[95% CI]		Sig. (*p*-value)	Effect Size
								Upper Bound	Lower Bound		
Current BI	B	98	3.21	1.39	3.00	2	4	-0.93	0.47	0.52	0.17
	W	18	3.44	1.38	3.00	2.75	4				
Ideal BI	B	98	3.06	1.20	3.00	2	4	0.14	1.31	0.84	0.61*
	W	18	2.33	0.84	2.00	2	3				
BI Dissatisfaction	B	98	0.15	1.31	0.00	-0.25	1	-1.63	-0.24	0.01*	0.70*
	W	18	1.11	1.37	1.00	0	2				

Table 4.4 displays the results of participants with regard to their current body image and *ideal* body image, as well as the BI dissatisfaction due to the difference between current and *ideal* body image of the black and white groups. No statistically significant difference was found or practical significance was suggested with regard to the participants' current BI. A medium practical significance (d=0.61) was suggested pertaining to black and white female adolescents' *ideal* BI participating in this study. The difference between the participants' current and *ideal* BI indicated as BI dissatisfaction on Table 4.4 was higher in that of white females (1.1±1.37) compared to black females (0.15±1.31); ($t(114) = -2.83$, $F(1,114) = 0.39$, $p \leq 0.01$) with a difference of 0.96(95% CI, -1.63 to -0.24) along with Cohen's effect size value (d=0.70) suggesting a medium practical significance.

In the 50th percentile of both groups the median value was the same for current BI (M=3 [IQR 2-4]) and only the white group desired to be thinner according to their *ideal* BI (M=2 [IQR 2-4]) leaving the black group with no dissatisfaction. The following data show the results of the correlations between the variables (BI dissatisfaction, body composition and physical fitness) for black and white participants.

4.2.4 The Relationship between Physical Fitness, Body Composition and Body Image Dissatisfaction in Black and White Female adolescents

In order to address the third objective of the study, the relationship between physical fitness, body composition (body mass index, body fat percentage) and body image dissatisfaction in black and white female adolescents were computed. Spearman correlations were computed between body image dissatisfaction (current BI – *ideal* BI = BI Dissatisfaction), body composition (BMI and BF %) and physical fitness $\dot{V}O_{2max}$. Table 4.5 presents the correlations between the various variables in both ethnic groups.

Table 4.5: Spearman's Rho Correlations between Body Image Dissatisfaction and Physical Fitness, Body Composition in Black and White Adolescents

Variables		**Body Image Dissatisfaction (current BI – *ideal* BI)**	
	n	r_s	*p*
$\dot{V}O_{2max}$ (mℓ/kg/min)	Black=97	-0.21	*0.05
	White=18	-0.18	0.47
BMI (kg/m^2)	Black=103	0.64	**<0.01
	White=18	0.67	**<0.01
BF%	Black=103	0.50	**<0.01
	White=18	0.80	**<0.01

r_s: Small < 0.1; Medium > 0.3; Large > 0.5

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed)

BMI = Body mass index

BF% = Body fat percentage

$\dot{V}O_{2max}$ = maximal oxygen uptake

Spearman's rank-order correlation was performed to determine the relationship between physical fitness, body composition and body image dissatisfaction. There was a strong positive correlation between BMI (r_s = 0.64, p<0.01) and BF% (r_s = 0.5, p<0.01) with BI dissatisfaction only in black female adolescents. White female adolescents showed results similar to those of their black counterparts with an even greater statistically significant, positive correlation between BF% (r_s = 0.8, p<0.01) and BMI (r_s = 0.67, p<0.01) with BI dissatisfaction. Both groups showed a small, negative correlation between physical fitness and BI dissatisfaction, however the correlation was only statistically significant in black female adolescents (r_s = -0.21, p<0.05).

4.3 Discussion

The results of this study will be discussed in the order in which the results were presented and in accordance with the objectives of the study, as stated in Chapter 1. The difference in physical fitness, body composition (body mass index and body fat percentage) and current body image (as derived from the Figure rating Scale described in Chapter 3) in black and white female adolescents; followed by the difference in body image dissatisfaction in black and white female adolescents; and lastly the relationship between physical fitness, body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

4.3.1 Difference in Physical Fitness, Body Composition and Current Body Image between Black and White Female adolescents

The baseline characteristics of the participants indicated that both black and white female adolescents (Table 4.2) perceived a current body image as silhouette number three (Figure 4.5) on the Figure rating scale (Stunkard *et al.*, 1994), this is according to the mean and median of the results. Silhouette number three represents an apparently healthy female body shape. According to Medilexicon's Medical Dictionary (2006) and Merriam Webster Dictionary (2013) body image is the way you perceive your body shape and how you think, other people see you. Adolescents often compare themselves to one another and internalise a current BI based on how others treated them and how people react towards them (Krayer *et al.*, 2008:900). According to Myers and Crowther (2007:305) this human behaviour of comparing oneself with others as well as images portrayed in the media striving towards the "thin ideal", plays a major role in body image and causes body image dissatisfaction. Therefore, "body image is body images", how you physically see yourself "the inside view", how other people see you and react to that perception of you and, how you think other people see you based on how you internalise that reaction and the way you see yourself (Cash, 2004:1). All of these actions and re-actions are externally driven by media (Hardit & Hannum, 2012:474); physical fitness, parents and peers (Kelly *et al.*, 2005:394); age and maturation (Bucchianeri *et al.*, 2013:5); cultural beliefs (Viviani *et al.*, 2013:95) and gender (Murnen & Don, 2012:133). In the first objective one type of body image known as, current body image is analysed.

This study found no significant difference between the black and the white participants' current BI (Table 4.2). This finding is similar to a study done in America on younger children – pre-adolescent participants (6-11 years old) that portrayed no significant difference between black and white females' current BI (Kelly *et al.*, 2011:381). A study done in South Africa on adolescents (13-18 years old) also showed no significant differences between black and white participants' current BI (Szabo & Allwood, 2006:204). Furthermore, Szabo and Allwood (2006:205) concluded that homogenisation is taking place within urban settings, not so much in rural settings, and may be the start of eating disorders among black ethnicities in South Africa. Current BI is influenced by age, socio-economic status (Czyz *et al.*, 2016:In Press) and is especially vulnerable during adolescence (Bucchianeri *et al.*, 2013:5). As urbanisation in South Africa continues to grow and black females are exposed to the "thin ideal" of the media, it may cause divergence between cultural beliefs and current BI (Micklesfield *et al.*, 2013:373). Roberts *et al.* (2006:1124-125) did a review on the differences between the black and white cultures, looking at current BI in studies ranging from 1996-2002. They explained that the reason for the dissipation between differences of current BI is due to both ethnicities actually experiencing a decrease in BI dissatisfaction globally. When looking at the content of fashion magazines around the world it was found that many of the smaller cultures are consumed by westernised ideals and South Africa was pointed out as one of these countries that has adapted to it, which causes cultures to become a melting pot of body dissatisfaction due to false "ideal" body images (Yan & Bissell, 2014:211).

When entering adolescence, hormonal changes, resulting in body shape changes as well as mental development take place, making the individual susceptible to mental health problems (Oldehinkel *et al.*, 2011:78). Early onset of adolescence may cause even more problems due to the individual feeling lonely and sometimes uneducated about the changes happening in the body (Myers & Crowther, 2009:692). The individuals in this study were at a mean age of sixteen years (see Table 4.1) and could therefore be classified in stage four or five of sexual maturation according to their chronological age, but this was not measured. Malina *et al.* (1999:193) did a longitudinal study on eight- to eighteen-year-old Polish adolescents and found that after the age of twelve the skinfolds tested (triceps, subscapular and abdominal) had increased and between fifteen and sixteen years had decreased again in female participants. Hayward *et al.* (1999:143–149) studied different adolescent female ethnicities in America during puberty and associated depressive symptoms. It was found that current BI

is closely linked to the start of puberty and early onset of puberty for whites and Hispanics, but not for blacks. Therefore one could assume participants had adapted to their new body shape in this present study, and could realistically estimate their current BI as both ethnic groups rated their current BI as healthy body shape (see table 4.1 and figure 4.5). Another variable, which is greatly influenced by the adolescent development stage, is body composition.

In this study, white participants showed higher body composition values (see Table 4.2) than did their black counterparts. The reason for the higher BC may be due to unhealthy dieting of a westernised community and their constant striving towards the "thin ideal" portrayed in the media, often leading to eating disorders (Jones & Smolak, 2011:85). Based on the findings presented from other studies, it is reasonable to acknowledge the diversity in body composition across ethnic groups in South Africa. Body composition increases rapidly during adolescence due to hormonal changes, fat cells are needed to give energy and nutrients to hormonal activities (Siervogel *et al.*, 2003:43; Meier & Gressner, 2004:1522); therefore more fat cells form. Because of rapid urbanisation in South Africa a much larger increase of BF% is seen due to the high influx of empty calorie food and drinks (Chopra *et al.*, 2002:952–958). Examples of these differences are as follows; black children at nine years of age have a higher bone mass than do white South Africans (McVeigh *et al.*, 2004:1010); white South African females have a higher prevalence of abdominal obesity between ages 18 and 60 years than the blacks (Rush *et al.*, 2007:1237); black South Africans have a much higher and currently increasing prevalence of stunting than do white and mixed ancestry children 8-11 years old (Armstrong *et al.*, 2011:838), which proves that there are body composition differences among ethnicities.

When unhealthy dieting (starvation, calorie restricted, use of supplements) practices are followed, in order to adhere to the "thin ideal", rebound weight gain is often the result (Hesse-Biber *et al.*, 2006:213). This rebound weight gain is caused by a homeostatic system of the body where the periphery communicates with the brain about the current nutrient and energy stores, when intake of these are deliberately restricted, the reaction of the body is to refill these stores (Maclean *et al.*, 2011:R583). This is a major health concern in South Africa, not only due to the overweight risk because of poor dieting practices as explained above. Higher socio-economic status (SES) is reported to be a marker for risk of overweight (Steyn *et al.*, 2005:12) and in this study the white participants were from high SES schools.

This very high risk of overweight is a matter of concern due to the further risks brought on by obesity, which largely results in non-communicable diseases and low-back pain (Ehrman *et al.*, 2009:218).

Low SES is a marker for a lower prevalence of obesity in South Africa (Jinabhai *et al.*, 2003:362). The majority of female adolescent participants in this present study lived in the township areas of the North West Province which are commonly associated with having lower BMI's than those living in the urban areas (Vorster *et al.*, 2007:480). However, this present study resulted in no statistically significant difference between black and white participants pertaining to the results of the BMI and BF% with black females having lower values (see Table 4.2). Malnutrition may have contributed to the slight differences where blacks had less BF% and smaller BMI values than whites (see Table 4.2). The results of our study are similar to findings of another study done in the North West Province that found that white adolescents' BMI and BF% were significantly higher than those of black adolescents 10-15 years (Kruger *et al.*, 2006:356). Kruger *et al.* (2006:356) found that whites lived in obesogenic environments near outlets where empty calorie food could easily be obtained and the need for being active is low due to indoor entertainment and transport. Apart from the malnutrition factor of black participants' lower BF% values, for especially those residing in the township, may be due to living a more physically active lifestyle at home (Mamabolo *et al.*, 2007:1054). However, females, both black and white, often use exercise in an attempt to change their body shapes (Butt *et al.*, 2011:1080), which may be their motivation to be physically active.

Physical fitness levels according to a maximal cardiovascular test ($\dot{V}O_{2\,max}$) indicated no significant differences between the white and the black female adolescents in this study (see Table 4.2). These findings are in contrast with a study done by Armstrong *et al.* (2011:1015) in South African children between ages 6 and 13 years, where black children showed lower fitness values. However, the participants were about 10 years younger than in the present population investigated and males were also included. According to Shisana *et al.* (2013:132) South African females between ages 18 and 40 years who live in urban informal settlements (Townships) were reported to be physically fitter (51.4% portrayed cardiovascular fitness) than the females who lived in town (33.9% portrayed cardiovascular fitness). A three-minute-step test was conducted, which resulted in a sub-maximal cardiovascular reading (Shisana *et al.*, 2013:50). Shisana *et al.* (2013:132) found that

females in rural areas were physically more active than the males in rural areas or females in urban areas because they are expected to do the household duties that require of them to be active. In a sub-study of the PAHL-Study, Wushe *et al.* (2014:5) measured physical activity objectively through means of an *Actiheart*® device for a 7-day period and found that 70.9% of white female adolescents and 58.8% of black female adolescents engage in moderate to vigorous activity four days of the week. Wushe *et al.* (2014:7), however, found that none of the adolescents, from neither of the ethnicities, reached the requirement of engaging in moderate to vigorous activity for sixty minutes every day. Urbanisation has infiltrated the majority of South Africans resulting in the small discrepancies found in this study between the white and black participants with regard to PF, BC and current BI (Puoane *et al.*, 2005:14, 2013:92; SAinfo reporter, 2013; Viviani *et al.*, 2013:95).

In order to understand the perceptions of the body image, the difference between the *ideal* and the current BI was determined in order to determine whether dissatisfaction is present.

4.3.2 Difference in Body Image Dissatisfaction between Black and White Adolescents

When *ideal* BI is compared with current BI, a disparity between the white and black participants were observed. The white participant group displays a statistically significant disparity as well as suggesting a medium practical significance according to Cohen's effect size value between current and *ideal* BI (see Table 4.4), which is a larger disparity compared to the black participant group. These results indicated that more BI dissatisfaction is present within the white participant group compared to the black participant group. It is clear that the group containing solely white females strove towards a leaner/skinnier BI than did the group containing black female adolescents. These findings are common among the westernised population, white females strive towards the "thin ideal" and black females often accept miscellaneous body shapes (Hesse-Biber *et al.*, 2006:217).

Females are exposed to the pressure of having the *"ideal image"* in order to fit in with peers from a young age (Murnen & Don, 2012:128). Often, when talking about an "*ideal image*", the "*thin ideal*" is mentioned as some kind of physical superiority for females (Brixval *et al.*, 2012:129). The constant presentation by the media of the "thin ideal" fuels the beauty industry by motivating females to spend money in order to obtain the "thin ideal". This "thin ideal" is often pursued by means of dieting, cosmetics, the medical procedures, which can

occasionally be taken to extremes in order to live up to this false image (Cash, 2011:388, 408, 476).

In black ethnic groups of South Africa it was common to believe that "bigger is better" due to poverty and illness resulting in thinness (Matoti-Mvalo & Puoane, 2011:44). Another study showed that most black females no longer desire to be overweight but also strive towards the "*thin ideal*" in South Africa (Banitt *et al.*, 2008:990). To internalise a false image of what a female "should" look like is often triggered by the media, who strongly promote the "*thin ideal*" (Myers & Crowther, 2007:305). Females who have a low sense of identity are easily influenced by society's *ideal* of what a female should look like in an attempt to find some kind of identity (Vartanian, 2009:108).

This particular study did not show that the black participants endeavoured towards the "*thin ideal*". The white females strives more towards the "*thin ideal*" (on average silhouette number two, Figure 4.5 which portrays an underweight weight class) and the black participants *ideal* BI is exactly the same at their current BI, which portrays a healthy body shape (on average silhouette number three, which portrays a healthy weight class). In KwaZulu-Natal Ogana and Ojong (2013:116) found that some Zulu adolescents are starting to aspire more and more towards the "*thin ideal*", this phenomenon may be due to them wanting to be more healthy but still aware of not being too thin so that they are not perceived as being HIV positive.

The current BI of blacks and whites did not differ statistically significantly and portrayed no practical significance and their *ideal* BI merely suggested a medium practical significance according to Cohen's effect size. However, a larger dissatisfaction was found among the white female adolescent group than among the black female adolescent group (see Table 4.4). This difference between the current BI and *ideal* BI is what results in what is described as poor BI due to dissatisfaction of current BI (Higgins, 1987:336). The result of BI dissatisfaction may be a dysfunctional psychological state, deprivation of a person's ability to complete the task at hand (accomplish) or reaching high achievements (according to their ideals) during completion of a task, and societal angst (Higgins, 1987:336; Koyuncu *et al.*, 2010:567). Body image dissatisfaction is adopted when internalising the ideals of society for the female body and portraying dissatisfaction towards one's body according to Higgins' (1987:336) self-discrepancy model. Therefore the concern of white females from this present

study portrays BI dissatisfaction, according to Higgins' self-discrepancy theory, to be great (Higgins, 1987:336).

In order to set a course of change for female adolescents and steer them towards a healthy BI, stopping them from internalising social standards of attractiveness, education on BI may be helpful (Warren *et al.*, 2005:246; Myers & Crowther, 2007:305). Females may be made aware of what the media's objectives are and learn not to place value on themselves according to and conform to societies' ideals for the female body (Warren *et al.*, 2005:246; Myers & Crowther, 2007:305). A healthy BI is defined as being comfortable and content with one's current BI (Wood-Barcalow *et al.*, 2010:112). In order to evaluate BI more holistically, the relationships between PF, BC and BI dissatisfaction were determined.

4.3.3 The Relationship between Physical Fitness, Body Composition, Body Image Dissatisfaction and Physical Fitness in Black and White Female adolescents

The final objective of this study was to determine the relationship between physical fitness, body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality. As discussed above, BI dissatisfaction in this study is the difference between current and *ideal* BI, which results in BI dissatisfaction and leads to poor BI (Jones & Smolak, 2011:81).

A large, positive, statistically significant relationship was found between BI dissatisfaction and BMI as well as BI dissatisfaction and BF% within both ethnicities (see Table 4.5). Therefore, a higher BMI and BF% results in a higher BI dissatisfaction, which is consequently known as BI dissatisfaction. Bearing in mind that the number of white participants was small (n = 18) it makes it difficult to rely on the results of the correlations. It is quite common that BI dissatisfaction and BMI are positively related (Canpolat *et al.*, 2005:153; Jones & Smolak, 2011:80). Canpolat *et al.* (2005:150) found that the "thin *ideal*" and a low self-esteem have a greater positive relationship with body image dissatisfaction than that of an overweight figure. In a study done among adult males and females in Finland, it was found that a statistically stronger positive relationship exists between BMI and BI dissatisfaction in females (Algars *et al.*, 2009:1126). An increase in BF% is often seen as a health risk along with being inactive; therefore it is believed that BI dissatisfaction is related to the perception of an increase in BF% and inactivity (Tiggemann, 2005:133; Meland *et al.*, 2007:348; Vilhjalmsson *et al.*, 2011:376).

It is commonly known that adolescents in the western world are constantly driven towards the "thin *ideal*" (Bucchianeri *et al.*, 2013:6). This is the result of misleading media messages and peers and parents who support these misconceptions of the female body and what it should look like (Hargreaves & Tiggemann, 2004:357; Fallon & Hausenblas, 2005:71; Markis & McLennan, 2011:425; Hardit & Hannum, 2012:473). Therefore, when female adolescents reach puberty and gain BF%, their BMI increases, and they often become dissatisfied with their current BI due to the drastic changes in body shape and size (McCabe & Ricciardelli, 2005:663; Tiggemann, 2005:133; Meland *et al.*, 2007:348; Cousineau *et al.*, 2010:299; Bucchianeri *et al.*, 2013:5).

The relationships between BI dissatisfaction and physical fitness in females reveal a small, negative relationship for black and white participants, which is not statistically significant for the white participants but statistically significant for black participants (see Table 4.5). Therefore, PF is negatively correlated to BI dissatisfaction for black female adolescents, as for the white participants, the number of participants were too few for correlations to be accurately established. Cash (2011:378) found a more significant, positive relationship between physical fitness and current BI than did this present study. Cash (2011:380) states that it is not the physical changes that matter, but the perception thereof, that has a major influence on BI. Hausenblas and Fallon (2006:42) suggest that the relationship between BI dissatisfaction and PF are possibly reliant on variables such as the status of one's health, outlook concerning exercise and whether that person actually exercises. The physical activity of these participants was, however, not measured. Wushe *et al*. (2014:471) conducted a study among the adolescents in the North West Province and found that their physical activity levels were low when objectively measured.

In South Africa urbanisation is rapidly infiltrating the communities (SAinfo reporter, 2013). It is known that an increase in urbanisation contributes to higher levels of inactivity due to changed environmental factors, which include violent behaviour, danger on roads due to traffic, poor quality of air, smog, no/too little parks, sidewalks and facilities where recreational sport can take place (WHO, 2008). Body image is significantly affected by the amount of physical activity, which changes BC, because of the change in BF% during the onset of puberty (Davison *et al.*, 2007:2401). Metcalf *et al.* (2011:946) stated that physical inactivity results in the increase of adiposity. When physical activity decreases, BC (BMI and BF%) increases and this once again circles back to the risk of NCD's increasing. PF is used as a health marker for adolescents; an indication of future cardiovascular health, body

mass index (BMI) is also used to evaluate disease risk within the normal population (Ruiz *et al.*, 2011:521-523). After the completion of the SANHANES-1 survey, it was recommended that employees need to be given more freedom to take part in physical and recreational activities at work, that the schools' education models must entail taking part in physical activities, that sports and recreation facilities must form part of new residential developments and that lanes must be built into all new urban roads (Shisana *et al.*, 2013:389).

4.4 Summary

In the above discussion, no significant differences were found among the black and white female adolescents concerning current BI, BMI, BF% and PF. Homogenisation, urbanisation, westernisation and obesogenic environments are trending through research. In this study white participants were clearly more dissatisfied with their current BI than were their black counterparts. The white participants are trending towards the "thin ideal" whilst the blacks desire on average a more healthy body shape. It seems that the black participants are changing their ethnic background perceptions with regard to BI and are starting to accept westernised images. Black ethnicities are influenced both by an ethnic approach and the media concerning BI and therefore may be experiencing conflict between being culturally acceptable and healthy. Body image dissatisfaction is positively related to an increase in BMI and BF% and negatively to an increase in PF, except in the case of white participants' BI dissatisfaction and PF, this may be due to the small sample size of the white participants in this study. According to a previous study, physical fitness is positively related to BI merely because of the perception of the body shape being slimmer.

Although the black and white participants of this study showed normal values for BMI, BF%, PF and current BI, the white participants of female adolescents aspired to having smaller current BI values; this phenomenon of body dissatisfaction was therefore greater among white participants. This is surely an indication that there is insufficient education with regard to body morphologies concerning shape and size during adolescence. Additionally, female adolescents are bombarded with images and messages of what an acceptable body shape and size is – with the majority of times being the "thin ideal". Furthermore, it is clear that black females are confused by the messages of the media and what they are taught within their culture. White female adolescents grew up in a culture where the "thin ideal" is widely accepted and has been the root of eating disorders and poor mental health for years. This

dilemma calls for role models to step up and make a mind shift away from the “thin ideal” in order to make a meaningful change in the way adolescents view their bodies.

CHAPTER 5

SUMMARY, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 Summary

When females reach the adolescent stage they face physical changes as well as psychosocial changes, which are influenced by their socio-cultural environment. During the adolescent stage, oestrogen levels increase and cause body shape changes during puberty, which is also coupled with an increase in body fat percentage. Puberty is also known as a stage when physical activity, especially in females, declines due to drastic body shape changes that are often misunderstood. Furthermore, the media plays a powerful role through illusory images by means of social networks, the Internet and magazines. Media revolves around an appearance culture that largely focuses on the "thin ideal" and causes social- and self-comparison among females. This has a major influence during the developing stages of an adolescent's psychosocial being. In South Africa, where rapid urbanisation is taking, the "thin ideal" is being spread among cultures where "bigger is better" was previously advocated, which causes body image confusion amongst black female adolescents. In the white communities the "thin ideal" has been a part of the culture for years and continues to be reinforced by the media. This leads to body image dissatisfaction and may trigger mental health issues such as depression and eating disorders. Understanding the relationship between physical fitness, body composition and body image will give a clearer perspective on how these variables interact with one another. The objectives of this study were firstly, to determine the difference in physical fitness, body composition (body mass index and body fat percentage) and current body image between black and white female adolescents; secondly, to determine the difference in body image dissatisfaction between black and white female adolescents; and thirdly, to determine the relationship between physical fitness, body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

In the summary of Chapter 1, the problem statement listed the risks of BI dissatisfaction, overweight and physical inactivity, which then highlighted how these risks, may lead to detrimental mental and/or physical health. Body image dissatisfaction is considered to be associated with physical activity patterns. When physical activity decreases, BF% increases

and these changes in turn lead to BI dissatisfaction. The literature reports that eating disorders such as anorexia nervosa and bulimia become more prevalent when BI dissatisfaction is present. These are the roots of a viscous circle that spirals into poor mental development, social angst, depression, and an increased risk of non-communicable and chronic diseases as well as adolescents with little to no ambition in life. Due to the continual downward spiral of having a poor BI and decreased physical activity pattern, it results in a decline of fitness, as well as mental health, the following research question was formulated; what are the differences between physical fitness, body composition, current body image and ideal body image and secondly how are these components related to each other in black and white female adolescent? Chapter 2 gave an overview of the literature, exploring the major influences that steer adolescents towards dissatisfaction or satisfaction with BI. Body image dissatisfaction is defined as a discrepancy between current and *ideal* BI. Healthy BI is defined as a mental experience of someone who has a good self-esteem and is content about his or her current body shape and size despite the negative feelings that they may experience due to external influences. The major influences steering BI are cultural beliefs, media, parents, peers and age. Although there is often disagreement among literature, the major trends are mentioned below. Most black ethnic groups believe that "bigger is better", whilst the westernised culture is known for a drive towards the "thin ideal". The media is a powerful weapon, which is known for its major influence on the public and its consistent drive towards the "thin ideal".

Parents are role models to their children and are often unaware of the key influence they have in their roles as parents. When parents are constantly dissatisfied with their own body image, children also become dissatisfied with their own. Some literature proves that fathers have a major influence on their children regarding BI, and other literature believes that mothers play the key role. Nevertheless, educating parents about the role they play and how to be a good role model may make a difference in the lives of their daughters; they may be a major cause of their children's body dissatisfaction without even realising the damage they are causing.

Peers constantly compare themselves with other in their group, which often leads to internalisation of dissatisfaction with their body shape and size. It was also found that friends rather than general peers might have an even larger mostly positive or negative influence than peers because they are in a close, trusting relationship with each other. As the human body ages it enters different development stages, such as adolescence, where hormones cause body shape changes, for instance hips become larger in females and BF% increases due to

development of sexual organs. These, in turn, change the course of physical fitness and body composition levels due to individuals not being properly educated about the changes they might experience in their bodies or having enough external positive motivation, other than body shape benefits to exercise or be physically active. Body image improves as BC (BMI & BF%) declines and physical fitness increases. However, complications emerge in regard to participation in elite aesthetic sports where females and males are judged by the outward look of their body.

Gymnasium environments often nurture poor BI due to posters promoting the *ideal* bodies of people with them merely promoting the gym as a place to improve one's body shape. Despite this knowledge, South Africa is infiltrated with westernised ideals and as a consequence of urbanisation, diets are changing to foods with empty calories, and insufficient levels of physical activity are often reported. Consequently obesity prevalence is increasing and non-communicable diseases are becoming more rampant in South Africans. Due to the lack of research in South Africa concerning PF, BC and BI specifically, limited education is conducted at schools to educate the youth about the misconceptions of cultural beliefs, the misconceptions concerning BI illustrated in the media as the *ideal*, the vital benefits of living a physically active lifestyle and having a healthy BF% and BI.

This observational cross-sectional study design was conducted to understand body image in adolescents from the North West Province and how BI dissatisfaction relates to body composition and physical fitness. In Chapter 3, the research methods performed were reported. The data collected formed part of the **P**hysical **A**ctivity and **H**ealth **L**ongitudinal **S**tudy (**PAHLS**). The current and *ideal* body image statuses were collected with a body image figure rating scale. Furthermore, body composition was determined by means of anthropometric skinfold measurement. Maximal fitness levels were tested by means of the Bleep Test and calculating indirect $\dot{V}O_{2\,max}$.

The core findings and the discussion of the study (Chapter 4) illustrated no statistically significant difference between black and white participants pertaining to any of the variables (physical fitness, body composition and body image). However, when the BI dissatisfaction was calculated by making use of the difference between current and *ideal* BI, a significant discrepancy was found between the two ethnicities, with black female adolescents of this study being more satisfied with their current BI compared to the white female adolescents of this study. The relationship between BI dissatisfaction and physical fitness showed only a

small significantly negative correlation among the black participants whereas BMI and BF% showed large positive correlations with BI dissatisfaction in both groups of females but with the largest values among white female adolescents.

5.2 Conclusions

The conclusions drawn from this study are based on the hypotheses stated in Chapter 1.

Hypothesis 1:

Physical fitness will be significantly lower and body mass index, body fat percentage and current body image will be significantly higher in black than in white female adolescents of the Tlokwe Local Municipality.

This hypothesis is *rejected.* None of the variables showed statistically significant differences between the two ethnicities within this study. Body mass index (White: M=22.8 [IQR 20.6-25.8], $\bar{X}$=23.56, *SD*=4.14; Black: M=21.3 [IQR 19.2-24.7], $\bar{X}$=22.23, *SD*=4.49) and BF% (White: M=23.9 [IQR 18-26.5], $\bar{X}$ =27.28, *SD*=5.38; Black: M=24.1 [IQR 20.8-29.4], $\bar{X}$=24.88, *SD*=6.47) were both higher in the white female adolescent group compared to the black female adolescent group but the analyses indicated no statistically significant differences (BMI $F(1,118) = 0.88$, ns and BF% $F(1,118) = 1.28$, ns). Current BI was the same for both ethnicities (White: M=3 [IQR 2.8-4], $\bar{X}$ = 3.4, SD= 1.4; Black M=3 [IQR 2-4], $\bar{X}$ = 3.2, SD= 1.4) and therefore no statistically significant differences are found ($F(1,114)$= 0.08, ns).

Hypothesis 2:

Body image dissatisfaction will differ significantly between black and white female adolescents of the Tlokwe Local Municipality.

This hypothesis is *accepted.* There is a significant difference between black and white adolescents' BI dissatisfaction; the white females' BI dissatisfaction (1.1±1.37) was higher than the black females' BI dissatisfaction (0.15±1.31); ($t(114) = -2.83$, $F(1,114) = 0.39$, $p \leq 0.01$) with a difference of 0.96(95% CI, -1.63 to -0.24) along with a medium practical significance suggested by Cohen's effect size value (d=0.70). The white participants of this study strive more towards the "thin ideal" and the blacks towards a normal, healthy body weight silhouette.

Hypothesis 3:

A significantly negative relationship will be found between physical fitness and body image dissatisfaction and a significantly positive relationship between body composition and body image dissatisfaction in black and white female adolescents of the Tlokwe Local Municipality.

This hypothesis is *partially accepted*. A small, negative relationship was found, which is statistically significant, between physical fitness and BI dissatisfaction for the black participants (r=-0.21, p=0.05) of this study. Furthermore, a large, positive relationship was found between body image dissatisfaction and BF% as well as BMI for the black participants (r=0.64, p<0.01) and the white participants (r=0.67, p<0.01). Moreover, due to the findings of the relationship between PF and BI dissatisfaction in white females, which is not significant, this hypothesis is *partially accepted*. Inconclusive results were obtained for the white participants, which was a small group.

Even though no statistical differences were found between the black and white female participants concerning current PF, BC and BI, a medium practical significance was suggested by Cohen's effect size between BMI and BF% was seen with whites displaying higher values. A possible explanation for this may be physical inactivity and following a more westernised diet. The less active a person is the more body fat is gained, which results in heightened dissatisfaction. To learn to adopt an active lifestyle instead of simply relying on certain school sports for remaining active may be far more beneficial to the individual in the long term. Furthermore, thorough education is advised in order to create awareness amongst females about the body changes that take place during puberty and why it is important to gain BF% during this time. It may be helpful for females to know that it is not a taboo to gain adipose tissue but that unhealthy weight gain, which is an onset of an unhealthy lifestyle, should be prevented. For the body to remain healthy, it is imperative for it to be fed nutritional foods instead of foods that only provide empty calories.

Among the groups tested in this study it appears that blacks are more satisfied with their body image and therefore possess a more positive BI (feeling positive about one's body, as described in Chapter 2, section 2.2) than the whites of this study. It seems that the white participants are conditioned by the "thin ideal" presented in the media. The average preferred body image is a skinny figure, whereas the blacks idealise a figure that is considered to be a normal, healthy body. The blacks have slowly started steering away from the "bigger is

better" model but are clearly not convinced by the "thin ideal". This actually confuses the black culture due to double messages being sent from their culture and media; therefore education is needed to eradicate such confusion. As for the white participants, they need to be educated about the false illusory images the media portrays. A large amount of the content spread by the media is created around a certain look, which will attract consumers, whereas these illusory images are digitally manipulated and therefore unreal.

Body image and BC are negatively correlated, due to BI dissatisfaction and BC being positively correlated. When an individual is dissatisfied about her current BI, healthy BI may dissipate. Moreover, as BMI and BF% increases, healthy BI may be compromised; this can be seen through the negative correlation between current BI and BC. The reason for this is the westernised world promoting the "thin ideal", which supposedly presents power and superiority of a female who possesses it. The more females drift away from the *ideal* BI, the greater the internalisation of dissatisfaction. The parents and guardians of these adolescents have a responsibility to lead by example to not be alarmed when natural weight gain develops but rather to be in tune with one's body to perceive whether or not it is in a healthy state. They may be advised to ask themselves the questions: "do I eat enough healthy, wholesome foods to give the proper nutrients to my body" and "am I following a healthy, active lifestyle?"

Body image dissatisfaction has a negative relationship with PF and therefore current BI satisfaction and PF are positively related to each other among black adolescents and unexpectedly not among white adolescents. Therefore, for black participants, the more physically fit they are, the more satisfied they are with their current BI. However, the same trend was not observed in the white adolescents and may be due to the small sample size. Physical fitness is widely known to improve mental as well as physical health and may be used as a mode to improve BI. Schools can consider providing the opportunity for students to be physically more active during the day, especially for those who are not interested in participating in sports. Families are recommended to make an effort to be active over weekends in order to set a standard for the members of the family to live an active lifestyle.

In the South African context, the outcomes of this study can deliberate the significance of a healthy BI. A healthy BI is seen when someone who has both positive and negative feelings about their body can focus on the positive and not internalize the negative but rather capture those negative thoughts and dispose of them by allowing positive thoughts to be their

individual truth. Internalizing a negative thought and therefore making it apart of one's identity may cause feelings of insufficiency and rejection. Feeling socially rejected causes physical pain, likewise to the pain you experience when breaking a bone in your body (Eisenberger, 2012:45). When negative thoughts bread in one's mind it may lead to risk behavior because the individual does not see him-/herself as valuable. Confident females who are comfortable under their own skin and poses a healthy BI could likely make a meaningful, positive impact on their communities instead of contributing to the economic burden of disease due to inactivity and overweight. These known risks increase the prevalence of non-communicable diseases as well as a decrease in mental health.

Based on the findings of this study the research question can be answered by stating that there is no significant difference between black and white female adolescents for PF, BC and current BI. However, there is a definite difference between body image dissatisfaction (current – *ideal* body image) among black and white female adolescents. Furthermore, the findings do however allude to a relationship between body image dissatisfaction and body composition. This positive relationship means that as the BMI and BF% increase, the body image dissatisfaction also increases. As for the black female adolescents' of this study, the inverse relationship reported between physical fitness and body image dissatisfaction indicate that the fitter they are the more satisfied they are with their body image. Fitness may be a useful method to damper the vicious circle of poor BI that is being fed into everyday by miscellaneous influences such as media, peers and parents.

5.3 Limitations

The findings reported in Chapter 4 of this study should be interpreted against the background of certain limitations experienced:

- The first limitation of this study was the fact that the white participants were too few to have a chance of achieving statistical significant results.
- As for the questionnaire, the phenotypic differences between the black and white participants were not accounted for. In the figure rating scale, images portray a westernised illustrated figure as opposed to the more ethnically inclusive characteristics that would be suited for the black participants.

5.4 Recommendations

The following recommendations are made in order to attain a richer understanding of the physical fitness, body composition and body image of female adolescents:

- Future studies are advised to ensure that the sample sizes (between ethnic groups) are large enough to enable researchers to conduct sound statistical analyses.
- Differentiate between the black participants who live in town and those who live in townships due to their lifestyles, which might be different.
- A figure rating scale encompassing more ethnically appropriate phenotypes is recommended in order for the participants to associate easier with the silhouettes due to some ethnic differences in body shape, for instance some cultures are known to have larger hips than others.
- Use an equation that entails more skinfolds and is corrected for ethnicities as well as for age. Due to differences in ethnicities, adipose tissue is more prevalent in some areas of the body than others. For instance one ethnicity may generally have more adipose tissue around the waist, and another more around the thighs
- Participants can be split into BF% classes when assessing differences between *ideal* and current BI in order to accommodate differences in current BI. This will assist in determining which BF% class participants are more satisfied with their current BI than are others.
- In order to determine how many hours they actually spend being inactive and are exposed to media content, determine the screen time of individuals: television, social media and surfing the internet.

5.5 Future research

This study gives an indication of the relationship between PF, BC and current BI in adolescent girls from the North West Province in South Africa. Future research in this area would be useful if it determines the relationship between the habitual physical activity levels, BI dissatisfaction and BC. In order to understand the role of the media in creating the “thin ideal”, the relationship between current BI and screen time/TV viewing may be determined.

The effect of an education intervention on healthy body image may clarify the understanding of cultural influences and the media on the perceptions held by adolescent girls with regard to body image and how it can be positively influenced.

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APPENDICES:

APPENDIX A: Request to conduct research

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APPENDIX C: Figure Rating Scale of Stunkard *et al*. (1994)

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APPENDIX E: Physical fitness date form

APPENDIX F: Ethics Approval for PAHL-Study

APPENDIX G: Acknowledgement of Language Review

APPENDIX A: Request to Conduct Research



School of Biokinetics, Recreation and Sport Science

Private Bag x6001,

Potchefstroom

2520

South Africa

The District Operational Director

Department of Education
North West Province
Potchefstroom

REQUEST TO CONDUCT RESEARCH WITHIN YOUR DISTRICT

Dear Sir,

We the researcher from the School of Bio kinetics, Recreation and Sport Science are hereby making a request to conduct research in the district under your authority.

To give the background of the study, research revealed that physical activity in adolescents is drastically declining. The decline in the level of physical activity of human populations has been observed, and such decline is been associated with increased mechanisation, reliance on technology and urbanisation, and the high rate of crime in South Africa and elsewhere in the world. Physical inactivity is thought to be one of the main risk factors for the development of obesity, diabetes, cardiovascular disease, osteoporosis and psychological constraints or risks of behavioural health.

Cross-sectional studies in South Africa which investigate the relationship between physical activity and determinants of cardiovascular disease for children and adults are available. Findings from these study revealed inactivity was significantly related to the determinants of cardiovascular disease. Little from the abovementioned studies could investigate physical activity and determinants of cardiovascular disease on a longitudinal basis. It is therefore important to note that South Africa is a country of paradox where obesity in children co-exists with malnutrition and many other ailments of health. It is therefore, against this background that a longitudinal study investigating the development and tracking of physical activity and the determinants of cardiovascular diseases in South African adolescents is needed. Adolescence is a time when independence is established and dietary and activity patterns may be adopted that is followed for many years. Most of the physiological, psychological and social changes within people take place during this period of life. The period of adolescence can be looked upon as a time of more struggle and turmoil than childhood. Adolescents have long been regarded as a group of people who are searching for themselves to find some form of identity and meaning in their lives. Thus, it has great influence on adult fatness and chronic disease of lifestyle as well as long-term outcome on quality of life. If youth health behaviours are tracked during adolescence, it would add support to the primary assumptions given for early interventions to prevent cardiovascular disease as well as delay in cognitive development. For this longitudinal study, tracking is defined as the stability of health behaviours over time, or the predictability of future values by early measurements. From the above given background, therefore, the aims of the study is to investigate over a five year period (2010-2014) a follow-up longitudinal development of physical activity and determinants of health risk factors of health behaviour in 14 years-old adolescents attending schools in Potchefstroom area of the North West Province of South Africa.

The above matter background information refers:

1. Permission is requested to conduct research in selected schools in your district as follows:
    1.1. BA Seobi Sec. School
    1.2. Tlokwe High School
    1.3. Resolofetse High School
    1.4. Botokwa High School
    1.5. Potchefstroom High School for Boys

1.6. Potchefstroom High School for Girls

1.7. Hoer Volkskool Potchefstroom

1.8. Potchefstroom Gimnasium School

2. The targeted groups are boys and girls aged 14 years, in essence the grade 8 learners (NB: the proportion will be as follow: in mixed schools, 35 girls and 35 boys; in blacks schools 30 boys and 30 girls will be required).

3. The targeted term is the first term of 2010 (to be continued during the same term in the subsequent years up until 2014)

4. Items to be assessed or measured are:

4.1. Demographic information of the selected participants

4.2. Anthropometric measurements (i.e. body height; weight; skin folds thickness (triceps, sub scapular and calf skin folds), and waist and hip circumferences)

4.3. Maturation (Tanner questionnaire)

4.4. Blood pressure measurement (mercury sphygmomanometer)

4.5. Physical activity questionnaire

4.6. ActiHeart (heart rate recorder with an integrated omnidirectional accelerometer. It is clipped onto two ECG electrodes worn on the chest.)

4.7. Health-related physical fitness (i.e. 20m shuttle run, standing broad jump, sit-and-reach, bent arm hang, sit-ups)

4.8. Social and self-efficacy questionnaire

4.9. Resting metabolic rate (determined by means of a mobile gas analyser)

4.10. Blood sampling (i.e. The participants will be requested to fast overnight (10 hours). A fasting sample of 10 ml blood will be taken from each participant in order to obtain ample blood for the various analyses of the study.)

4.11. Nutritional intake questionnaire.

4.12. Leisure and recreation constraint questionnaires

5. The schedule of the project will be as follow (Specific dates for selected schools will be finalised per arrangement with the principals concerned):

Month and week	Duration
April 2010, week 12 – 16	3 hours per child in a selected school
April 2010, week 19 – 23	3 hours per child in a selected school

Due to the fact that participants will be asked to fast 10 hours without eating breakfast in the morning, therefore sandwiches provision will be made available upon completion of the

measurements. The outcomes of this project will benefit the children and the schools with the information regarding the physical activity status and the determinants of health for future.

Hoping for a positive response.

Yours sincerely,

Thank you,

Prof. M. Andries. Monyeki
(Principal Investigator, NWU-Potchefstroom)

Dr Hanlie Moss
Leader of Niche Area for Physical Activity, Sports and Recreation, NWU-Potchefstroom

APPENDIX B: Information Letter to the Parents and Consent Forms



School of Biokinetics, Recreation and Sport Science

Private Bag x6001,

Potchefstroom

2520

South Africa

INFORMATION LETTER TO THE PARENTS AND CONSENT FORMS: *PAHLS STUDY*

Dear Parent or Guardian,

Your child is been invited to participate in a study entitled – Five year Longitudinal Study of Physical Activity status and the Determinants of Health in Adolescents attending high school in Potchefstroom areas of South Africa (*PAHLS-Study, 2010–2014*).

My name is Professor Makama Andries Monyeki (from Potchefstroom Campus of the North-West University) principal investigator in the project together with the research team would like to ask your permission to allow your child (or a child under your care) to participate in our study. To give the background of the study, research revealed that physical activity in adolescents is drastically declining. The decline in the level of physical activity of human populations has been observed, and such decline is been associated with increased mechanisation, reliance on technology and urbanisation, and the high rate of crime in South Africa. Physical inactivity is thought to be one of the main risk factors for the development of obesity, diabetes, cardiovascular disease, osteoporosis and psychological constraints or risks of behavioural health. Therefore, the purpose of this study is to gather information about physical activity (i.e. by questionnaire & ActiHeart rate monitor) and health determinants (i.e. through measurements of anthropometry, maturation, blood pressure measurement, health-related physical fitness, social and self-efficacy questionnaire, resting metabolic rate, oxygen consumption (by the use of a portable gas analyser apparatus), blood sampling, leisure and recreation constraint questionnaires, nutritional intake questionnaire as questionnaire on risk factors of life) over a period of five years (2010–2014).

Participation in this study is not part of the child's regular classroom work; it is an optional activity in which the learner can choose to participate. The study will assess and test the following variables: anthropometric measurements, maturation, blood pressure measurement, health-related physical fitness, social and self-efficacy questionnaire, resting metabolic rate, oxygen consumption, blood sampling, leisure and recreation constraint questionnaires, nutritional intake questionnaire as questionnaire on risk factors of life. Blood samples will be collected by a registered professional nurse who will be obliged to health profession practices at all times.

The data of the study will be used for research purpose only. The measurements will not be shared with your child classmates or teacher. All information collected in this study will be kept confidential. Your child's participation is important because the information that shall be gathered on him/her will help him/her with knowledge for personal development and life skills.

Your child participation in the project is very important, but it is entirely your choice. If your child chooses to refuse to participate in any part of the study or withdraw from the study at any time, for any reason, this will not cause anyone to be upset or angry, and this will not results in any type of penalty.

There are no costs required from your child (or a child under your care) to participate in the study. Further, no payment will be granted to your child (or a child under your care) for participating in the study.

If you have any question regarding this study, please feel free to call me at (018) 2991790 / e-mail:andries.monyeki@nwu.ac.za or the PHASrec Niche Area Leader Dr Hanlie Moss at (018) 2991821 / e-mail:hanlie.moss@nwu.ac.za. If you have any questions regarding your rights or your child's rights as participants in this study you can call Ms Hannekie Botha at (018) 299 4850 from Potchefstroom Campus of the North-West University Research Ethics Office.

Thank you, in advance, for considering your child participation in this study. Should you choose that your child participate, please read and sign the attached consent form. Keep one

consent form for your records and return the other copy. All received consent form will be kept locked during the entire period of the study. In addition, your child is requested to bring along his/her birth clinic card. The card will be given back to the child immediately after collecting information on birth date and birth weight. A child who shall have returned a completed and signed consent form will participate in the study.

Sincerely,
Prof. Makama Andries Monyeki
Principal Investigator – PAHLS Study
CONSENT FORM
(Parent/Guardian Copy)

FIVE YEAR LONGITUDINAL STUDY OF PHYSICAL ACTIVITY STATUS AND THE DETERMINANTS OF HEALTH IN ADOLESCENTS ATTENDING HIGH SCHOOL IN POTCHEFSTROOM AREAS OF SOUTH AFRICA (*PAHLS-STUDY, 2010–2014*).

I, ..., father/mother/guardian of .....
agree to permit my child to provide the information on physical activity (i.e. by questionnaire & ActiHeart rate monitor) and health determinants (i.e. through measurements of anthropometry, maturation, blood pressure measurement, health-related physical fitness, social and self-efficacy questionnaire, resting metabolic rate, oxygen consumption (by the use of a portable gas analyser apparatus), blood sampling, leisure and recreation constraint questionnaires, nutritional intake questionnaire as questionnaire on risk factors of life), by the researchers at my child school. I understand that the results of this study of Five year longitudinal study of physical activity status and the determinants of health in adolescents attending high school in Potchefstroom areas of South Africa (*PAHLS-STUDY NWP*) will be used for research purpose and nothing else. I am aware that if I have any question or concerns about the study I can contact the researcher at (018) 299 1790 or the PHASRec Niche Area Leader at (018) 299 1821. Any questions or concerns regarding my child rights as a participant in this study can be addressed to Ms Hannekie Botha at (018) 299 4850 from Potchefstroom Campus of the North-West University Research Ethics Office. I understand that there will be no discomfort or foreseeable risks for my child to participate in the study. I understand that all information my child provide will remain strictly confidential. I have read and understand the information provided above and in the information letter. I have been provided with the opportunity to ask questions and my questions have been answered satisfactorily. I consent to have my child participate in the study described above, understanding that he/she may refuse to participate in any part of the study and can withdraw from the study at any time. I have kept one copy of this consent for my records and will return the second copy with the clinic birth card. I am aware that by giving consent my child can participate in the study. The return consent form will be kept locked during the entire period of the study.

Child's Age:.....
Grade:.....
Teacher:.....
School Name:.....

Name of Child:.....

Name of Parent/Guardian:.....

.....	.....
(Signature of Child)	(Signature of Parent/Guardian)
.....	.....
(Date)	(Date)



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

CONSENT FORM (*PAHLS*)

(Return this copy with the demographic questionnaire)

FIVE YEAR LONGITUDINAL STUDY OF PHYSICAL ACTIVITY STATUS AND THE DETERMINANTS OF HEALTH IN ADOLESCENTS ATTENDING HIGH SCHOOL IN POTCHEFSTROOM AREAS OF SOUTH AFRICA (*PAHLS-STUDY, 2010–2014*).

I, ..., father/mother/guardian of .....
agree to permit my child to provide the information on physical activity (i.e. by questionnaire & ActiHeart rate monitor) and health determinants (i.e. through measurements of anthropometry, maturation, blood pressure measurement, health-related physical fitness, social and self-efficacy questionnaire, resting metabolic rate, oxygen consumption (by the use of a portable gas analyser apparatus), blood sampling, leisure and recreation constraint questionnaires, nutritional intake questionnaire as questionnaire on risk factors of life), by the researchers at my child school. I understand that the results of this study of Five year longitudinal study of physical activity status and the determinants of health in adolescents attending high school in Potchefstroom areas of South Africa (*PAHLS-STUDY NWP*) will be used for research purpose and nothing else. I am aware that if I have any question or concerns about the study I can contact the researcher at (018) 299 1790 /e-mail:andries.monyeki@nwu.ac.za or the PHASRec Niche Area Leader at (018) 299 1821 /e-mail:hanlie.moss@nwu.ac.za. Any questions or concerns regarding my child rights as a participant in this study can be addressed to Ms Hannekie Botha at (018) 299 4850 from Potchefstroom Campus of the North-West University Research Ethics Office. I understand that there will be no discomfort or foreseeable risks for my child to participate in the study. I understand that all information my child provide will remain strictly confidential. I have read and understand the information provided above and in the information letter. I have been provided with the opportunity to ask questions and my questions have been answered

satisfactorily. I consent to have my child participate in the study described above, understanding that he/she may refuse to participate in any part of the study and can withdraw from the study at any time. I have kept one copy of this consent for my records and will return the second copy with the clinic birth card. I am aware that by giving consent my child can participate in the study. The return consent form will be kept locked during the entire period of the study.

Child's Age:.....

Grade:.....

Teacher:.....

School Name:.....

Name of Child:.....

Name of Parent/Guardian:.....

.....	.....
(Signature of Child)	(Signature of Parent/Guardian)
.....	.....
(Date)	(Date)

APPENDIX C: Figure Rating Scale of Stunkard et al. (1994)

PHAL-STUDY

BODY IMAGE: Silhouette scale –

Female/Vroulik Date/

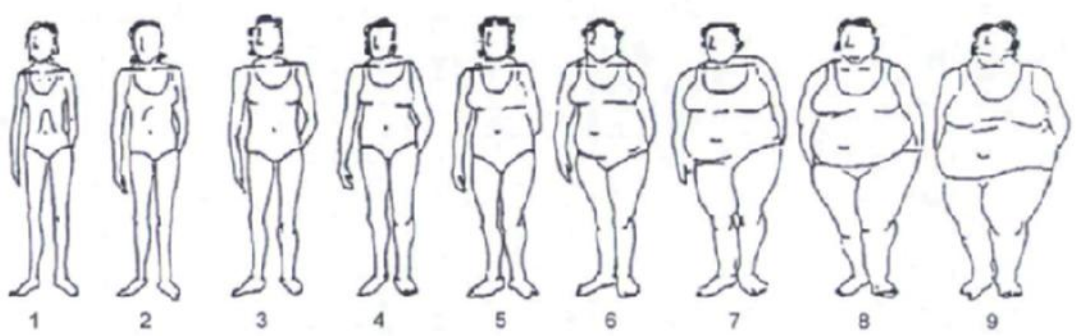
Datum:_____ Subject nr / Proefpersoon nr:_____

Age / Ouderdom: _____

SECTION A / AFDELING A

Mark (x) the figure that mostly represent yourself at this moment in your life.

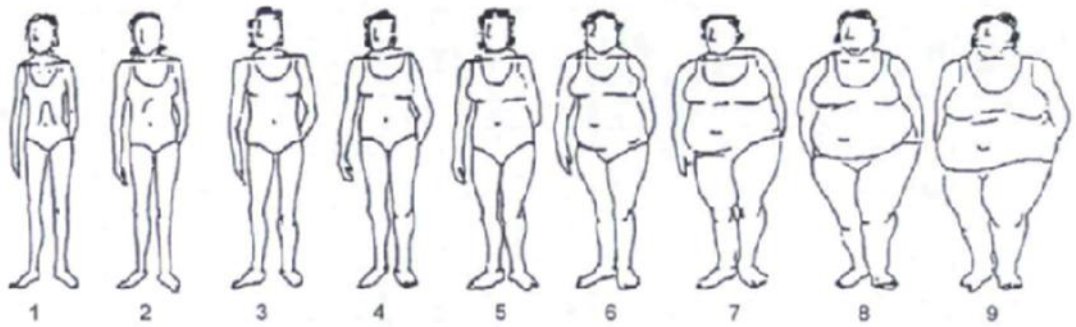
Merk (x) die figuur wat die meeste soos jy lyk op hierdie stadium van jou lewe.



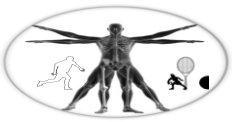
SECTION B / AFDELING B

Mark (x) the figure that you would like to look like. (If it's the same figure – you can mark the same one again)

Merk (x) die figuur soos wat jy graag wil lyk. (Indien dit dieselfde figuur is – kan jy dit weer 'n keer merk)



APPENDIX D: Anthropometry Proforma



PAHLS Project - Anthropometry Proforma

Subject number:	

Name: …… Sport: ……

Surname first names

Date of Birth:			
	Day	Month	Year

Test Date:			
	Day		Month

Year

Box height: .....

Gender: M ☐ F ☐

	ID	*Site*	*Trail 1*	*Trail 2*	*Trail 3*	*Mean/ Median*

Basic	1	Body mass				
	2	Stature				
	3	Sitting height				
	4	Armspan				

Skinfolds	5a	Triceps : R				
(SF)	5b	Triceps : L				
(mm)	6a	Subscapular : R				
	6b	Subscapular : L				
	7a	Biceps : R				
	7b	Biceps : L				
	8a	Supraspinale : R				
	8b	Supraspinale : L				
	9	Abdominal : R				
	10a	Front thigh : R				
	10b	Front thigh : L				
	11a	Medial calf : R				
	11b	Medial calf : L				

Girths	12	Head				
GR	13a	Arm (relaxed) : R				
(cm)	13b	Arm (relaxed) : L				

	14a	Arm (flexed & tensed) : R				
	14b	Arm (flexed & tensed) : L				
	15	Waist (minimum)				
	16	Gluteal (hips)				
	17a	Thigh (mid) : R				
	17b	Thigh (mid) : L				
	18a	Calf (maximum) : R				
	18b	Calf (maximum) : L				

Breadths	19	Wrist				
BR	20	Ankle				
(cm)	21	Foot length				
	22	Humerus				
	23	Femur				

APPENDIX E: Physical Fitness Date Form

PAHLS PHYSICAL FITNESS DATA FORM

NAME OF LEARNER: _____

SUBJECT NO. _____

TEST COMPONENT	**1ST TIME**		
POLE HEIGHT (CM)			
Vertical jump Reaching height (cm)	**A**		
FINAL VERTICAL JUMP HEIGHT A-B (cm)			
TEST COMPONENT	**1ST READING**	**2ND READING**	**HIGHEST**
Vertical jump height (cm)			**B**
Tendo peak power (W)			
Tendo speed (m/sec)			
TEST COMPONENT	**1ST READING**	**2ND READING**	**HIGHEST**
horizontal jump distance (cm)			
TEST COMPONENT	**1ST READING**	**2ND READING**	**HIGHEST**
basketball throw distance (m)			
TEST COMPONENT	**1ST READING**	**2ND READING**	**HIGHEST**
L: hand grip strength (kg)			
R: hand grip strength (kg)			

TEST COMPONENT	**1ST READING**							
ABDOMINAL STRENGTH TEST (LEVEL)	0	1	2	3	4	5	6	7

TEST COMPONENT	**1ST TIME**
bent arm hang (sec)	

TEST COMPONENT	**1ST TIME**
sit ups (reps)	

TEST COMPONENT	**1ST READING**	**2ND READING**	**LOWEST**
5m Speed (sec)			
10m speed (sec)			
40m speed (sec)			

TEST COMPONENT	**1ST READING**	**2ND READING**	**LOWEST**
L: agility 505-test (sec)			
R: agility 505-test (sec)			

TEST COMPONENT	**1ST READING**
Gender	**M / F**
birth date	**year / month / day**

20M SHUTTLE RUN							
LEVEL	**SHUTTLE NUMBER AND HEART RATES**						
1	1	2	3	4	5	6	7

2	1		2		3		4		5		6		7	8
3	1		2		3		4		5		6		7	8
4	1		2		3		4		5		6		7	8	9
5	1		2		3		4		5		6		7	8	9
6	1		2		3	4		5	6		7		8	9	10
7	1		2		3	4		5	6		7		8	9	10
8	1		2		3		4	5	6		7		8	9	10	11
9	1		2		3		4	5	6		7		8	9	10	11
10	1		2		3		4	5	6		7		8	9	10	11
11	1		2		3		4	5	6	7	8		9	10	11	12
12	1		2		3		4	5	6	7	8		9	10	11	12
13	1	2	3		4		5	6	7		8		9	10	11	12	13
14	1	2	3		4		5	6	7		8		9	10	11	12	13
15	1	2	3		4		5	6	7		8		9	10	11	12	13
16	1	2	3		4		5		6	7	8	9	10		11	12	13	14
17	1	2	3		4		5		6	7	8	9	10		11	12	13	14
18	1	2	3		4	5		6	7	8		9	10		11	12	13	14	15
19	1	2	3		4	5		6	7	8		9	10		11	12	13	14	15
20	1	2	3		4	5		6	7	8	9	10	11	12	13	14	15	16

TEST COMPONENT **1ST TIME**

$\dot{V}O_{2\max}$ (ML/KG/MIN) - INDIRECT	

$\dot{V}O_{2\max}$ (ML/KG/MIN) - DIRECT	

ve_{MAX} (l/MIN) – DIRECT

r_{MAX} – DIRECT

hr_{MAX} (BEATS/MIN) - DIRECT

APPENDIX F: Ethics Approval for PAHL-Study

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Email Ethics@nwu.ac.za

ETHICS APPROVAL OF PROJECT

The North-West University Ethics Committee (NWU-EC) hereby approves your project as indicated below. This implies that the NWU-EC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Five year Longitudinal Study of Physical Activity status and the Determinants of Health in Adolescents attending high school in Potchefstroom areas of South Africa (PAHLS-Study)

Ethics number:

N	W	U	-	0	0	5	8		-	1	0	-	A	1
Institution				Project Number						Year			Status	

Status: S = Submission, R = Re-Submission, P = Provisional Authorisation, A = Authorisation

Approval date: 2010/07/19 **Expiry date**: 2015/07/18

Special conditions of the approval (if any): None

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The project leader (principle investigator) must report in the prescribed format to the NWU-EC:*
  - *annually (or as otherwise requested) on the progress of the project,*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-EC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-EC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-EC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-EC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the Ethics Committee for any further enquiries or requests for assistance.

Yours sincerely

Prof MMJ Lowes
(chair NWU Ethics Committee)

APPENDIX G: Acknowledgement of Language Review

27 February 2016

I, **Ms Cecilia van der Walt**, hereby confirm that I took care of the **editing** of the **M Dissertation** of **Ms Nelia Greeff** titled ***BODY IMAGE, BODY COMPOSITON AND PHYSICAL FITNESS IN FEMALE ADOLESCENTS.***

MS CECILIA VAN DER WALT

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