

# Ethnic differences in eating attitudes, body image and self-esteem among adolescent females living in urban South Africa

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## Abstract

**Objective:** To examine differences between black and white female adolescents in eating attitudes, body image perceptions, and self-esteem, and the association of these with body mass index (BMI). **Methods:** A cross-sectional survey of 340 urban South African adolescent girls aged 13, 15 and 17 years, attending private and government (public) high schools. EAT-26, body image and self-esteem questionnaires were administered, and height and weight was measured to determine BMI. The associations between BMI and EAT-26, body image perceptions, and self-esteem scores were determined in the different ethnic and age groups. **Results:** There was a significant difference in eating attitudes, body image perceptions, and self-esteem between the ethnic groups ( $P < 0.05$ ). Significantly more black girls (31.2%) reported an EAT-26 score  $\geq 20$  (predisposition to an eating disorder) compared to white girls (19.7%) even though the prevalence of overweight/obesity among the white girls was higher (29.5%) than in their black peers (25.1%) ( $P = 0.37$ ). White girls had a higher BMI and lower self-esteem, yet better body image score compared to their black peers. Black girls exhibited a greater tendency to control what they ate compared to white girls, while more white girls had a desire to be thinner compared to black girls. **Conclusion:** The results suggest that exposure of Western norms of thinness in a multiethnic and cultural urban setting is influencing both eating attitudes and behaviour. These findings are highly relevant for all African countries undergoing transition, and important in the development of interventions to optimise adolescent health prior to adulthood.

**Keywords:** Ethnicity; Eating attitudes; Body image; Self-esteem; Girls; South Africa

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## Introduction

Black adult African women are more likely to be obese in a middle-income country like South Africa.<sup>1</sup> In South Africa, the prevalence of overweight and obesity among black women is 58.5%, which is higher than other South African ethnic groups (mixed ancestry 52%, white 49.2%, Indian 48.9%).<sup>1</sup> This higher prevalence is likely to be the result of a complex interaction of biological, cultural, environmental and physiological factors<sup>2</sup>, and for black South African women in particular, the concepts of cultural beliefs around fatness may be a key contributing factor. Research from African countries has shown that leanness is not necessarily perceived as beautiful, but rather being plump (overweight) signifies beauty, health and higher social status.<sup>2,3</sup> Research from South Africa has confirmed that black women associate overweight with happiness, affluence, and the absence of disease (such as HIV/AIDS)<sup>4</sup>, and having overweight children is a measure of 'good' parental care.<sup>3</sup>

Recently, there have been conflicts between traditional cultural perceptions around plumpness and the Western culture desire to be thin among females. Nevertheless, the increasing desire for a slimmer shape amongst girls

in Western, and non-Western cultures, is a growing public health concern because of its association with eating disorders and poor weight management strategies.<sup>5,6</sup> More girls than boys express a feeling of discontent with their body size and shape, and the pattern of disordered eating habits is now starting at an earlier age than previously.<sup>2,7</sup> There is growing evidence to indicate that eating disorders may also be occurring in South African ethnic groups other than Caucasian populations as a result of increasing exposure to 'Western' norms around thinness.<sup>5,8,9</sup> Due to the high risk of obesity among African girls and women and the concomitant increase in the risk of metabolic disease<sup>10</sup>, it is important to understand the influence of cultural norms around eating attitudes and body image in a multi-ethnic transitioning society. Therefore, the aim of this research was to determine whether there is a difference in eating attitudes, self-esteem and body dissatisfaction between ethnic groups in urban South African adolescent girls.

## Methods

### Sample

A sample of adolescent girls stratified according to ethnicity and age was obtained from a mix of private and public (government model C) high schools in Johannesburg, South Africa. A proposal for participation was submitted to several schools based on their location and demographic composition, and adolescents were recruited only from schools that were willing to participate. The rationale and procedures of the study were explained to all adolescents who met the age criteria. Those interested in participating

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in the study were provided with consent forms for them and their parents to complete. A random sample of those children who returned both completed written informed consent forms and were available during the timeslot allocated by the school for the study were recruited.

A total of 340 girls were randomly selected from the volunteers and participants were included until our stratified target samples were reached, (183 black and 157 white girls, aged 13 (n=115), 15 (n=113) and 17 (n=112) years). Our intent was not to conduct a regional survey of all ethnic groups, though we acknowledge the value of that type of study, but more to comprehensively examine acculturation of black South African adolescents by using a white group as a reference ethnic group to represent "Western" culture in South Africa. Written informed consent was obtained from the girls' guardian and written assent from the participants themselves. The study was approved by the Committee for Research on Human Subjects of the University of the Witwatersrand.

#### Data collection

Information on age, school year, anthropometrics and type of school (private or public) was obtained from each adolescent by a team of trained data collectors. Height was measured using a portable stadiometer (Holtain; UK) and recorded to the nearest millimetre, and weight was measured to the nearest 100 g, using a digital scale. Participants were measured in light clothing without shoes. All height and weight measurements were collected by the same female research assistant to ensure consistency as well as low measurement variability. The research assistant's coefficient of variation was below 2%. Height and weight measurements were used to compute the participant's body mass index (BMI) in kg/m<sup>2</sup>. Age- and gender-specific adolescent cut-off points were used to define overweight and obesity.<sup>11</sup>

A trained team of two field workers administered the questionnaire, explained each questionnaire section, and clarified any confusion in both English and the language of choice of the participant. All participants completed the 26-item Eating Attitudes Test (EAT-26)<sup>12</sup>, which had been validated previously in both rural<sup>13</sup> and urban<sup>14</sup> children in South Africa. These researchers considered EAT-26 to be a sufficiently valid measure of dysfunctional eating attitudes and behaviours in this population. The overall score was obtained by summing the scores for each of the 26 items. Subjects with an overall score of  $\geq 20$  are considered to more likely display possible eating disorders<sup>15</sup>. EAT-26 was then classified into three sub-scores, namely: dieting, bulimia and food preoccupation, and oral control. Participants completed the Rosenberg self-esteem scale, which has been previously used in South Africa<sup>16</sup>. Scores were categorized into three; low (scores 1-2), average (score of 3) and high (scores of 4-5), with a high score indicating a high self-esteem<sup>17</sup>.

The body perception of body image scale consists of 10 items. It assesses attitudes related to body shapes and the degree to which participants are dissatisfied with different parts of their body such as the stomach, hips, and buttocks. Perceptions of body image among our participants was measured using a 5-point scale ranging from 'very satisfied' to 'very dissatisfied', the higher the score the more dissatisfied the participant was with their body image. The scores were later divided into; low dissatisfaction (score=1 and 2), average (score=3) and high dissatisfaction (score=4 and 5). Further, participants were asked to associate different body shapes from a series of

randomly placed silhouettes, with specific words or phrases (such as looks clumsy, happy, worst, strong, happiest, best, less respect, more respect, unhappy). These silhouettes, based on Stunkard's body silhouettes<sup>18</sup>, have been validated in South African adolescent females<sup>19</sup>. For analysis purposes the body silhouettes were coded 1 to 8 (from the thinnest to the fattest). Participants were also required to select a body silhouette which they identified as representing their current body shape (i.e. 'actual' figure), as well as the body shape that they would desire to have (i.e. 'ideal figure'). Body discrepancy was calculated by determining the difference between the 'actual' and 'ideal' figure, which is termed the 'Feel minus Ideal Discrepancy or FID' and indicates body discrepancy. Negative, zero and positive scores indicated desire to be thinner, content with body shape and desire to be fatter, respectively<sup>8,18,20</sup>. The participants were also asked to select silhouettes, which they believed their family (family ideal) and peers (peers ideal) would want them to have.

#### Statistical analyses

Statistical analyses were performed using a statistical package STATA version 11 (StataCorp Texas, USA). Cronbach's Alpha reliability test was done to test for internal consistency of the questionnaires. Wilcoxon-Mann-Whitney test was used to test for significant differences between ethnic groups across each of the EAT-26 sub-scores. ANOVA tests were used to evaluate if there were significant differences in body dissatisfaction, eating attitudes and self-esteem by age and ethnicity. Comparisons of the mean body image and self-esteem scores across age group, weight status and ethnicity were made using Scheffe's test to adjust for multiple comparisons among groups with unequal sample sizes. A chi-square test was carried out to test the significant differences between EAT-26 cut-offs ( $\geq 20$  and  $<20$ ), BMI cut-offs, body image and self-esteem categories across ethnicity. Spearman's rank correlation coefficient analyses were conducted to test for associations between the independent variables. A p-value  $<0.05$  was considered statistically significant.

#### Results

Table 1 presents descriptive data of the sample. There was a similar distribution of the ethnic groups within the three age groups and within the whole sample, with 46.2% of participants being white and 53.8% black. The majority of both white (87.3%) and black (86.9%) participants attended public schools. Overall, white girls had a higher BMI ( $22.6 \pm 4.3$ ) than black girls ( $21.5 \pm 4.2$ ) ( $p=0.03$ ). In Table 1 the prevalence of overweight/obesity is presented for the different age groups, however, when the age groups are combined the prevalence among the white girls is 29.2% and 25.1% in black girls. Overall, 29.5% of the white females were overweight as compared to blacks (25.1%)  $p=0.37$ .

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

**Table 1: Characteristics of study participants**

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

\* Differences between black and white girls were statistically significant

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

groups within the different age groups ( $X^2=2.98$ ;  $p=0.226$ ), when the age group data were combined significantly more black girls (31.2%) than white girls (19.7%) had an EAT-26 score  $\geq 20$  ( $X^2=5.6$ ;  $p<0.05$ ). Of the sub-components of the EAT-26 questionnaire, only the oral control sub-score was significantly higher in black than white girls ( $p=0.009$ ) (Figure 1).

For the whole group, self-esteem was higher in black than white girls with 59.5% of the white girls reporting a low self-esteem compared to only 26.7% of the black girls ( $X^2= 20.5$ ;  $p=0.001$ ) as shown in Figure 2. There was also a significant difference between the ethnic groups at 17 years of age with the white girls having a self-esteem that was lower than the black girls ( $X^2=14.8$ ;  $p=0.001$ ).

Dissatisfaction with body image was significantly lower in the white than black girls ( $X^2=33.5$ ;  $p=0.0001$ ) as shown in Figure 3. There were also significant differences in perceptions of body image between the ethnic groups within the age groups with the black girls being more dissatisfied than their white peers at age 13 ( $X^2=6.4$ ;  $p=0.04$ ), 15 ( $X^2=15.4$ ;  $p=0.001$ ) and 17 ( $X^2=19.8$ ;  $p=0.0001$ ) years.

BMI was inversely associated with dissatisfaction with body image (whites:  $r=-0.40$ ;  $p=0.0001$ ; blacks:  $r=-0.30$ ;  $p=0.0001$ ) and positively associated with EAT-26 score (whites:  $r=0.30$ ;  $p=0.0001$ ; blacks= $0.16$ ;  $p=0.038$ ). The self-esteem score was inversely associated with body dissatisfaction among the whites ( $r=0.49$ ;  $p<0.0001$ ) and

negatively correlated with EAT-26 ( $r=-0.285$ ;  $p=0.004$ ). There was no significant association between self-esteem and body image among blacks.

Data on the girls' perceptions of different body shapes are presented in Table 2. There were significant differences in perception of silhouettes by ethnicity. The majority of black girls chose a silhouette with a higher BMI to be the 'best' and to receive more 'respect', than the BMI chosen by the white girls ( $P<0.05$ ). The white girls perceived a higher BMI silhouette to be 'clumsier' than black girls ( $P<0.05$ ) and the black girls perceived a low BMI silhouette to receive less respect than the white girls. Black girls perceived that their family and friends desired them to have a higher BMI than that indicated to be the perceptions of the family and friends of their white counterparts. There was no significant association between body image perceptions and the type of school (indicator of socio-economic status) they attended.

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

## Discussion

The study highlights the complexities governing adolescent females' perceptions of body image, self-esteem, and eating attitudes in a multi-ethnic, highly transitioning, urban

Figure 1: Distribution of eating attitudes among black and white female adolescents

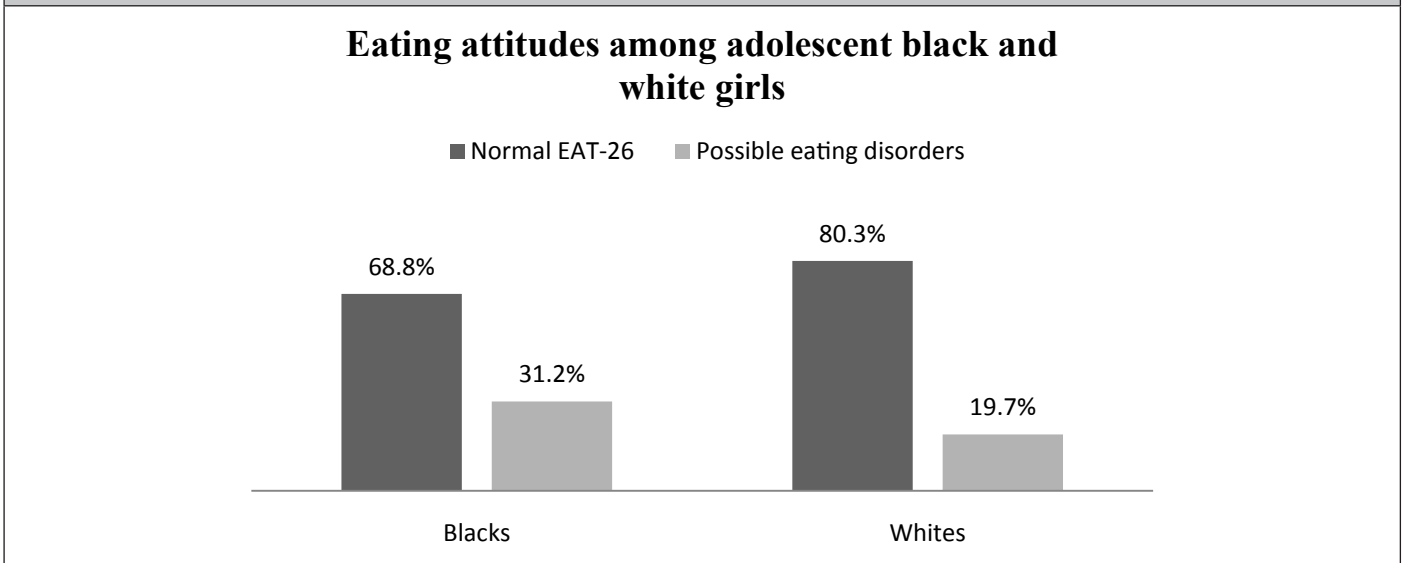


Figure 2: Distribution of self-esteem among black and white female adolescents

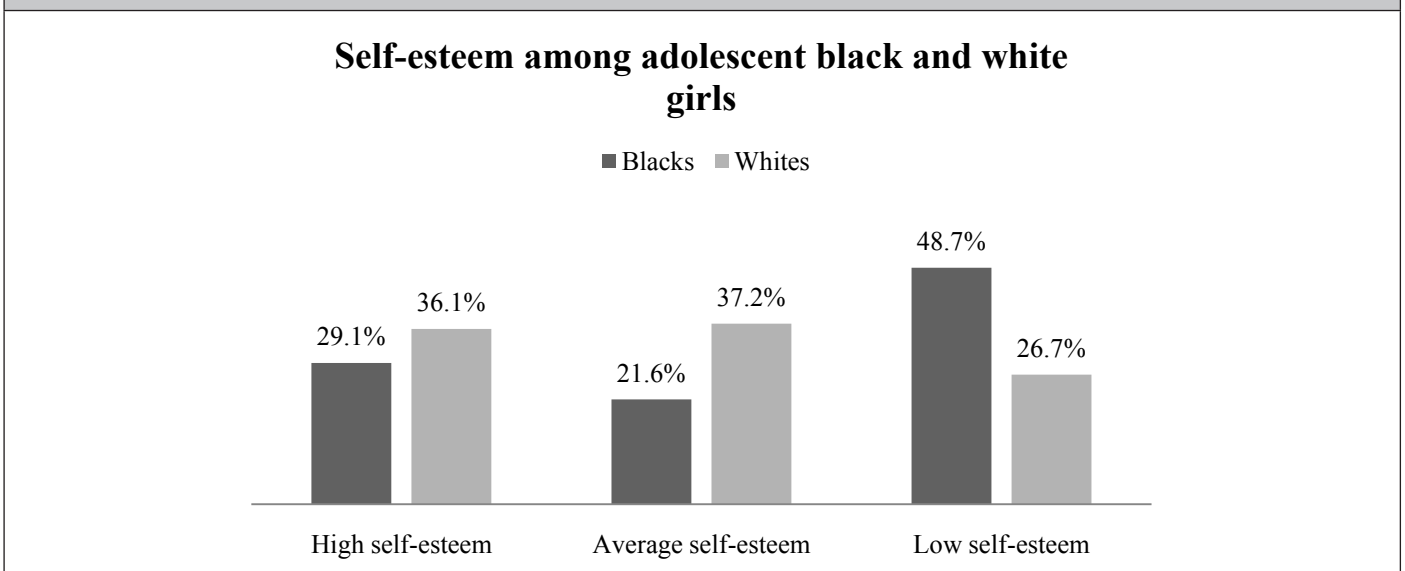
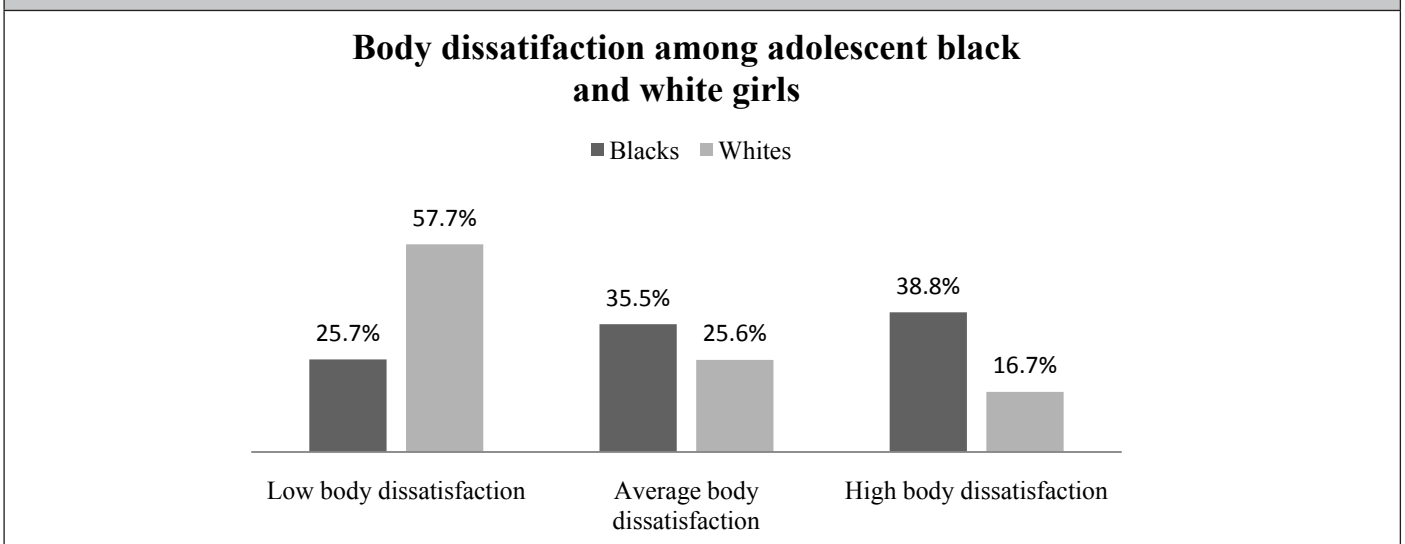


Figure 3: Distribution of body dissatisfaction among black and white female adolescents



**Table 2: The association of body silhouettes with attributes as assessed by black and white South African girls**

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

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

\* Significant difference across race

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

Our study does not show differences in perceptions of body image, eating attitudes or self-esteem between the different age groups. This is not consistent with findings from previous studies in high-income countries. Hoare and Cosgrove, observed more abnormal eating scores, lower self-esteem and more body dissatisfaction in older than younger girls.<sup>21</sup>

Our findings indicated a higher prevalence of possible eating disorder pathology (EAT-26 ≥ 20) among black females (31.2%) compared to their white peers (19.7%). This supports previous research in South African, which showed that black females are at a higher risk of eating disorders than white females and demonstrates a possible marked increase in prevalence among black adolescent girls and a decrease among white adolescent girls recently. Le Grange et al observed that 11% of white and 13% of black females<sup>9</sup> and Senekal et al reported that 14% of black females scored above the EAT-26 cut-off.<sup>22</sup> This could be as a result of conflict between traditional cultural beliefs and 'Western' expectations, with black urban teenagers embracing Western norms to fit in with the demands of Western culture. This suggests that acculturation is slowly

gaining hold among black urban adolescent females and eroding the more traditional/cultural concepts of an overweight female being beautiful, healthy and affluent.

Our results show a higher percentage (25.4%) of adolescent girls had high EAT-26 scores than previous South African studies, which found a prevalence between 13% and 22%, also using the EAT-26<sup>9,23</sup>. The higher prevalence in our study could be attributed to the fact that the other studies had been done some fifteen years previously, with the current adolescents being exposed to greater pressures to fit in with 'Western' norms<sup>8</sup>. A similar explanation might account for the differences in findings between our study and those of Szabo.

Our study suggests that black girls experience a significant increase in oral control behaviours, indicating a greater tendency to restrict their intake and being more concerned about physical appearance than their white counterparts. However, Szabo found a greater prevalence of bulimic symptoms in black students than their whites peers<sup>23</sup>. These differences could be a result of the different time periods in which the studies were carried out; Szabo's study was done over 10 years earlier than our study and thus our girls might have been exposed to greater urbanization pressures.

We showed a significant linear association between BMI and EAT-26 score in both the black and white girls suggesting that the heavier girls were more likely to present with disturbed eating behaviours. This is likely as overweight females are more likely to engage in weight control behaviours such as oral control and dieting behaviours<sup>24</sup>. Our study also showed that black girls had a lower BMI and higher EAT-26 score than the whites; we speculate that black girls are slowly adopting Western norms, which emphasize leaner body sizes/shapes hence encouraging inappropriate weight control behaviours such as dieting and oral control. The higher BMI in white girls is different to what is seen in older South African women, where the prevalence of obesity is higher in blacks as compared to the whites<sup>25</sup>. This may suggest that the shift in overweight and obesity in black females occurs later in early adulthood<sup>4</sup>. White females

were also found to have lower self-esteem than their black peers. Low self-esteem among overweight and obese white females might be attributed to the cultural differences between blacks and whites. Among black females overweight is associated with affluence, health, body and being HIV/AIDs negative<sup>3</sup> whereas whites associate a leaner body with beauty.<sup>26</sup> These findings are in line with a study that was done in the U.S, which demonstrated that black girls have a high self-esteem than whites<sup>27</sup>. Our study found that high self-esteem is associated with low eating attitude scores, which is consistent with the findings of Hoare and Cosgrove of an higher eating attitude score (possible eating disorder) being associated with a lower self esteem<sup>21</sup>. Our study has also shown that the majority of white and black girls reported a desire to be thin, although close to 30% of the black girls still wanted to be fatter compared to only 10% of the white girls. We can only speculate that cultural perceptions on ideal body shape play a role here, where blacks strive to be fatter and whites leaner. Previous findings in the US are consistent with our research<sup>26</sup> and other research has shown that black females demonstrated a preference for a heavier body size and perceived greater approval of a heavier body size from both their peers and family as compared to whites.<sup>28</sup>

In the current study, black girls demonstrated significantly greater dissatisfaction with their body image as compared to whites. A number of South African studies on body image have shown inconsistent results. Walker et al.<sup>29</sup> found that both white and black girls experienced body dissatisfaction, while a more recent study that examined body dissatisfaction among white urban, black urban and black rural girls, found white urban girls were more dissatisfied compared to urban and rural black girls<sup>30</sup>. However, Caradas et al.<sup>8</sup> observed that white girls had a significantly better body image (more satisfied) than their black counterparts. This might be as a result of the increased body discrepancy among black teenagers as the majority of the black girls desired to be bigger or smaller (not content with their current body shape/size) compared to whites. Our study demonstrated that an increase in BMI was associated with better body image. These findings are not in agreement with previous studies that found obesity to be strongly associated with poor body image<sup>31</sup>.

Our study also highlights the influence of peer and family opinions on the adolescents' perception of an ideal body shape and support the findings of Paxton et al.<sup>32</sup>. Previous studies have shown that parental influences play a vital role in their children's eating attitudes as children tend to attach importance to their parents' comments and preference on physical appearance and emphasis on a leaner body shape/size. Similarly, peer teasing and negative comments on female adolescents' body shapes/sizes have been linked to body dissatisfaction, occurrence of eating disturbances and low self-esteem<sup>33</sup>.

This study has a limitation in that the measure of cause-effect relationships as it is difficult to establish these in a cross-sectional study. It is imperative that these factors be examined longitudinally throughout adolescence in order to identify precursors and trends in eating related pathology; and we are currently conducting such a study. Another limitation is that the study sample was obtained through convenience sampling and was restricted to the city of Johannesburg only. For findings to be applicable to a general South African adolescent population, a

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

## Conclusion

We conclude that there are significant ethnic differences in eating attitudes, body image and self esteem between black and white South African adolescent girls, however eating attitudes and body image were similarly associated with BMI in both ethnic groups. It appears that many of these differences may still be due to cultural demands and preferences on the adolescent girls. This study offers evidence that acculturation of Western ideals of thinness is occurring in urban black South African females. Despite this, there is an increasing prevalence of adult female obesity in South Africa, currently standing at 35%, 1 and an associated high metabolic disease burden 10. The study is highly relevant for all African countries undergoing transition where researcher and policy leaders grapple with the development of interventions to optimise adolescent health prior to adulthood.

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## References

1. Puoane T, Steyn K, Bradshaw D, Laubscher R, Fourie J, et al. Obesity in South Africa: the South African demographic and health survey. *Obes Res* 2002; 10: 1038-1048.
2. Muris P, Meesters C, van de Blom W, Mayer B. Biological, psychological, and sociocultural correlates of body change strategies and eating problems in adolescent boys and girls. *Eat Behav* 2005; 6: 11-22.
3. Mvo Z, Dick J, Steyn K. Perceptions of overweight African women about acceptable body size of women and children. *Curationis* 1999; 22: 27-31.
4. Puoane T, Fourie JM, Shapiro RN, Rosling L, Tshaka NC, et al. 'Big is beautiful' - an exploration with urban black community health workers in a South African township. *South African Journal of Clinical Nutrition* 2005; 18: 6-15.
5. Szabo CP, Hollands C. Factors influencing eating attitudes in secondary-school girls in South Africa-a preliminary study. *South African Med J* 1997; 87: 531-533.
6. Nakamura K, Hoshino Y, Watanabe A, Honda K, Niwa S, et al. Eating problems in female Japanese high school students: a prevalence study. *Int J Eat Disord* 1999; 26: 91-95.
7. VandenBerg P, Neumark-Sztainer D, Cafri G, Wall M.

- Steroid use among adolescents: longitudinal findings from Project EAT. *Pediatrics* 2007; 119: 476-486.
8. Caradas AA, Lambert EV, Charlton KE. An ethnic comparison of eating attitudes and associated body image concerns in adolescent South African schoolgirls. *J Hum Nutr Diet* 2001; 14: 111-120.
  9. le Grange D, Telch CF, Tibbs J. Eating attitudes and behaviors in 1,435 South African Caucasian and non-Caucasian college students. *The American journal of psychiatry* 1998; 155: 250-254.
  10. Mayosi BM, Flisher AJ, Lalloo UG, Sitas F, Tollman SM, et al. The burden of non-communicable diseases in South Africa *Lancet* 2009; 374: 934-947.
  11. Cole JT, Mary CB, Katherine MF, William HD. Establishing a standard definition for child overweight and obesity worldwide. *International survey BMJ* 2000; 320.
  12. Garner DM, Garfinkel PE. The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. *Psychol Med* 1979; 9: 273-279.
  13. Szabo CP, Allwood CW. Application of the Eating Attitudes Test EAT-26 in a rural, Zulu speaking, adolescent population in South Africa. *World Psychiatry* 2004; 3: 169-171.
  14. Szabo CP, Allwood CW. A cross-cultural study of eating attitudes in adolescent South African females. *World Psychiatry* 2004; 3: 41-44.
  15. Park J, Beaudet MP. Eating attitudes and their correlates among Canadian women concerned about their weight. *Eur Eat Disord Rev* 2007 15: 311-320.
  16. le Grange D, Louw J, Russell B, Nel T, Silkstone C. Eating attitudes and behaviours in South african adolescents and young adults. *Transcult Psychiatry* 2006; 43: 401-417.
  17. Rosenberg M. *Society and the adolescent self-image* Princeton, Princeton University Press, NJ, USA, 1965.
  18. Stunkard AJ, Sorensen T, Schulsinger F. Use of the Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis* 1983; 60: 115-120.
  19. Mchiza Z, Goedecke JH, Steyn NP, Charlton K, Puoane T, et al. Development and validation of instruments measuring body image and body weight dissatisfaction in South African mothers and their daughters. *Public Health Nutr* 2005; 8: 509-519.
  20. Mchiza ZJ, Goedecke JH, Lambert EV. Intra-familial and ethnic effects on attitudinal and perceptual body image: a cohort of South African mother-daughter dyads. *BMC Public Health* 2011; 11: 433.
  21. Hoare P, Cosgrove L. Eating habits, body-esteem and self-esteem in Scottish children and adolescents. *J Psychosom Res* 1998; 45: 425-431.
  22. Senekal M, Steyn NP, Mashego TAB, Nel JH. Evaluation of body shape, eating disorders and weight management related parameters in black female students of rural and urban origins. *South African Journal of Psychology* 2001; 31: 45-53.
  23. Szabo CP. Eating attitudes among black South Africans. *Am J Psychiatry* 1999; 156: 981-982.
  24. Neumark-Sztainer D, Rock CL, Thornquist MD, Cheskin LJ, Neuhaus ML, et al. Weight-control behaviors among adults and adolescents: associations with dietary intake. *Prev Med* 2000; 30: 381-391.
  25. Goedecke JH, Utzschneider K, Faulenbach MV, Rizzo M, Berneis K, et al. Ethnic differences in serum lipoproteins and their determinants in South African women. *Metabolism: clinical and experimental* 2010; 59: 1341-1350.
  26. Stevens J, Kumanyika SK, Keil JE. Attitudes toward body size and dieting: differences between elderly black and white women. *Am J Public Health* 1994; 84:1322-1325.
  27. Van den Berg PA, Mond J, Eisenberg M, Ackard D, Neumark-Sztainer D. The link between body dissatisfaction and self-esteem in adolescents: similarities across gender, age, weight status, race/ethnicity, and socioeconomic status. *J Adolesc Health* 2010; 47: 290-296.
  28. Parnell K, Sargent R, Thompson SH, Duhe SF, Valois RF, et al. Black and white adolescent females' perceptions of ideal body size. *J Sch Health* 1996; 66: 112-118.
  29. Walker AR, Walker BF, Locke MM, Cassim FA, Molefe O. Body image and eating behaviour in interethnic adolescent girls. *J R Soc Health* 1991; 111: 12-16.
  30. Szabo CP, Hollands C. Abnormal eating attitudes in secondary-school girls in South Africa--a preliminary study. *S Afr Med J* 1997; 87: 524-526.
  31. Bulik CM, Wade TD, Heath AC, Martin NG, Stunkard AJ, et al. Relating body mass index to figural stimuli: population-based normative data for Caucasians. *Int J Obes Relat Metab Disord* 2001; 25: 1517-1524.
  32. Paxton SJ, Schutz HK, Wertheim EH, Muir SL. Friendship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviors, and binge eating in adolescent girls. *J Abnorm Psychol* 1999; 108: 255-266.
  33. Halliwell E, Harvey M. Examination of a sociocultural model of disordered eating among male and female adolescents. *Br J Health Psychol* 2006; 11:235-248.