Author's response to reviews

Title: Intra-familial and ethnic effects on attitudinal and perceptual body image of South African women

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Author's response to reviews: see over
Reviewer 2: Miranda Pallan

We will like to extend our gratitude to the reviewer for taking time to review our manuscript. Responses are in red font below each comment.

Title:
1. The title refers to intra-familial and ethnic effects of body image on South African women. The interest of this study is that it looks at mother and daughter diads, so I would suggest the title is changed to better reflect this.

Intra-familial and ethnic effects on attitudinal and perceptual body image: a cohort of South African mother-daughter dyads (See page 1)

Methods:
2. Under the study population section the authors describe the mother-daughter diads that were included in the sample. It is not clear who were excluded. From what is written, it looks like mothers and daughters of different ethnicities were excluded. If this is the case, this should be made clearer, and some justification for this exclusion should be given.

To control for the potential confounding effects of diverging cultural/ethnicity beliefs within mother-daughter pairs, in our sample we excluded all mother-daughter pairs that were of mixed race (meaning that we excluded those pairs comprised of mothers who were of different ethnicity to their daughters). Ethnicity was used as an independent variable. (Paragraph 2 page 6)

3. A little more detail should be given on the silhouettes used to measure body image; how exactly was the instrument administered to the mothers and daughters; does each silhouette correspond to an actual BMI value or BMI? A psychometric evaluation of the instrument should also be given.

Figural stimuli were used to identify body size and shape status of the girls and their mothers. A set of eight silhouettes ranging from the very thin to very heavy derived from the Pathways Study (Stevens et al., 1999) were redrawn and modified to represent ethnic diversity in South Africa, with permission obtained. These changes did not affect the original body sizes and shapes. Further, a set of eight silhouettes also ranging from the very thin to very heavy were used for mothers adopted from the Stunkard’s body image figures (Stunkard et al., 1983). These silhouettes were allocated numbers 1 to 8 from left to right and the numbers were used for comparative analyses. The silhouettes were grouped into four categories following the internationally successfully use of classification [McElhone et al., 1999; Pimenta et al., 2009]: silhouettes 1, 2 and 3 equivalent to underweight (BMI ≤19.9kg/m² or WHO BMI ≤ 49.9th percentile for mothers and daughters, respectively), silhouettes 4 and 5 represented normal weight (BMI = 20 - 24.9 kg/m² or WHO BMI = 50 – 84.9th percentile for mothers and daughters, respectively), silhouettes 6 and 7 represented overweight (BMI = 25 - 29.9 kg/m² or...
WHO BMI = 85 – 94.9th percentile for mothers and daughters, respectively) and silhouette 8 represented obesity (BMI ≥ 30 kg/m² or WHO BMI ≥ 95th percentile for mothers and daughters, respectively).

To determine body size perception (“Feel” silhouette) the participants were then asked to choose a silhouette that closely resembled their weight. The comparison between the “Feel” silhouette and the categories of BMI was conducted and the differences were considered as a proxy of body image disturbance. Individuals were classified as correctly identifying their body size if they selected a silhouette that corresponded to their measured BMI category. Whereas, participants who selected a silhouette that was higher than their measured BMI category were classified as overestimating their body size. Moreover, individuals were classified as underestimating their body size when they selected a silhouette that was lower than their measured BMI category. In our mother-daughter sample, participants could identify bigger body sizes in themselves. (pages 7-8)


5. A little more detail needs to be included in the methods on how BMI and body fat data were collected, i.e. how the measurements were undertaken on the mothers and daughters.

**Measuring BMI and Body Fat**

Body weight (for both mothers and daughters) was assessed in light clothing, without shoes, and recorded to the nearest 0.5kg using a calibrated electronic scale (TANITA HD-309, Tanita Corporation of America Inc, USA). The height (for mothers only) was measured without shoes to the nearest 0.5cm using a calibrated height meter. The BMI was calculated as weight (in kg) divided by the square of height (in m) for mothers; and the World Health Organization (WHO) BMI percentiles (weight-for-age) were determined for girls (WHO, 2003). Triceps, biceps, subscapular and suprailiac skinfold thickness were measured (for both mothers and daughters) using calibrated Harpenden calipers, and recorded to the nearest 0.1mm. Percentage body fat measurements were calculated using standard equations by Durnin and Womersely (1973) for mothers, and using equations by Lohman (1992) for girls. (page 8)

4. Authors state that the "Feel" silhouettes were compared to WHO BMI percentiles for girls. Please give a reference for these percentiles.

We adopted the World Health Organization (WHO) cut-points for children following the fact that; in children, overweight and obesity may be defined as weight –for-age (BMI ≥ 85th and 95th age-related percentile), respectively, for research and epidemiological purposes (Kuczmarski et al., 2000; Cole, 2000; WHO, 1995; WHO, 2003). In fact, evidence suggests BMI (weight-for-height) to be strongly associated with percentage body fat only in adults (such that, the correlation is about 0.75 and 0.76 in adult men and women, respectively, Deurenberg et al., 1991). Whereas, in the whole group of children the BMI versus percentage body fat relationship is lower, and is found to be about 0.43 and 0.53 (Deurenberg et al., 1991). As such, the Who suggested that the WHO BMI percentiles (weight-for-age) may serve as relevant reference standard for obesity in children (WHO, 2003, page 8).

References are


Results:
6. In general, clearly presented. Table 2a is somewhat confusing, this information may be better presented in two tables; one showing the unadjusted mother and daughter scores, and the other showing the mother and daughter scores adjusted for maternal BMI.
### Table 2a - Silhouettes chosen by mothers and their daughters to represent different dimensions of body image (page 24)

<table>
<thead>
<tr>
<th>Silhouettes</th>
<th>Overall Mother-Daughter relationship (n = 166)</th>
<th>p value</th>
<th>p value after adjusting for maternal BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual body size</td>
<td>5.0±1.5 vs. 4.2±1.2</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ideal body size</td>
<td>3.9±1.0 vs. 3.7±1.4</td>
<td>=0.308</td>
<td>&lt;0.308</td>
</tr>
<tr>
<td>Personal FID index score</td>
<td>1.2±1.4 vs. 0.5±1.4</td>
<td>&lt;0.001</td>
<td>=0.685</td>
</tr>
<tr>
<td>Friend FID index score</td>
<td>1.2±1.6 vs. 0.5±1.6</td>
<td>&lt;0.001</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Thin figure</td>
<td>1.3±0.7 vs. 1.3±0.9</td>
<td>=0.96</td>
<td>=0.96</td>
</tr>
<tr>
<td>Normal figure</td>
<td>3.9±0.7 vs. 4.5±1.2</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fat figure</td>
<td>8.1±1.4 vs. 7.8±0.8</td>
<td>&lt;0.05</td>
<td>=0.342</td>
</tr>
<tr>
<td>Beautiful figure</td>
<td>3.7±0.9 vs. 3.7±1.4</td>
<td>=0.813</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Respected figure</td>
<td>4.4±1.8 vs. 4.5±2.0</td>
<td>=0.615</td>
<td>=0.606</td>
</tr>
<tr>
<td>Figure showing happiness</td>
<td>4.1±1.9 vs. 4.1±1.6</td>
<td>=0.693</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values are presented as Means ± Standard Deviations. *p<0.05 – no mother-daughter (family) resemblance; p>0.05 – family resemblance present:

**Discussion:**
7. The last sentence of the discussion, prior to the conclusions, states: "These results have important implications on the development of obesity in South Africa following the high prevalence of obesity in women, which also differs between ethnic groups." I think these needs to be expanded on, so that the authors state what these implications are.

Evidence suggests that South African women are at increased risk of becoming overweight and obese, and that black South African women and adolescent girls are particularly vulnerable (Puoane et al., 2002; Armstrong et al., 2006; Reddy et al., 2003). However, adult South African
women appear to have misperceptions regarding their body size status (Puoane et al., 2002). In the same study, ethnicity influenced women’s body image perception. Further, indirect evidence supports a greater tolerance for larger body size status in urban black adult South African women (Puoane et al., 2005). Similarly, Caradas et al. (2001) in their study of urban South African adolescent girls, also found dissatisfaction with body size status and body shape to be significantly lower in black girls compared to white girls and those of mixed ancestry. In the current study the results obtained corroborate those of the afore-mentioned studies. Further, in the current study it seems as if in addition to ethnic disparities in body image beliefs, attitudes and perceptions, family environment also impacts on the body image beliefs, attitudes and perceptions. In this regard, health service providers need to always consider ones family and their ethnicity when developing interventions directed at increasing the awareness of a healthy body size status, and when developing strategies to manage and prevent obesity. For instance, in South Africa black women are mostly not bothered by being overweight as they do not evaluate their body size in relation to the white ideals (preference of a thinner body size) however, they use black social and cultural standards that regard a bigger body size to be beautiful, healthy and wealthy. In this regard, health promotion needs to be ethnic- and culture-specific. (summary section page 16. Presented in a manner that will make the information more fluid)


Conclusions:
8. The authors briefly indicate that their findings should be considered by professionals who are developing and delivering obesity interventions. The paper would benefit from a more detailed discussion around the implications of the findings with respect to obesity prevention and management in both adults and children.

The explanation given for comment no. 7 also applies for comment 8
Moreover, it should acknowledge the cultural and body size standards. Further, health education should not only include the affected (the overweight/obese) but also include the whole family, so as to help dispel the myth and stereotypes suggesting “big to be beautiful, healthy and respected”. Moreover, focus is to be directed to the underserved and vulnerable communities such as young South African black (pre-adolescent) children, who are at risk of developing to be overweight adults, due to stereotypes suggesting black social standards to regard a bigger body size to be beautiful, healthy and wealthy. (Conclusion section page 16. Presented in a manner that will make the information more fluid)
Reviewer 1: Rachel RODGERS

We will like to extend our gratitude to the reviewer for taking time to review our manuscript. Responses are in red font below each comment.

Minor essential revisions:
1. The authors state that participants were asked to identify silhouettes showing respect, happiness, and beauty. Were these adjectives selected by the authors? If so, on what basis? Have these adjectives been used in previous research on body image among South African women? Respect, in particular is an unusual word to associate with a body shape, is this culturally relevant?

The adjectives were adopted from previous South African studies that researched issues related to the body image of women (Venter et al., 2009; Puoane et al., 2005). Furthermore, adjectives such as ‘dignity’ or ‘respect’ are indeed culturally relevant. In the South African black culture for instance, overweight or obesity in adulthood symbolizes respect and dignity whereas, leanness or thinness is always viewed negatively. (Please note// References by Venter et al., 2009; Puoane et al., 2005 presented on the discussion section, second paragraph, page 14)


2. The authors provide a very nice review of the literature regarding previous findings concerning ethnic influences on body image and relations with obesity risk. I wonder whether the section relevant to family influences on body image and eating could be expanded, firstly to include some of the work done on mother-daughter similarities in body image among black American dyads (ex: Brown, Schreiber, McMahon, Crawford, & Ghee, 1995; Flynn & Fitzgibbon, 1995) and perhaps include some more recent references on family influences?

We acknowledge this very important comment however; due to the focus of this paper being on body image of South African women only, we could not include data on healthy eating and partaking in physical activity. (this is presented as limitations of the study on pages 16 and 17)

However, since the current study involved a secondary analysis of data which forms part of a larger project where factors associated with obesity in South African women of different age and ethnic groups, we are able to provide the afore-requested information as follows:
Unfortunately, measuring physical activity in adult women was beyond the scope of the overall project, thus we were unable to explore mother-daughter resemblance in physical activity/exercise behaviours. However, we have previously conducted an *a posteriori* analysis, to determine the extent to which family status impacted on behaviours, such as fruit and vegetable intake, dietary added sugar and dietary fat intake, which have internationally been shown to play a role in the development of obesity. The specific behaviours we examined were: overconsumption of energy-dense foods (specifically, fat intake that is ≥30% of total food EI) and added sugar (≥20g of sugar each day), as well as a low intake of fruits and vegetables (< 3 serves per day). Using the McNemar Chi Squared Test, we compared mother and daughter pairs to determine the extent to which these specific behaviours matched. Food and energy intake of mothers was quantified using the validated QFFQ (MacIntyre et al., 2001, and for girls, it was quantified using the structured 24-hr recall derived from the a previously validated QFFQ (Steyn et al., 2001).

Please note//

Although we only collected one structured 24-hour recall from the girls (derived from a previously validated QFFQ for children, Steyn et al., 2003), reported energy and macronutrient intake were similar to that reported in South African children who participated in the BT20 study (Norris et al., 2008) and the NFCS (Steyn et al., 2003).

The result of our analysis suggested mother-daughter pairs to be similar with respect to the amount of fat consumed each day (P=0.912). Our results were in line with those of Lee and Birch (2002), in which they found mothers of girls who consumed more fat to have a higher fat intake themselves. Moreover, Lee and Birch found that fat intake influenced the intake of other nutrients. In this regard, Lee and Birch (2002) found that families who consumed more fat in their diet also had lower intakes of fibre and certain micronutrients (such as Vitamins A,C,B6, folate and riboflavin). In fact, in this study children who consumed high fat diets consumed fewer fruits, more meat, more sweets and also presented with lower Healthy Eating Index scores (scores presenting a degree to which a child’s diet conformed to the Food Guide Pyramid serving recommendations of the US Department of Agriculture for 5 major food groups) than did children with low fat diets. In this regard, the authors of the afore-mentioned paper recommended that fat may be one of the most important macronutrients to be targeted in the interventions designed for the treatment and management of obesity.

Conversely, in our study we did not find any significant mother-daughter relationships with respect to added sugar or for fruit and vegetable consumption (as dichotomous variables). In fact, we observed that 34% adult women consumed fewer than 3 fruits and vegetables in a day compared to 17% of the girls. Black adult women were shown to consume the lowest number of fruits and vegetables each day (3.4±0.9 vs 3.4±0.9 and 3.8±0.9 servings per day, compared to
women of mixed ancestry and white women, respectively). Our results are in direct contrast to those of Galloway et al. (2005) and Wardle et al. (2002) who found that fruit and vegetable intake in mothers was similar to the fruit and vegetable intake of their daughters (2002). Differences in the results of our study and those of Galloway et al. (2005) may be related, in part, to the overall low intake of fruits and vegetables in the Galloway study, as well as the fact that Wardle studied younger children of 2-6 years, whereas we studied pre-adolescent children (9-12 years).

With respect to added sugar intake, our results were also in contrast to studies in which the parent's intake was a major predictor of high sugar, carbonated beverages, candies, cookies intake in their primary school-aged children (Hang et al., 2007). Moreover, Elfhag et al. (2008) found that mothers modeled the consumption of sweets to their daughter in association with emotional eating. Differences between the study by Elfhag et al. (2008) and our study may be attributed, in part, to the fact that the father's intake was taken into consideration, and that the context for psychological dimensions of eating behaviour were measured. In our study we showed that the proportion of mothers whose added sugar intake was in excess of 20g per day was more than 65%. This proportion was in direct contrast to the 10% of the girls whose added sugar intake was in excess of 20g per day. Added sugar in the diet of South African adults is mainly table sugar added in hot beverages such as tea and coffee. South African children on the other hand, consume less hot beverages if any, and as such they appear to take the least amount of added sugar compared to their mothers. The estimates of added sugar intake for girls in our study may also have been influenced by the single, QFFQ completed by the girls. The results of our study were also different from the results of van der Horst et al. (2007) whereby the intake of sugar-sweetened beverages in their Dutch adolescent study of was influenced by parental modeling.


3. In the methods section, the authors state that participants responded to questions assessing body dissatisfaction taken from focus groups, evaluating whether participants had “ever” felt thin etc… It is slightly unclear if any results related to these questions are presented. If so, then perhaps the results could be more clearly linked to these questions? If not, then perhaps the questions don’t need to be included in the methods.

We acknowledge and thank the reviewer’s comments regarding this issue, and as such, we removed the section from the methods, as it really is not discussed in the current paper, but in the previous paper of Mciza et al., 2005 (this can be seen as a comment on page 9)

4. The daughters included in the present study are preadolescent. Although body dissatisfaction and attitudes towards overweight are visible from an early age, it is possible that these attitudes change somewhat during puberty. It might be interesting to discuss what influence the daughter’s developmental stage might have had on the results.

In this study we sought to assess mother-daughter resemblances with regards to body image. We included only preadolescent children inorder to control for the potential confounding effects of diverging stages in sexual maturation on body weight, body fatness and body image, given the fact that adolescent children are more likely to be influenced by their social environments and peers on body image issues than their family environment. Indeed, developing curves and breasts at the adolescent stage might have impacted on (confounded) our results because curve development in this stage might be easily confused as fat accumulation, thus impacting on the self esteem of adolescent children.

Procedure taken in inclusion criteria (presented on page 6, first paragraph)
To control for the potential confounding effects of diverging stages in sexual maturation on body weight, body fatness and body image, girls were also asked to estimate their pubertal stage. Self-rating has been found to be the reliable way to identify pubertal development in South African children (Norris and Richter, 2005). Self-rating was done using diagrammatic sketches of Tanner (1962) classifications of breast development and pubic hair growth. Participants did this individually with privacy ensured by the interviewer. We classified the girls’ developmental stage based on self-staging of both breast and hair development. Of the 372 girls who participated, 89% were found to be in Tanner Stages 1 and 2% in Stage 3 and 7% in Stage 4. Four percent of the girls could not correctly identify their stage of development. Only girls who were in Tanner Stages 1 and 2, and who returned to school with the signed consent forms (n=333) were included in the final analysis. For example, these 333 girls reported having no
breasts at all or were within the Tanner stage 1 of breast development. Further, 98% of these girls reported being in Tanner stage 1 of pubic hair development and only 2% (n=7) reported being within Tanner Stage 2 of pubic hair development. Six of these 7 girls were 9 to 11 years old. As such, we included all the 333 girls in our final analysis as it seemed unlikely that this would have impacted on the results or interpretation of our research. The final sample comprised of 333 primary schoolgirls, of whom 32% were black, 34% were of mixed ancestry and 34% were white. Of the 204 mothers and caregivers to the girls who responded, 31% were black, 37% were of mixed ancestry and 32% were white.


5. It seems that the author’s results suggest that across several measures black daughters showed a preference for larger silhouettes than their mothers. These findings do not seem to be discussed. Is this evidence of a trend over time towards a larger figure? Is this perhaps due to daughters being pre-adolescents?

It is more likely that the daughters responses were in fact influenced by their age. In fact, growing up in home and family environments where a bigger body size is valued and rendered beautiful, as a preadolescent child you are more likely to hold the same values towards a bigger body size. In fact, in the current study black girls were leaner according to their average BMI, they might have been told to gain weight by their family, thus, they seemed to prefer a larger silhouette. The majority of black mothers on the other hand were obese. They might have been sensitized of their weight, and might have wanted to loose weight and be thinner. However, South Africa studies suggest black South African women to be resistant to the adoption of health behaviours such as the maintenance of an ideal weight, despite knowing that their increased risk for non-communicable diseases. This could be partly related to the weight-loss stigma associated with the HIV/AIDS wasting syndrome. The following quote typifies this: ‘If you are thin, people think that you are sick — you may have TB or HIV/AIDS’ (Matoti-Mvalo, 2006). Further, South African studies have shown that for black women, being overweight is associated with high socio-economic status, attractiveness and happiness (Puoane et al., 2005) (presented in the discussion section on pages 13 and 14)


6. The author’s findings could perhaps be contrasted with those of other authors having explored the effects of ethnicity on body dissatisfaction in mother and daughter dyads (see point above).
I acknowledge the reviewer’s comment. Below is a short discussion contrasting the study finding with other international studies: (presented in the introduction and also presented in the discussion section on pages 13 and 14)

The results of our study are in contrast with other international studies that suggest family environment to have a big impact on children’s beliefs. Moreover, there is evidence suggesting children who have obese parents develop to be obese adult themselves. In this regard, parents indirectly model their body size to their preadolescent children. Parental modeling commonly exists in the presence of the mother-child bond, which is the first primary relationship children experience (Birch and Davison, 2001; Cutting et al., 1999; Birch and Fisher, 2000). The mother-child bond appears to be stronger between mothers and their daughters than mothers and their sons (Elfhag and Linne’, 2005; Cutting et al., 1999), and is dependent on the age of the child (Ogden and Elder, 1998; Hill and Bhatti, 1995; Cutting et al., 1999). For example, Cutting et al. (1999) studied boys and girls of ages 3-6 years and found that during early years, a girl child is more likely to learn a great deal about weight concerns from her mother. Moreover, Hill and Bhatti (1995) found resemblances in the body image to exist between mothers and their daughters when younger (preadolescent) daughters were examined within families (Hill and Bhatti, 1995). However, Ogden and Elder (1998) when they studied adolescent girls (mean age = 20.21±1.76 years) they found no mother-daughter resemblances in issues related to body image.


7. The study limitations are not clearly stated. Perhaps the authors could add a brief paragraph discussing these limitations at the end of their discussion? (limitations are presented on pages 16 and 17 and also as a response to comment number 2 above)

The limitations of the current study were that we didn’t include mothers and their daughters’ thoughts regarding eating and exercising behaviours and attitudes, despite the international...
evidence suggests family environment and parental modeling to have influence in children consuming fruits and vegetables and partaking in physical activity. The reason was that this information was beyond the scope of this paper, as our focus was specifically on body image, and not included other obesity determinants. However, in the larger project of which this paper forms a small part of, we have conducted an \textit{a posteriori} analysis, to determine the extent to which family status impacted on health behaviours, such as fruit and vegetable intake, or dietary fat intake, which have been shown to play a role in the development of obesity. Further, we presented results of Wardle et al. (2002) who demonstrated that preadolescent children across all social classes who are exposed to fruits and vegetables by parents in their homes show an increase in preference for vegetables compared those who were not exposed. Additionally, we presented results of Hang et al., 2007 and Elfhag et al., 2008 that suggested the parent's intake of unhealthy snacks (high fat/sugar, carbonated beverages, candies, cookies) to influence the intake of these snacks by primary school-aged children. For example, Elfhag et al. (2008) found that mothers modeled the consumption of sweets to their daughters in association with emotional eating. Moreover, in Birch and Fisher (2000), Cutting et al. (1999) and Davison and Birch (2002) studies, it has also been shown that family environment also impacts strongly on children’s health behaviours (such as eating healthily and participating in physical activity). In these studies, family environment includes mothers' i) feeding practices, ii) BMI status, iii) dietary restraint and disinhibition, iii) dietary patterns and iii) physical activity.

Another limitation may be the fact that we did not include adolescent girls in the study. Including them might have given us a clearer picture on how girls’ body image beliefs change over time. As well as how the girls’ development stage impact on the change of the beliefs and attitudes. In this regard, including this group of women in the future study may paint a somewhat complete picture mother-daughter resemblances in body image.

2. Elfhag K, Tholin S, Ramussen F. Consumption of fruit, vegetables, sweets and soft drinks are associated with psychological dimensions of eating behaviour in parents and their 12-year-old children. \textit{Pub Health Nutr} 2008; 11(9): 914-23

Minor issues not for publication. The paper is well-written although there are a few minor editing issues Abstract: in the results section, the second p value given should presumably be .96? And the p should be lower case. Also, I think that it is unusual to report p values to so many decimal places, 2 or 3 will suffice, especially when it is non-significant. These points should be modified
throughout the manuscript. One of the sentences in the abstract results section could perhaps be moved though, to make the paragraph more fluid: the results regarding black families attitudes towards bigger figures should be moved to the end of the results section, since the sentence “More specifically” refers to the first sentence of that paragraph. Background: second paragraph: the sentence beginning “In this regard” could be rephrased.

We acknowledge the reviewer’s comments. We have made the changes accordingly and we have highlighted them in the abstract section (results) as well as right through the whole manuscript.