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Relationship Between Body Mass Index and Body Image Disturbances Among South African Mothers and Their Daughters Living in Soweto, Johannesburg

Emmanuel Cohen, PhD; Philippe Jean-Luc Gradidge, PhD; Lisa K. Micklesfield, PhD; Shane A. Norris, PhD

In South African families, a phenomenon of mothers' acceptance of stoutness coexists with their daughters' appreciation for thinness. A sample of N = 615 mother-and-daughter pairs was recruited to conjointly identify the relationships toward body image and body mass index between both groups by assessing body weight satisfaction, body esteem, and eating disorders risk. We observed higher prevalence of obesity in mothers and higher eating disorders risk in daughters, while mother-daughter relationships were identified for body mass index and psychometric dimensions. The high prevalence of obesity in mothers and their tolerance for stoutness could expose their daughters to eating disorders and obesity.

Key words: eating and feeding disorders, mothers/daughters communication, obesity, weight management

STUDIES in high-income countries (HICs) have shown that overweight and obesity are positively associated with psychological disturbances due to body weight dissatisfaction linked with stigmatization of obesity and fear of being "fat."[1-3] As a result, people living in HICs are faced with a complex, discordant situation, where the prevalence of overweight and obesity is increasing even though thinness is the predominant desired body size.[4] This paradox has also been observed among black populations living in HICs for which the prevalence of obesity is high,[5] while the so-called traditional valorization of stoutness is questioned by Western norms promoting pronounced thinness in young adults.[6-8] Given the increasing urbanization, exposure to Western norms, and obesity prevalence in sub-Saharan Africa (SSA),[9,10] researchers have started examining this ambivalence among African populations.

Studies have identified the sociocultural valorization of adiposity as a risk factor for obesity in African populations,[9-13] and a relationship between eating disorders and body weight perception among urban-dwelling African adolescents and young adults has been demonstrated, particularly recently in Africa.[14,15] Furthermore, the media has been acknowledged to influence contemporary thinking toward favoring thinner body sizes among younger adults.[16,17] Thus, African cultural values of body size, perceived as a protective factor toward common modern body image disturbances and eating disorders, seems to be diluted in young people through acculturation of Western influence.[14,18,19] Hence, in the context of an increasing obesity epidemic in SSA, it is therefore important to understand the acculturation toward thinness occurring in African populations, as well as the persistence of tradition valorization of stoutness.[20-22]

South Africa is an SSA country experiencing a particularly strong obesity epidemic,[23] with evidence of coexistence between valorization and devaluation of stoutness differing by age. Older black populations consider stoutness as a symbol of health (countering the thinness stigma associated with human immunodeficiency virus), wealth, and prosperity while younger people consider body fat as an expression of morbidity and sexual

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undesirability.[24,25] Despite the acculturation of younger age groups through the urbanization and modernization of South Africa expressed by a devaluation of overweight/obesity,[26,27] parents may still represent the traditional African values and could influence the way their children perceive their bodies by encouraging behaviors that favor larger body size.[25,28]

Studies from various countries such as Thailand, Israel, and the United States, including African ethnic minorities, have shown that parents, and particularly those who are overweight/obese, tend to underestimate their children's body weight, especially when these ones are overweight.[29-32] In addition, other studies have shown that parents, through their dietary intake habits and global parenting style, can mediate and influence the relationship of their offspring with their body weight management.[33] For instance, Cutting et al[34] have shown that US mothers' dietary disinhibition mediates familial similarities in degree of overweight for mothers and daughters. In addition, Mcdonald et al[35] demonstrated that overweight in children is associated with maternal obesity in Colombia. Beyond the nutritional status, other studies attested that parents can influence the relationship of their offspring with their body weight perception,[36] with a potential intergenerational transmission of body image disturbances and eating disorders.[37-41]

In South Africa, although recent studies showed that adolescents are exposed to obesity, body image disturbances, and eating disorders in urban areas at an early age,[26,42] the influence of mothers as a determinant of these disorders in their daughters remains relatively unknown. The relationship between obesity and body image disturbances/eating disorders already demonstrated has not been considered conjointly in South Africa, particularly in their potential for intergenerational transmission from mothers to daughters. Therefore, this study aims to examine the relationship between mothers and daughters on (1) body image disturbances and eating disorders and (2) obesity by testing the association between mothers' and daughters' body weight perceptions, body esteem, eating attitudes, and body mass index (BMI) within families living in a poor-urban South African township, which is exposed to obesity.[43] The 3 first dimensions could assess intergenerational body weight satisfaction, poor body esteem and eating disorders risk, and the last dimension, overweight and obesity.

METHODS

Sample

For this study, we assembled a sample of 615 mother-daughter pairs, who are part of the Birth to Twenty Plus cohort study (Bt20), a cohort study investigating the determinants of health and development of South African families predominantly living in Soweto, Johannesburg.[44] Data were collected on maternal attitudes and practices when their daughters were 12 years of age (early adolescence), and data on the daughters' attitudes and practices were collected at 18 years of age (late adolescence).

Measures

All instruments were measured in both mothers and daughters.

Eating attitudes

The participants' risk of eating disorders was measured using the Eating Attitudes Test-26 (EAT-26).[45] This questionnaire includes 26 items in the form of a Likert scale and was administered by trained field workers. The individual items were recoded according to the coding developed by Garner et al.[45] Total EAT-26 scores of 20 or greater indicate an increased risk of eating disorders, requiring clinical referral. The validity of this instrument has been reported in other South African study (Cronbach α ranged from 0.75 to 0.79).[19]

Body esteem scale

An adapted questionnaire was used to determine the estimated attitude toward own body image.[46] The instrument consisted of 21 questions, divided by components or subscales of body esteem, and in the form of a 5-point Likert scale ranging from options of "never" to "always." These components included eliciting questions on the participants' overall feelings toward their own overall body appearance (the *appearance* subscale: BES-AP), contentment with personal body weight (the *weight* subscale: BES-WE), and positive perception of personal body image (the *attribution* subscale: BES-AT). The internal consistency of the tool is high (Cronbach α ranged from 0.86 to 0.86).

Body weight perceptions

Furthermore, a body figures scale based on the Figure Rating Scale developed by Stunkard et al[47] and adapted/validated in South African adolescent and adult females[48] was used to determine body weight perceptions. The figures were coded 1 to 8 (underweight: 1-2, normal weight: 3-4, overweight: 5-6, and obesity: 7-8) and shuffled before being presented individually to participants for each interview.[49] Participants were required to select a body figure which they identified as representing their current body size, as well as their ideal body size (IBS). A *body weight self-satisfaction index* was calculated by the discrepancy between current body size and IBS, which is termed the

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"Feel minus Ideal Discrepancy" (FID). Negative, zero, and positive scores indicated desire to be fatter (FID-gain weight), contentment with body size (FID-satisfied), and a desire to be thinner (FID-lose weight), respectively.[11] We also created a *body weight self-assessment index* by the discrepancy between BMI categories of participants and their current body size assessed by the Figure Rating Scale adapted to South African populations. Negative, zero, and positive scores indicated an overestimation, a correct estimation, and an underestimation of body size, respectively. Then, we created a *valorization of fatness index* by the coding of all responses on IBS variable of 5 and greater as an appreciation for overweight and obesity.

In addition, we completed this assessment protocol on body weight perceptions using a question also assessing weight change attempts (WCAs). Precisely, we asked whether participants have already tried to lose weight by asking this question: "Have you already tried to lose weight during the past?" A positive response coded as "lose weight desire" means a WCA and a negative response coded as "no lose-weight desire" means an absence of WCA.

Anthropometry

Height was measured using a portable stadiometer (Holtain, Crymych, United Kingdom) and recorded to the nearest millimeter, and weight was measured to the nearest 100 g, using a digital weighing scale. Participants were measured in light clothing without shoes. Using height and weight measures of mothers and daughters (18 years of age), BMI was calculated as weight (kg)/height $(m)^2$. Body mass index categories included underweight (BMI <18.5 kg/m^2), normal (BMI $\geq$18.5-24.9 kg/m^2), overweight (BMI $\geq$25-29.9 kg/m^2), obese (BMI $\geq$30-39.9 kg/m^2), and morbidly obese (BMI $\geq$40 kg/m^2).

Statistical analysis

Statistical analysis was performed using Stata version 12 (StataCorp, Texas). Stratifying by weight status of participants, we used chi-square and Fisher exact tests to evaluate the prevalence of underweight, overweight, obesity, and eating disorders risk (EAT-26 scores $\geq$20), the frequency of WCA and FID scores (FID-gain weight, FID-satisfied, FID-lose weight), and analysis of variance/analysis of covariance or paired *t* test to assess means of BMI, EAT-26 scores, the 3 body esteem dimensions (appearance: BES-AP, attribution: BES-AT, and weight: BES-WE), and IBS. We also compared these variables each other between mothers and daughters. We used the Pearson correlation and the Cohen κ: simple kappa (κ) and weighted kappa (κ^w) to correlate and assess interrater agreement of BMI and all psychometric variables each other between mothers and daughters. Finally, we used binary logistic regression and multivariable linear regression models to identify the predictors (including mothers' characteristics) of WCA (lose weight desire) and BMI in daughters, respectively.

Ethics

The study was approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand. All participants gave written informed consent and minor assent was obtained if younger than 18 years before being involved in the study.

RESULTS

Most of the participants were of black South African ethnicity (85.9%), with whites, Indians, and participants of mixed ethnicity making up the remainder of the sample. Mothers were 41.4 ± 8.0 and daughters were 17.9 ± 0.39 years of age.

BMI and prevalence

The prevalence of underweight, normal weight, overweight, and obesity was 2.2%, 21.5%, 26.9%, and 49.4%, respectively, in mothers and 10.8%, 63.5%, 16.4%, and 9.3% in their daughters ($P <$ .001). There was a significant BMI means difference between both groups: 30.4 ± 7.2 kg/m^2 in mothers versus 23.0 ± 4.8 kg/m^2 in daughters ($P <$ .001).

Mother's and daughter's body weight perceptions according to BMI status

Ideal body size

Mothers and their daughters had significantly different IBS and body esteem dimensions according to their BMI status (Table 1). Although IBS increased along increasing BMI categories of mothers and daughters, it was situated in the normal BMI range on the Figure Rating Scale: figural stimuli 3 and 4. Indeed, the BMI/IBS correlation in mothers was $r = 0.23$ ($P <$ .001), and in daughters, $r = 0.25$ ($P <$ .001).

Body esteem

Concerning body esteem dimensions, normal-weight and overweight mothers had higher body esteem than underweight and obese mothers, while the global body esteem was observed to decrease with increasing BMI in the daughters.

Body weight self-assessment

In addition, among all daughters, 23.8% overestimated, 61.6% correctly estimated, and 14.6% underestimated their weight versus 4.7%, 35.7%, and 59.7% in all mothers ($P <$ .001). Among underweight/normal-weight subjects, 28.5% of

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TABLE 1. Ideal Body Size and Body Esteem Scale Means According to Body Mass Index

	Underweight	Normal Weight	Overweight	Obesity	*P*[a]
Mothers					
Ideal body size	3.7 ± 1.6	3.9 ± 1.0	4.0 ± 0.9	4.4 ± 1.0	[b]
BES appearance	6.6 ± 9.6	10.2 ± 7.1	9.8 ± 7.2	6.2 ± 9.6	[b]
BES attribution	8.3 ± 2.1	9.8 ± 2.2	9.9 ± 2.1	8.9 ± 2.6	[b]
BES weight	11.7 ± 7.3	14.7 ± 6.3	12.5 ± 7.9	9.3 ± 9.0	[b]
Daughters					
Ideal body size	3.5 ± 1.1	3.7 ± 1.2	4.2 ± 1.2	4.4 ± 1.4	[b]
BES appearance	9.5 ± 6.6	8.3 ± 8.2	5.4 ± 8.6	1.9 ± 10.0	[b]
BES attribution	10.0 ± 1.9	9.7 ± 2.4	9.0 ± 2.6	8.4 ± 2.6	[b]
BES weight	15.5 ± 5.6	14.3 ± 6.8	10.0 ± 9.0	6.2 ± 8.3	[b]

Abbreviation: BES, body esteem scale.
[a]Analysis of variance between body mass index categories.
[b]$P < .001$.

daughters overestimated, 65.3% correctly estimated, and 6.2% underestimated their weight versus 16.8%, 73.3%, and 9.9% in mothers ($P < .05$). Among overweight/obese subjects, 10.3% of daughters overestimated, 50.7% correctly estimated, and 39.0% underestimated their weight versus 0.7%, 23.6%, and 75.7% in mothers ($P < .001$).

Body weight self-satisfaction

Table 2 shows a relative concordance between WCA (desire to lose weight) and FID-lose weight in both mothers and daughters. The desire to lose weight increased significantly with increasing BMI, while FID-gain weight decreased significantly with BMI. In addition, among underweight/normal-weight subjects, 22.6% of daughters had a desire to lose weight versus 9.2% in mothers ($P < .001$), while among overweight/obese subjects, 52.7% of daughters had a desire to lose weight versus 32.2% in mothers ($P < .001$). Among those subject who were underweight/normal weight, 24.1%, 51.4%, and 24.5% of daughters wanted to gain, maintain,

TABLE 2. Weight Change Attempt, Eating Disorder Risk, and Feel-Ideal Discrepancy Frequencies According to Body Mass Index

	Underweight	Normal Weight	Overweight	Obesity	*P*[a]
Mothers					
Weight change attempt	20.0% (2)	8.3% (10)	27.9% (39)	34.5% (92)	[b]
Eating disorders risk	0% (0)	10.7% (12)	9.5% (12)	12.3% (31)	NS
FID-gain weight	55.6% (5)	33.9% (41)	7.6% (31)		[b]
FID-satisfied	22.2% (2)	48.8% (59)	28.0% (114)		
FID-lose weight	22.2% (2)	17.4% (21)	64.4% (262)		
Daughters					
Weight change attempt	9.7% (6)	24.8% (90)	41.9% (39)	71.7% (38)	[b]
Eating disorders risk	3.2% (2)	9.9% (36)	19.2% (18)	15.1% (8)	[c]
FID-gain weight	47.5% (29)	20.0% (71)	3.5% (5)		[b]
FID-satisfied	45.9% (28)	52.4% (186)	23.1% (33)		
FID-lose weight	6.6% (4)	27.6% (98)	73.4% (105)		

Abbreviations: FID, Feel minus Ideal Discrepancy; NS, not significant.
[a]Fisher exact test between body mass index categories.
[b]$P < .001$.
[c]$P < .01$.

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and lose weight, respectively, versus 35.4%, 46.9%, and 17.7% in mothers ($P < .05$). Conversely, among overweight/obese subjects, 26.6% and 73.4% of daughters wanted to gain/maintain (only when categories aggregated) and lose weight, respectively, versus 35.6% and 64.4% in mothers ($P < .05$). Finally, we noticed that 32.7% of mothers and 27.0% of daughters who desired to lose weight still valued overweight and obesity on the *valorization of fatness index*.

Eating disorders risk

The prevalence of eating disorders risk was 11.0% in mothers and 10.8% in daughters, respectively. It was not significantly associated with higher BMI categories in mothers, while in their daughters, eating disorders risk was significantly associated with increasing BMI (Table 2). Finally, among overweight/obese subjects, 17.7% of daughters had an eating disorders risk versus 11.4% in mothers ($P = .053$; overweight daughters/mothers: 19.2% vs 9.5%, $P < .05$; obese daughters/mothers: 15.1% vs 12.3%, not significant).

Relationship between mother's and daughter's BMI and body weight perceptions

Differences between mothers and daughters

In Table 3, after controlling for the confounding effect of maternal BMI, it was observed that mothers had significantly lower EAT-26 score and higher BES-AP, BES-AT, and BES-WE scores than their daughters, while IBS scores were similar between mothers and their daughters. However, without controlling for maternal BMI, we observed a significant difference between mothers and their daughters for IBS: 4.1 ± 1.0 (in mothers) versus 3.8 ± 1.3 (in daughters) ($P < .001$).

Similarities between mothers and daughters

In addition, BMI ($r = 0.29$, $P < .001$), EAT-26 ($r = 0.10$, $P < .05$), BES-AP ($r = 0.19$, $P < .001$), BES-WE ($r = 0.15$, $P < .001$), and FID ($r = 0.15$, $P < .01$) were significantly correlated between mothers and daughters. Using Cohen κ to accurately match the response modalities from all psychometric variables between mothers and their daughters, we observed significant agreement for BMI categories ($\kappa = 0.06$, $P < .001$; $\kappa^w = 0.14$, $P < .001$), WCA ($\kappa = 0.13$, $P < .01$), BES-AP ($\kappa = 0.03$, not significant; $\kappa^w = 0.12$, $P < .01$), BES-WE ($\kappa = 0.06$, $P < .05$; $\kappa^w = 0.13$, $P < .01$), and FID ($\kappa = 0.08$, $P < .01$; $\kappa^w = 0.15$, $P < .001$).

Then, we found a significant positive association between mothers and daughters on the *valorization of fatness index* ($P < .01$). This index was also associated with overweight and obesity in both groups (mothers: $P < .05$; daughters: $P < .001$).

TABLE 3. Eating Attitude Test, Body Esteem Scale, and Ideal Body Size Mean Comparisons Between Mothers and Daughters

	Mean[a]	N	P[a]
Eating attitude test			
Mothers	9.3 ± 8.4	468	
Daughters	10.8 ± 8.4	468	b
BES appearance			
Mothers	9.3 ± 9.2	503	
Daughters	6.0 ± 9.2	503	c
BES attribution			
Mothers	9.6 ± 2.7	501	
Daughters	9.2 ± 2.7	501	d
BES weight			
Mothers	13.0 ± 8.3	503	
Daughters	11.3 ± 8.3	503	d
Ideal body size			
Mothers	4.0 ± 1.1	496	
Daughters	4.0 ± 1.1	496	NS

Abbreviations: BES, body esteem scale; NS, not significant.
[a]Analysis of covariance, adjusted by body mass index of mothers.
[b]$P < .05$.
[c]$P < .001$.
[d]$P < .01$.

Prediction of daughters' weight change attempt and BMI

The results of the binary logistic regression model (Table 4) showed an independent association between mothers' and their daughters' desire to lose weight. Furthermore, an independent association between overweight daughters and their desire to lose weight was demonstrated. Univariate analyses showed an association between overweight mothers' and their daughters' desire to lose weight.

The multivariable linear regression model (Table 5) showed an independent positive association between mothers' and daughters' BMI. Univariate analyses showed a positive association between mothers' desire to lose weight and daughters' BMI and a positive association between black ethnicity and daughters' BMI.

DISCUSSION

This study analyzed the relationship between African mothers' and their daughters' body weight perceptions and management in a poor-urban obesogenic environment. As demonstrated in studies from various SSA countries, body image perceptions

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TABLE 4. Odds Ratio and 95% Confidence Intervals for Daughters Who Want to Lose Weight, Adjusted by Binomial Logistic Regression Analysis, and Compared With Subjects Who Do Not Want[a]

		Daughters Lose Weight Desire	
Predictors	**Categories**	**Odds Ratio**	**95% Confidence Intervals**
Ethnicity	Nonblack[b]		
	Black	1.6	0.8-3.3
Mothers age		1.0	1.0-1.0
Mothers' BMI[c]	No overweight[b]		
	Overweight/obesity	1.2	0.7-2.0
Mothers lose weight desire[d]	Do not want[b]		
	Want	**1.7**	**1.0-2.6**[f]
Daughters' BMI[e]	No overweight[b]		
	Overweight/obesity	**3.1**	**2.0-4.9**[g]
N = 488			

Abbreviation: BMI, body mass index.
[a]Values in boldface indicate binomial logit analysis significant effects (superscripts f and g): $P < .05$ and $P < .001$, respectively.
[b]Category taken as reference.
[c,d,e]Crude analysis significant effect ($P < .05$; $P < .01$; and $P < .001$, respectively).

differ across the age spectrum.[9,25,50] In the present study, we observed that mothers and daughters had contrasting and contradictory body weight perceptions. The majority of mothers were overweight or obese while most of the daughters were normal weight; however, the mothers valued fatness more than their daughters. This paradoxical trend between mothers and their daughters has also been observed in other African countries such as Nigeria.[15,51]

In the current study, mothers had better body esteem and eating attitudes than their daughters, despite most having a larger body weight. Overweight and obese mothers had higher BES scores than their daughters, and most of them underestimated their actual body weight.[52,53] Mothers seemed to value larger body size because of the overweight/obese category having a significantly higher BES than the normal weight category. In addition, the BES, WCA, and FID scores for the mothers were positively associated with BMI. Mothers who were overweight/obese had a greater desire to lose weight and tended to develop poorer body esteem and higher risk of eating disorders than those who were lean.[27,54] However, this trend was observed only with a higher BMI level (around obesity), which could be explained by their better body weight status awareness when diagnosed with

TABLE 5. Multivariable Linear Regression to Assess the Factors Associated With Daughters' BMI[a]

	Daughters' BMI		
Predictors	**Coefficients**	**95% Confidence Intervals**	
Black ethnicity[b] (0: others, 1: black)	1.21	−0.04	2.46
Mothers' age	0.01	−0.05	0.06
Mothers' BMI[c]	**0.16**	**0.10**	**0.22**[d]
Mothers lose weight desire[b] (0: no desire, 1: desire)	0.73	−0.20	1.66
Daughters lose weight desire[c] (0: no desire, 1: desire)	**3.51**	**2.63**	**4.38**[d]
N = 488			

Abbreviation: BMI, body mass index.
[a]Values in boldface indicate multivariable linear regression model significant effects (superscript d): $P < .001$.
[b,c]Crude analysis significant effect ($P < .05$ and $P < .001$, respectively).

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cardiometabolic diseases, as observed in urban Ghana.[21]

In comparison, daughters showed poorer body esteem than their mothers and were more exposed to eating disorders risk despite most were in normal or underweight BMI categories, a trend in South African young women commented recently by Mchiza.[55] Then, the second highest BES mean in daughters was in the underweight category after normal weight. In addition, underweight and normal-weight daughters tended to overestimate their actual weight more than their mothers, and overweight daughters were more exposed to eating disorders risk, as observed in another South African study.[56] In addition, WCA and FID scores show that daughters desire to be underweight or normal weight while their mothers expected to be normal weight or overweight, an intergeneration contrast already observed in South Africa,[57,58] as already identified in other African countries.[20,59] Unlike their mothers, daughters seemed to reject fatness for aesthetic reasons since most of them did not present with excess body weight, as also identified in other South African and Nigerian studies.[15,19]

Indeed, studies of African populations suggest that younger people are more influenced and acculturated by Western norms through media, which promotes thinness and could explain this young women depreciation toward fatness.[60] Conversely, older people are more influenced by their traditional African culture valuing stoutness, which is perceived as a symbol of health, fertility, peacefulness, and prosperity, especially in married women.[22,28] In this perspective, the prevalence of overweight and obesity in mothers was similar to those found in other South African studies and therefore strongly higher compared with the prevalence found in many other African and Western countries.[61-63] For daughters, we observed that the prevalence of overweight was lower than the national prevalence in adolescent females but the prevalence of obesity was slightly higher.[42] Concerning eating disorders risk, we observed that its prevalence in daughters was between those showed by Le Grange et al[64] and Gitau et al.[24] The prevalence of eating disorders risk in both mothers and daughters was slightly higher than that found in the rest of the continent and some Western countries[65,66] and slightly lower than that found in Nigeria.[15]

A relationship between mothers and their daughters regarding body weight perceptions and BMI was also observed. First, after controlling for BMI, IBS of both groups was similar, situated in the normal weight category, even though without BMI adjustment, mothers had an IBS significantly higher than their daughters. We observed a positive correlation between BMI and IBS in both groups. This could be explained by a tendency in mothers and daughters to unconsciously "adjust" their IBS to their BMI.[59] Since mothers were more overweight and obese than their daughters, this propensity had a strong effect on IBS mean difference. We also found significant correlations and/or agreements between mothers and daughters for EAT-26 and body image variables (WCA, FID, BES-AP, and BES-WE), which could be an accidental convergence caused by 2 different behavioral patterns.

Indeed, since the BMI of mothers and daughters was significantly different, most normal-weight daughters are living with mothers who are particularly overweight or obese, and a large proportion of them would like to lose weight. Therefore, daughters faced with the reality of their mothers' morbid BMI status[67] could reject being overweight as a self-protective strategy to prevent their potential future weight gain caused by the influence of their mothers' lifestyle choices, as highlighted in a South African study.[40] This preventive reaction at home could also be exacerbated by norms conveyed by media and peers promoting thinness.[68] In this specific context, an agreement between mothers and daughters on psychometric variables is understandable, as identified in the binary logistic regression model. It seems that most of mothers do not want to be fat anymore while most of daughters do not want to become like them. This may be illustrated by the BES-AT disagreement between mothers and daughters demonstrating contrasted social attributions of the body, while we found agreements for BES-AP and BES-WE.

The correlations and interrater agreements expressed by κ values on BMI were also significant between mothers and daughters. A plausible explanation is the partial influence of mothers' eating attitudes, body weight perceptions, and possibly also genetic inheritance on BMI of some daughters, already identified in previous studies,[31,34,69] and probably expressed in the multivariable linear regression model. Since mothers' BMI is a predictor of daughter's BMI, the univariate association between mothers' desire to lose weight and daughters' BMI, already identified in a previous study,[70] could be explained by the association between mothers' desire to lose weight and their own BMI. Mothers would transmit their own body weight appreciation to their daughters with consequences on their BMI. Beyond these BMI associations, we observed that interrater agreements were weak for BMI as well as psychometric variables. The correlation analyses cannot avoid a potential shift between variables, which does not affect the coefficient values, while κ statistics, more accurate than correlations,

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allow matching variable modalities with each other.

The relative concordance between mothers and daughters for BMI and psychometric variables, besides the strong differences between both groups on these dimensions, might not be paradoxical but ambivalent, as explained by the possible double reaction of daughters toward their maternal environment. Some of the daughters (*scenario 1*) could be influenced by obesogenic mothers' lifestyle as their relative tolerance for overweight and obesity,[71] whereas other daughters (*scenario 2*), not particularly overweight, try to prevent this influence, exacerbated by an external societal pressure, and develop a poorer body esteem associated with the phobia of fatness, as already observed in HICs.[33,72,73] At this stage, our study suggests that many daughters experience the second scenario because they are more exposed to eating disorders risk than overweight and obesity.

However, the exposure to overweight/obesity in daughters is confirmed, supported by a BMI relationship between mothers and daughters, which could be exacerbated with older age of young women, especially by the decrease of peer and media pressures and the beginning of conjugal life. Therefore, we recommend that public health policies focus on the mother-daughter relationship toward body image and obesity to prevent eating disorders risk and obesity in adolescents and young adults. These policies should also consider the delayed influence of maternal environment on the BMI of daughters as they age and transition into marriage. Finally, future South African studies should integrate simultaneously parental, media, and peer effects on adolescents and young adults to assess their respective influence on body image and eating attitudes.[74]

CONCLUSIONS

The findings of this study demonstrate that despite the variation in body weight perception models between mothers and their daughters, the daughters show lower body fatness appreciation than their mothers; overweight/obese mothers seem to exacerbate their daughters' desire to become thinner. The particularly high prevalence of cardiometabolic risk factors in the mothers and their relative tolerance for overweight and obesity could, on the one hand, overexpose daughters to obesity and, on the other hand, motivate many of them to excessive lower weight by exposing them to distorted body images of themselves and increased risk of eating disorders. Since body image disturbances/eating disorders and obesity conjointly have an intergenerational transmission from obese mothers to their daughters, South African public health policies should take into account this generational interaction to prevent eating disorders and obesity in adolescent and young adult women.

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