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Relationships between maternal factors and weight loss attempts among urban male and female adolescents living in Soweto-Johannesburg, South Africa

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Abstract

Purpose. South Africa is undergoing rapid urban transition favoring ideals of thinness which increases eating disorders risk for female adolescents, while older women continue to uphold corpulence as a female cultural value. This study aims to assess the potential conflicting relationship between urban male and female adolescents' weight loss attempts (WLA) and maternal body image norms within households.

Methods. The study included a longitudinal sample of mother-daughter and mother-son pairs from the Birth to Twenty Plus Cohort (Bt20+) (N=1613), utilizing data collected at 13, 17 and 22 years. Sociodemographic characteristics, eating attitudes, WLA and body mass index (BMI) were assessed in mothers and their offspring. Relationships between maternal factors and offspring's WLA were assessed using both logistic regression and structural equation modelling.

Results. More females had WLA compared to their male counterparts at 13, 17 and 22 years. Multivariable models showed an independent positive association between maternal household socioeconomic status and boys' WLA at 13 years, while independent negative associations were found between mothers' BMI and boys' WLA at 17 and 22 years. Mothers' age and sons' WLA at 22 years showed an independent positive association. No association was found between maternal factors and daughters' WLA.

Conclusions. Strong gender-differentiated intergenerational patterns were observed between maternal factors and offspring's WLA from early adolescence to early adulthood. The lack of relationship between maternal factors and daughters' behavior in contrast to that of sons suggests that Western acculturation may pose a greater risk for females to modern body image disturbances and eating disorders.

Keywords: Inter-generational, Cultural values, Adolescent, Gender, Body image, Weight loss

Introduction

Over the past several decades, there has been increasing stigmatization of body weight alongside rising rates of obesity in high-income countries (HICs).¹ Body weight norms promoting thinness as the preferred body size have been reported to exacerbate psychological and eating attitude disturbances among overweight and obese people, including African populations.^{2,3} In addition, with increasing urbanization and exposure to Western media and obesity prevalence in sub-Saharan Africa (SSA)⁴, African countries are increasingly affected by emerging norms on thinness⁵. This is accentuated in emerging transitional countries such as South Africa and among younger generations.

Even though media can influence contemporary thinking in favor of thinner body sizes amongst South African youth as well as African migrants,^{6–8} traditional African norms around stoutness as a symbol of wealth, peacefulness, health and fertility remain.^{9–11} In transitional contexts, stoutness is perceived to be a protective factor against modern body image disturbances and eating disorders, serving to counteract Western norms of thinness. Young people occupy a critical position between these two cultural models.^{12–14}

Moreover, many South African studies show coexistence between admiration and stigmatization of stoutness. Older Black populations perceive stoutness as a symbol of health and prosperity whilst younger people consider body fat as indicative of disease and sexual undesirability^{15,16} While parents may still transmit traditional perceptions around large body size to their children^{16,17}, young people acculturated by modernization increasingly eschew overweight and obesity.^{18,19} Some studies also show that parents' lifestyle and behaviors can influence their children's body weight perceptions and management^{20,21}, with the potential for intergenerational transmission of body image disturbances and eating disorders.^{20–23}

Recent South African studies show that adolescents are exposed to modern body image norms in urban areas from an early age.¹⁸ The impact of Western media is reported to be greater

among adolescent females than males regarding body weight perception and management¹⁵, but the influence of maternal behaviors and lifestyle on sons' and daughters' body image and weight management remains underexplored. As in other studies conducted in Western countries^{24,25}, we assume that the familial environment of adolescents, including maternal BMI and eating attitudes, could impact on their body image and weight management. Therefore, this study aims to examine the intergenerational association between maternal factors (sociodemographic characteristics, body size and eating attitudes) and weight loss behaviors among adolescent sons and daughters within families living in Soweto, a poor urban South African township with high rates of obesity.²⁶

Methods

Sample

The current study consisted of a sample of 1,613 mother-adolescent (both sexes) pairs from the Birth to Twenty Plus cohort study (Bt20+). The Bt20+ study aimed to investigate the determinants of health and development among children and families in Soweto, Johannesburg.²⁷ Data were collected longitudinally on sociodemographic characteristics, maternal and adolescent eating attitudes, weight loss behaviors, and Body Mass Index (BMI) of both mothers and their children when aged 13 (early adolescence), 17 (late adolescence) and 22 years (early adulthood). Mothers were studied once when their child was 12 years old.

Measures

Data instruments were administered to both adolescents (males and females) and mothers.

Sociodemographic characteristics

Maternal sociodemographic characteristics that were assessed included age, socioeconomic status (SES) and level of education. SES was assessed by enumeration of the assets in the

household and education was assessed by collecting the highest academic grade (e.g. grade 7) reached by the mother.²⁸

Weight Loss Attempt (WLA)

Participants were asked if they had engaged in behaviors with an aim to lose weight during the past year. A positive response coded as “weight loss attempt” indicated a WLA and a negative response coded as “no weight loss attempt” indicated an absence of WLA.

Eating attitudes

The risk of eating disorders was measured using a 26-item questionnaire, the Eating Attitudes Test-26 (EAT-26) administered by study field workers.²⁹ The EAT-26 is one of the most widely used standardized measures to assess eating disorders risk based on feelings and behaviors related to symptoms and concerns characteristic of eating disorders (e.g. vomiting after meal, food phobia and restriction, body weight concern). The EAT-26 can be used as a whole to assess a global eating disorders risk (as in this study) but can also be divided into three subscales (Dieting, Bulimia and Food Preoccupation and Oral Control subscales) to more specifically assess these main dimensions of eating disorders risk. The 26 items were on a Likert scale and coded using the system developed by Garner et al.²⁹ The EAT-26 varies from 0 (minor value) to 78 (major value). An EAT-26 score of ≥ 20 indicates the need for clinical referral due to risk of eating disorders. The instrument’s reliability in other South African studies ranged from α (Cronbach’s) of 0.75 to 0.79.¹⁴

Anthropometry

A portable stadiometer (Holtain, UK) was used to measure height, recorded to the nearest mm. Weight was measured using a digital weighing scale and recorded to the nearest 100g.

From these measures, BMI was calculated as: weight (kg)/height (m)². Underweight was defined as a BMI < 18.5 kg/m², normal weight as ≥ 18.5 kg/m² and < 25 kg/m², overweight as ≥ 25 kg/m², and obesity as ≥ 30 kg/m².

Statistical analysis

Stata software 15.1 (StataCorp, College Station, TX) was used for all analyses. We used the chi square test to evaluate the prevalence of underweight, overweight, obesity, and eating disorders risk (EAT-26 scores ≥20), and the frequency of WLA. Normality of continuous variables was checked using the Shapiro-Wilk test, and study characteristics were compared between males and females using the Wilcoxon sum-rank and chi square tests. Logistic regression was performed to assess the associations between maternal factors and WLA among their adolescent children at ages 13, 17 and 22 years, separately for males and females; logistic regression was used since the response variable of interest (WLA) is binomial. We used BMI as a continuous rather than a categorical variable for better statistical power. Odds ratios (ORs), 95% confidence intervals (CIs) and p-values were reported.³⁰

Structural equation modelling (SEM) was used to determine whether there was an intergenerational effect of maternal factors on offspring early adulthood WLA (i.e. age 22 years) through specific pathways³¹. Multivariable analyses performed using SEM were guided by an *a priori* conceptual model (Figure 1). We hypothesized that: 1) maternal factors (BMI, education, eating disorders risk and age) are associated with BMI (at 13, 17 and 22 years), eating disorders risk (at 13, 17 and 22 years) and WLA at 22 years, and 2) BMI (at 13, 17 and 22 years) and eating disorders risk (at 13, 17 and 22 years) are associated with WLA at 22 years. We conducted our analyses separately for males and females.

Figure 1

Ethics

The study was approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand. The present secondary analysis was approved by the Stanford Institutional Review Board. All participants gave written informed consent and assent was provided by children under the age of 18 years.

Results

Descriptive statistics

A total of 1,613 mothers were included in the analyses (Table 1). The majority of mothers completed at least Grade 8, 86% had scores indicative of risk for eating disorders (i.e., greater or equal to 20), and 27.5% had a WLA, with a BMI median of 30 kg/m². On average, households in our sample had four physical assets. Adolescent children of the maternal participants were nearly evenly distributed by sex (Table 2).

Table 1

Females had higher BMIs compared to males at ages 13, 17 and 22 years ($p < 0.001$ for each). More female adolescents wanted to change their weight compared to their male counterparts at 13 ($p = 0.018$), 17 ($p < 0.001$) and 22 years ($p < 0.001$). The EAT-26 score was similar at all three ages in both sexes, but with a median significantly higher in girls than in boys at 17 years.

Table 2

Pair-wise correlations between eating disorders risk and BMI

The correlations between eating disorders risk and BMI were 0.1 at 13 years, 0.05 at 17 years and 0.1 at 22 years, indicating a small positive correlation at the 3 measurement points. Separately, BMIs measured at 13, 17 and 22 years were highly correlated with each other. Eating disorders risk at 13 had low positive correlation with eating disorders risk at 17 and 22

years ($\rho=0.05$ and 0.07 , respectively) while eating disorders risk at 17 was moderately correlated with eating disorders risk at 22 years ($\rho=0.45$). Only the correlation between 13 and 17 years was not significant (Supplementary Table 1).

Logistic regressions for WLA

Maternal WLA was associated with lower eating disorders risk, lower maternal age, higher education level (Grade 8 and more) and higher maternal BMI (Supplementary Table 2).

At age 13, boys' WLA was associated with higher maternal SES (Supplementary Table 3). No maternal factors were associated with WLA among girls at age 13. Higher girls' BMI was persistently associated with their WLA in the hierarchical regressions (Supplementary Table 4).

At age 17, boys' WLA was associated with their BMI. The odds for WLA were higher by 50% [$OR=1.53$; 95% CI (1.27; 1.84)] among boys with higher BMI. In addition, lower maternal BMI was associated with boys' WLA. Among girls, their higher BMI and eating disorders risk were significantly associated with WLA (Table 3, Supplementary Table 5).

Table 3

At age 22 years among males, there was strong evidence that WLA was associated with their own higher eating disorders risk and BMI, lower maternal BMI and higher maternal age (Supplementary Table 6). However, among females aged 22 years, WLA was associated with their own high eating disorders risk and higher BMI (Supplementary Table 7).

Structural Equation Model results

Table 4 summarizes the results from the SEM for WLA at 22 years, based on the conceptual framework shown in Figure 1. Supplementary Figures 1 and 2 show pathways for WLA. Among both sons and daughters, WLA was associated with higher BMI and higher eating

disorders risk at 22 years. In addition, for boys only, higher BMI at 13 years, higher maternal age, and lower maternal BMI were also significantly associated with WLA.

Table 4

Maternal education was found to be indirectly associated with sons' WLA at 22 years through eating disorders risk at 22 years and BMI at 22 years. In addition, maternal BMI had an indirect effect on WLA at 22 years through higher eating disorders risk at 22 years and BMI at 22 years. Further, maternal age was indirectly associated with WLA at age 22 through BMI at 13 years. For females, as shown in Supplementary Figure 2, only maternal BMI was indirectly associated with WLA through BMI at 22 years.

Discussion

This study analyzed the relationships between multiple maternal factors and daughters' and sons' body weight management in a poor-urban, obesogenic environment (Soweto, South Africa). We observed that multiple maternal factors, including higher maternal SES, higher maternal age and lower maternal BMI were associated with sons' WLA. Moreover, a negative association between maternal BMI and sons' WLA was found at ages 13 and 17. In contrast, no association between maternal factors and daughters' WLA was found, even though the frequency of WLA was significantly higher among daughters than sons at the three time points.

We first observed that the prevalence of WLA was significantly higher in daughters than in sons and this trend could be undoubtedly linked to the significantly higher eating attitude median score in daughters than in sons at age 17 years. Therefore, WLA practices were higher in daughters, a trend commonly identified in other South African and Western studies.^{15,32} Globally, the impact of the norm of thinness, through Western media, appears to be stronger in young females than in males as women are more targeted by the media and affected by

fatness stigmatization.^{33,34} This trend, identified around the world, is confirmed by our results showing that WLA was significantly associated with increasing BMI and eating disorders risk at earlier time points in daughters than in sons.

In Soweto, most mothers are single and suffer from overweight or obesity.^{35,36} In this household environment, daughters and sons are confronted daily with household members who are overweight and possibly obese, and this excess of fat is frequently associated with eating disorders risk. The maternal lifestyle, especially eating behaviors, choice of foods and dietary intake can expose her offspring to obesity.²⁰ Moreover, maternal normalization and valorization of obesity, already identified in several African studies,^{23,37} can make overweight and obesity the body norm at home for children, as observed in a recent South African study.¹⁷ Thus, adolescents living in urban-poor Soweto could be exposed to two distinct body norm models, with the household environment and cultural values potentially promoting stoutness, and the adolescent peer network reinforced by media images and messages promoting thinness, as discussed in a recent South African study.²³ The impact of these two exposures has rarely been studied.

Our results demonstrate that the impact of maternal factors was stronger in sons than in daughters. Importantly, we observed that decreasing maternal BMI was associated with increasing WLA in sons. This finding does not mean that sons' WLA is only driven by maternal factors. Males' WLA is also positively associated with their own BMI at 17 and 22 years, and their eating disorders risk at 22 years. The recent literature in Western countries shows that the impact of media on body image and weight management is also affecting young men, although the trend seems lower than in young women.³⁸ In South Africa, a similar tendency was found, with young black men having body image concerns and eating disorders risk equivalent to their young black female counterparts, and an engagement in unhealthy control behaviors.¹⁵

Secondly, we found that decreasing maternal age was associated with increasing sons' WLA at 22 years only. The explanation of this finding may emanate from the association between decreasing maternal age and increasing maternal WLA, showing that younger mothers were more likely to attempt to lose weight. This tendency could be the consequence of a higher influence of modern values around thinness in this age group, as observed in other African populations³⁹. In this context, younger mothers could exacerbate their sons' WLA, if we hypothesize that sons at adult age may be more aware of risks of obesity, even more so as they see their BMI increase with their age, as observed in a recent study⁴⁰. In addition, this scenario seems particularly probable as sons grew up in most cases with mothers who were overweight or obese, so that they might be more likely to attempt to lose weight at 22 years through the partial influence of their younger mothers' attempts to decrease their own weight. Since the maternal environment influences boys more than girls, despite girls presenting with higher rates of WLA and eating disorders risk, it appears that WLA external influences such as peer network and media are impacting daughters more than sons, and the influence of external factors exceeds that of maternal factors for girls. Indeed, African studies found that the acculturation process towards thinness valorization, through the influence of Western media, has a higher impact on females than males.^{11,15} Thus, the maternal and more generally traditional influences towards body norms seem to be lower in young adolescent females who have more tendency to adhere to modern norms of thinness.⁵

While the modern trend for thinness could affect more females than males in African countries, other dimensions of the body valued by the modernity and the consumer society, such as becoming muscular, are of greater concern for masculine than feminine identity.⁴¹ In South Africa, Black males could be more concerned by the obsession to be muscular than White males, as a symbol of Black masculinity.⁸ The mental disorder called "muscle

dysmorphia”, identified in the DSM-V as a hybrid category between eating and body
dysmorphic disorders,⁴² was observed in a South African sample.⁴³

A limitation of our study is that we only considered WLA based on weight-loss practices, and
did not specifically investigate WLA based on practices to become more muscular. The desire
to be more muscular could involve different pathways between maternal factors and weight
management by their sons, and is an important dimension to consider in future studies.
Another limitation is that our sample did not comprise of fathers, and therefore, does not
include paternal factors in body image construction and weight management of their
adolescents. This interaction has not been explored within the South African context due to
the labor migration and absence of fathers in the household. Indeed, only 20% of Bt20+
participants had contact with their fathers during adolescence.

Therefore, it would be interesting to investigate in future qualitative studies how the paternal
role could mediate the body size and shape of their offspring, especially the muscular
component of their sons’ body, in addition to the potential influence of media and peer
networks. A comparison between families with and without a father would be informative for
assessing this intergenerational relationship, rarely studied, between males’ body image and
weight management from the same household. Future South African studies should integrate
simultaneously these parameters to assess their respective contribution on body image and
weight management of adolescents and young adults.⁴⁴

The final limitations of this study concern the measurement tools used to assess our variables.
First, the Eating Attitude Test identified eating disorders risk for most mothers from our
sample unlike their adolescents. Indeed, this questionnaire can measure different kinds of
eating disorders having contrasting aetiologies. Most mothers suffered from overweight or
obesity, and excess weight is commonly strongly associated with binge eating disorders⁴⁵.
Moreover, the negative association found between eating disorders risk and WLA in mothers

could be explained by the fact that they might have suffered from binge eating disorders, while the cause of eating disorders risk in underweight and normal weight adolescents might be linked to fat phobia generally associated with other eating disorders as anorexia or bulimia nervosa⁴⁶.

More globally, the second limitation related to our measurements is the degree of reliability of self-report in response to our questionnaires. Indeed, eating attitudes and WLA were assessed by self-report rather than through clinical assessments. This subjective self-assessment presents its limitations and was already discussed in different research areas.⁴⁷ Nevertheless, our data quality and the validity of the study instruments used suggests that questionnaire items were reliable. The differentiated intergenerational patterns we observed between sons and daughters should be confirmed, however, by clinical diagnosis and qualitative inquiry into the relative impact of the family and peers/media on the development of body weight concerns in young males and females.

The implications of our findings suggest that public health interventions need to assist adolescents and their families to better understand the multiple factors that are influencing their attitudes and behaviors around eating and body image so as to promote healthy weight status and minimize eating disorders risk, especially in female adolescents.

Conclusions

Differing patterns were observed between adolescent males and females in the intergenerational relationships with maternal factors and their longitudinal WLA from early adolescence to adulthood. The lack of relationship between maternal norms and daughters' behavior may reinforce the notion of body image acculturation and movement away from traditional cultural norms and a greater exposition to modern body image disturbances and eating disorders risk.

References

1. Puhl RM, Heuer CA. Obesity stigma: important considerations for public health. *Am J Public Health*. 2010;100(6):1019–1028.
2. Solmi F, Hatch SL, Hotopf M, Treasure J, Micali N. Prevalence and correlates of disordered eating in a general population sample: the South East London Community Health (SELCoH) study. *Soc Psychiatry Psychiatr Epidemiol*. 2014;49(8):1335–1346.
3. Burke NL, Tanofsky-Kraff M, Crosby R, et al. Measurement invariance of the Eating Disorder Examination in black and white children and adolescents. *Int J Eat Disord*. 2017;50(7):758–768.
4. Biadgilign S, Mgutshini T, Haile D, Gebremichael B, Moges Y, Tilahun K. Epidemiology of obesity and overweight in sub-Saharan Africa: a protocol for a systematic review and meta-analysis. *BMJ Open*. 2017;7(11):e017666.
5. Fadipe B, Oyelohunnu MA, Olagunju AT, Aina OF, Akinbode AA, Suleiman TF. Disordered eating attitudes: demographic and clinico-anthropometric correlates among a sample of Nigerian students. *Afr Health Sci*. 2017;17(2):513–523.
6. Jones LA, Cook-Cottone C. Media and cultural influences in African-American girls' eating disorder risk. *ISRN preventive medicine*. *ISRN Prev Med*. 2013:319701.
7. Toselli S, Rinaldo N, Gualdi-Russo E. Body image perception of African immigrants in Europe. *Glob Health*. 2016;12(1):48.
8. Gitau TM, Micklesfield LK, Pettifor JM, Norris SA. Eating attitudes, body image satisfaction and self-esteem of South African Black and White male adolescents and their perception of female body silhouettes. *J Child Adolesc Ment Health*. 2014;26(3):193–205.
9. Appiah CA, Otoo GE, Steiner-Asiedu M. Preferred body size in urban Ghanaian women: implication on the overweight/obesity problem. *Pan Afr Med J*. 2016;23:239.
10. Benkeser RM, Biritwum R, Hill AG. Prevalence of overweight and obesity and perception of healthy and desirable body size in urban, Ghanaian women. *Ghana Med J*. 2012;46(2):66–75.
11. Cohen E, Boëtsch G, Palstra FP, Pasquet P. Social valorisation of stoutness as a determinant of obesity in the context of nutritional transition in Cameroon: the Bamileke case. *Soc Sci Med*. 2013;96:24–32.
12. Cachelin FM, Rebeck RM, Chung GH, Pelayo E. Does ethnicity influence body- size preference? A comparison of body image and body size. *Obes Res*. 2002;10(3):158–166.
13. Miller MN, Pumariega AJ. Culture and eating disorders: A historical and cross-cultural review. *Psychiatry Interpers Biol Process*. 2001;64(2):93–110.
14. Szabo CP, Allwood CW. A cross-cultural study of eating attitudes in adolescent South African females. *World Psychiatry*. 2004;3(1):41–44.

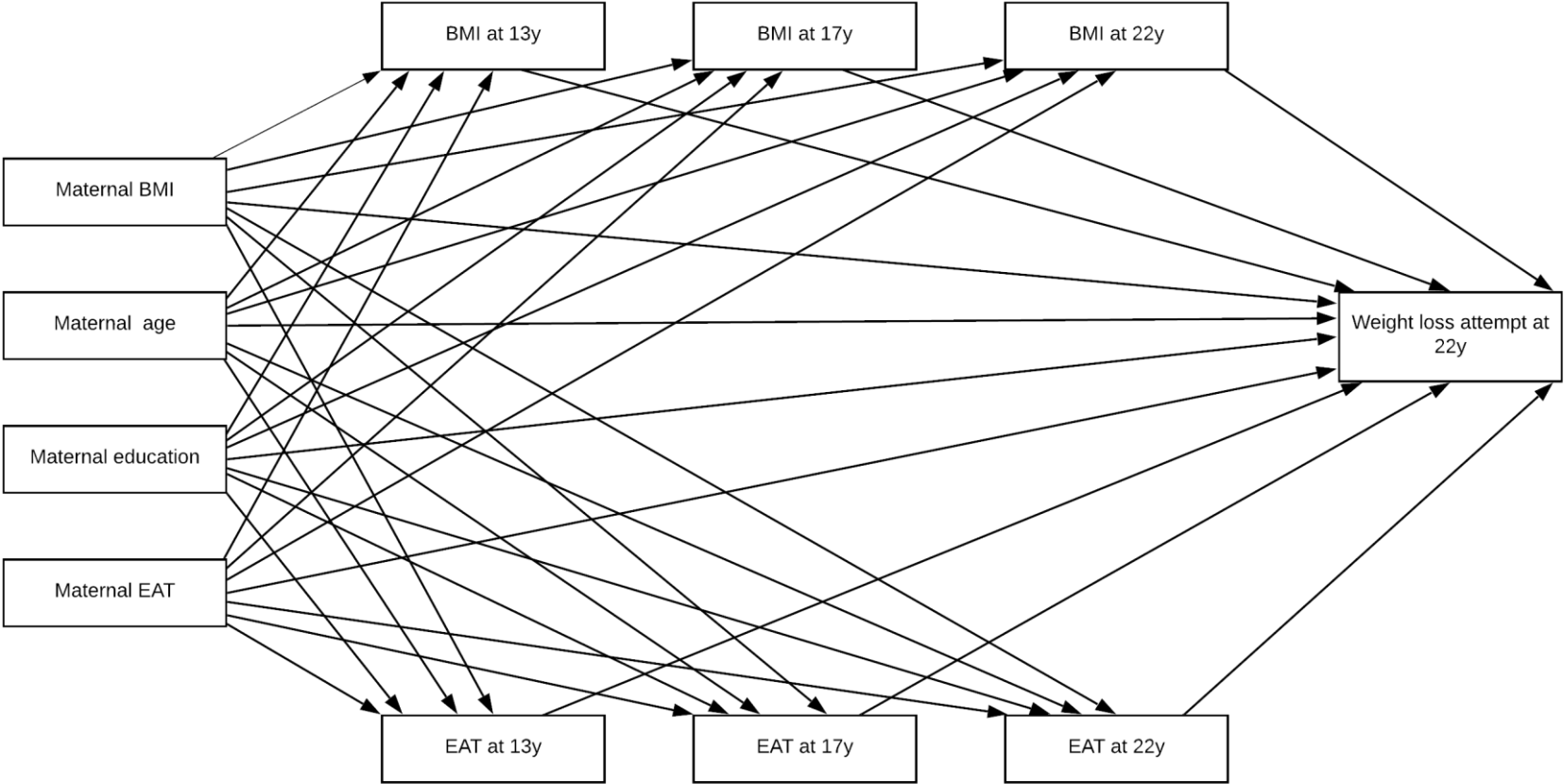
- 377 15. Gitau TM, Micklesfield LK, Pettifor JM, Norris SA. Changes in eating attitudes, body
378 esteem and weight control behaviours during adolescence in a South African cohort.
379 *PloS One*. 2014;9(10):109709.
- 380 16. Okop KJ, Mukumbang FC, Mathole T, Levitt N, Puoane T. Perceptions of body size,
381 obesity threat and the willingness to lose weight among black South African adults: a
382 qualitative study. *BMC Public Health*. 2016;16(1):365.
- 383 17. Pedro TM, Micklesfield LK, Kahn K, Tollman SM, Pettifor JM, Norris SA. Body image
384 satisfaction, eating attitudes and perceptions of female body silhouettes in rural South
385 African adolescents. *PloS One*. 2016;11(5):0154784.
- 386 18. Gitau TM, Micklesfield LK, Pettifor JM, Norris SA. Ethnic differences in eating
387 attitudes, body image and self-esteem among adolescent females living in urban. *South*
388 *Afr J Psychiatry*. 2014;17:468–74.
- 389 19. Mchiza ZJ, Parker WA, Makoe M, Sewpaul R, Kupamupindi T, Labadarios D. Body
390 image and weight control in South Africans 15 years or older: SANHANES-1. *BMC*
391 *Public Health*. 2015;15(1):992.
- 392 20. Berge JM, MacLehose R, Loth KA, Eisenberg M, Bucchianeri MM, Neumark-Sztainer
393 D. Parent conversations about healthful eating and weight: associations with adolescent
394 disordered eating behaviors. *JAMA Pediatr*. 2013;167(8):746–753.
- 395 21. Mchiza ZJ, Goedecke JH, Lambert EV. Intra-familial and ethnic effects on attitudinal
396 and perceptual body image: a cohort of South African mother-daughter dyads. *BMC*
397 *Public Health*. 2011;11(1):433.
- 398 22. Arroyo A, Segrin C, Andersen KK. Intergenerational transmission of disordered eating:
399 Direct and indirect maternal communication among grandmothers, mothers, and
400 daughters. *Body Image*. 2017;20:107–115.
- 401 23. Cohen E, Gradidge PJ-L, Micklesfield LK, Norris SA. Relationship Between Body Mass
402 Index and Body Image Disturbances Among South African Mothers and Their
403 Daughters Living in Soweto, Johannesburg. *Fam Community Health*. 2019;42(2):140–
404 149.
- 405 24. Elfhag K, Linné Y. Gender differences in associations of eating pathology between
406 mothers and their adolescent offspring. *Obesity*. 2005;13(6):1070-1076.
- 407 25. Berge JM, Wall M, Loth K, Neumark-Sztainer D. Parenting style as a predictor of
408 adolescent weight and weight-related behaviors. *J Adolesc Health*. 2010;46(4):331-338.
- 409 26. Alaba O, Chola L. Socioeconomic inequalities in adult obesity prevalence in South
410 Africa: a decomposition analysis. *Int J Environ Res Public Health*. 2014;11(3):3387–
411 3406.
- 412 27. Richter LM, Victora CG, Hallal PC, et al. Cohort profile: the consortium of health-
413 orientated research in transitioning societies. *Int J Epidemiol*. 2011;41(3):621–626.
- 414 28. Michelson H, Muñiz M, DeRosa K. Measuring socio-economic status in the millennium
415 villages: the role of asset index choice. *J Dev Stud*. 2013;49(7):917–935.

- 416 29. Garner DM, Olmsted MP, Bohr Y, Garfinkel PE. The eating attitudes test: psychometric
417 features and clinical correlates. *Psychol Med.* 1982;12(4):871–878.
- 418 30. Sperandei S. Understanding logistic regression analysis. *Biochem Medica Biochem*
419 *Medica.* 2014;24(1):12–18.
- 420 31. Newsom JT. *Longitudinal Structural Equation Modeling: A Comprehensive*
421 *Introduction.* Routledge; 2015.
- 422 32. Raffoul A, Hammond D. Correlates of Weight-Loss Methods Among Young Adults in
423 Canada. *Obesity.* 2018;26(8):1357–1364.
- 424 33. Van den Berg P, Paxton SJ, Keery H, Wall M, Guo J, Neumark-Sztainer D. Body
425 dissatisfaction and body comparison with media images in males and females. *Body*
426 *Image.* 2007;4(3):257–268.
- 427 34. Brewis AA. *Obesity: Cultural and Biocultural Perspectives.* Rutgers University Press.
428 New Brunswick, NJ; 2011.
- 429 35. Tibazarwa K, Ntyintyane L, Sliwa K, et al. A time bomb of cardiovascular risk factors in
430 South Africa: results from the Heart of Soweto Study “Heart Awareness Days.” *Int J*
431 *Cardiol.* 2009;132(2):233–239.
- 432 36. Mlotshwa L, Manderson L, Merten S. Personal support and expressions of care for
433 pregnant women in Soweto, South Africa. *Glob Health Action.* 2017;10(1):1363454.
- 434 37. Moore SE, Harris CL, Watson P, Wimberly Y. Do African American mothers accurately
435 estimate their daughters’ weight category? *Ethn Dis.* 2008;18(2 Suppl 2):211–4.
- 436 38. Dakanalis A, Zanetti AM, Riva G, et al. Male body dissatisfaction and eating disorder
437 symptomatology: Moderating variables among men. *J Health Psychol.* 2015;20(1):80–
438 90.
- 439 39. Cohen E, Gradidge PJJ, Ndao A, et al. Biocultural determinants of overweight and
440 obesity in the context of nutrition transition in Senegal: a holistic anthropological
441 approach. *J Biosoc Sci.* 2018:1-22.
- 442 40. Mintem GC, Gigante DP, Horta BL. Change in body weight and body image in young
443 adults: a longitudinal study. *BMC Public Health.* 2015;15(1):222.
- 444 41. Bégin C, Turcotte O, Rodrigue C. Psychosocial factors underlying symptoms of muscle
445 dysmorphia in a non-clinical sample of men. *Psychiatry Res.* 2019;272:319–325.
- 446 42. Nieuwoudt JE, Zhou S, Coutts RA, Booker R. Muscle dysmorphia: Current research and
447 potential classification as a disorder. *Psychol Sport Exerc.* 2012;13(5):569–577.
- 448 43. Hitzeroth V, Wessels C, Zungu-Dirwayi N, Oosthuizen P, Stein DJ. Muscle
449 dysmorphia: a South African sample. *Psychiatry Clin Neurosci.* 2001;55(5):521–523.
- 450 44. Aliyev B, Türkmen A. Parent, peer and media effect on the perception of body image in
451 preadolescent girls and boys. *Univers J Psychol.* 2014;2(7):224–230.

- 452 45. Higgins DM, Dorflinger L, MacGregor KL, Heapy AA, Goulet JL, Ruser C. Binge
453 eating behavior among a national sample of overweight and obese veterans. *Obesity*.
454 2013;21(5):900–903.
- 455 46. Herpertz-Dahlmann B. Adolescent eating disorders: update on definitions,
456 symptomatology, epidemiology, and comorbidity. *Child Adolesc Psychiatr Clin*.
457 2015;24(1):177–196.
- 458 47. Atkin AJ, Gorely T, Clemes SA, et al. Methods of measurement in epidemiology:
459 sedentary behaviour. *Int J Epidemiol*. 2012;41(5):1460–1471.
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461 **Figures and Tables**

462 **Figure 1: Conceptual framework for BMI (at age 13, 17 and 22 years), eating attitude (EAT) (at age 13, 17 and 22 years) and weight loss attempt at age 22 years.**

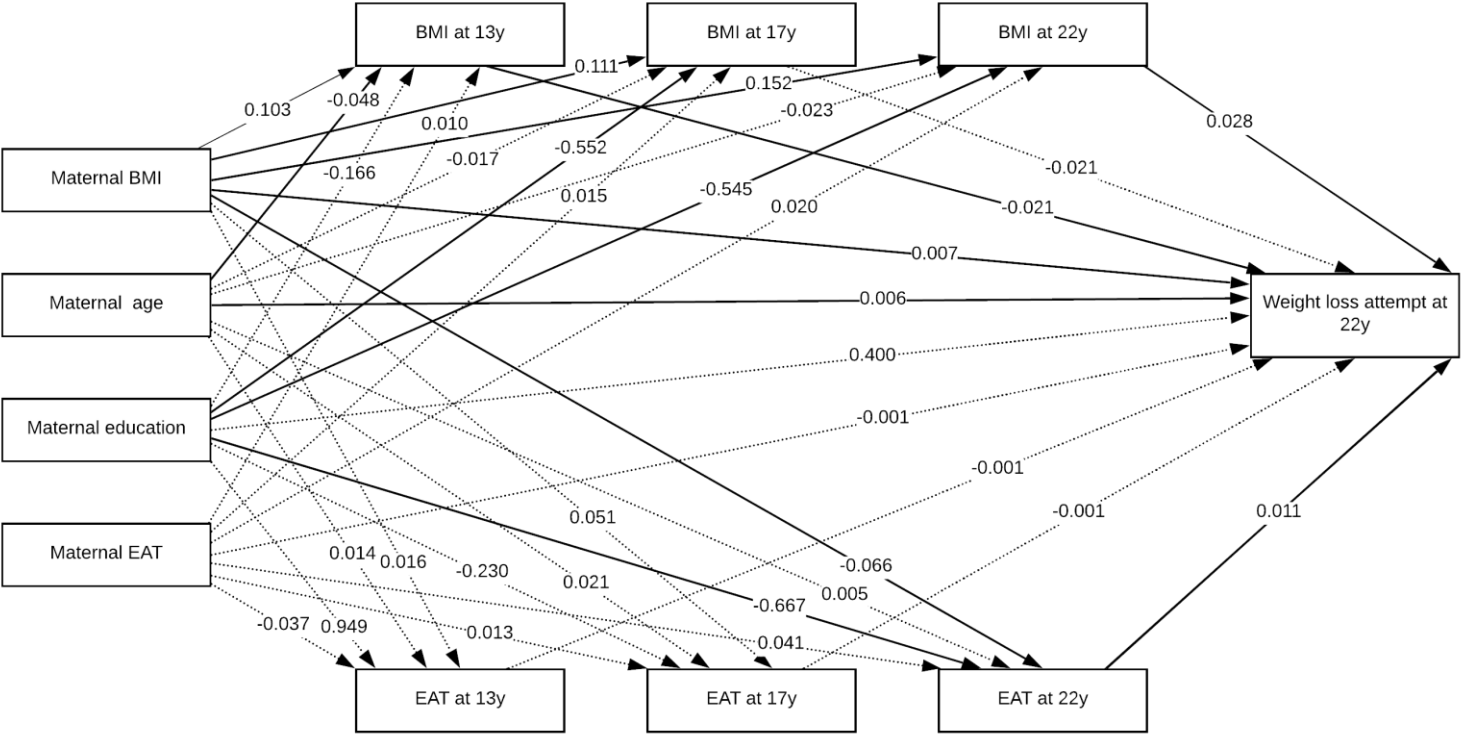


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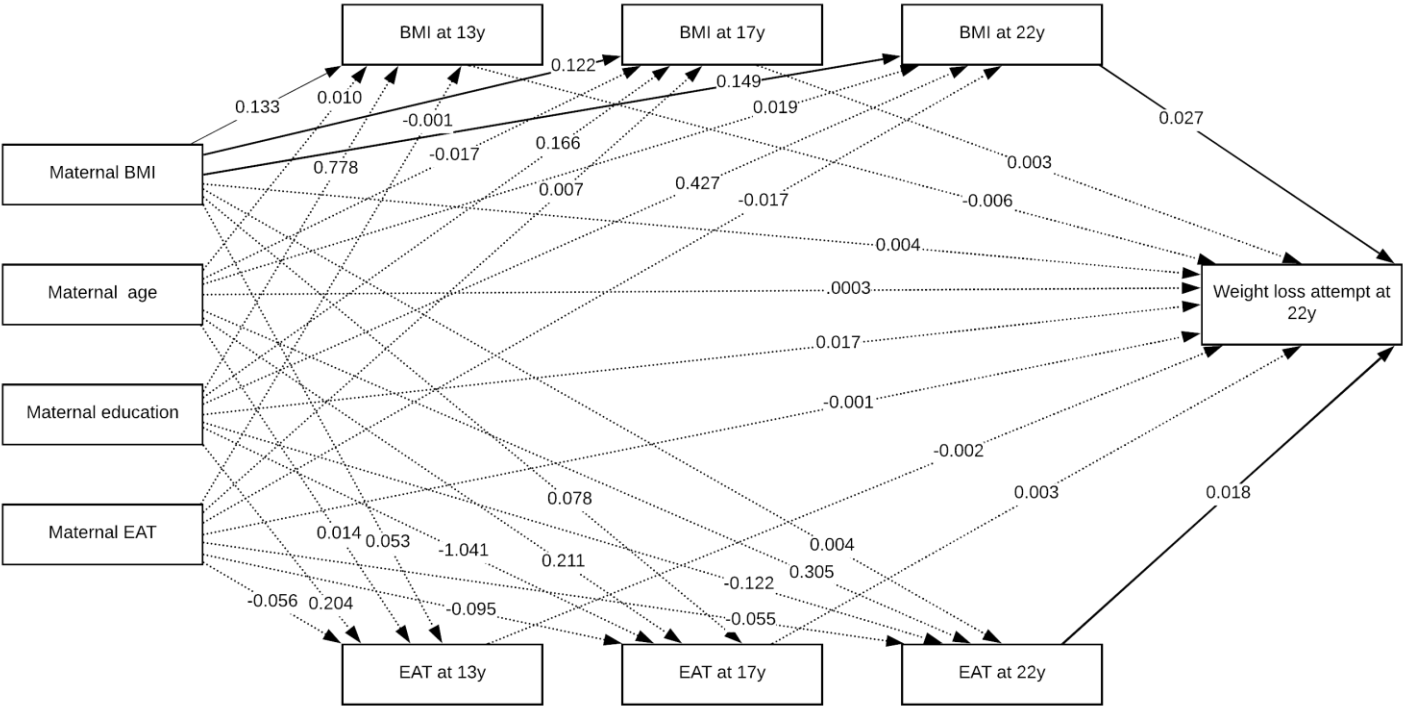
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466 **Supplementary Figure 1:** Results of structural equation modelling (SEM) showing intergenerational associations between maternal characteristics
467 and their sons' body mass index, eating disorders risk and weight loss attempt.



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470 Note: Bold lines represent statistically significant paths; dotted lines represent statistically insignificant paths
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475 **Supplementary Figure 2:** Results of structural equation modelling (SEM) showing intergenerational associations between maternal characteristics
 476 and their daughters' body mass index, eating disorders risk and weight loss attempt.



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 478 Note: Bold lines represent statistically significant paths; dotted lines represent statistically insignificant paths
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484 **Table 1: Descriptive statistics for household and maternal factors of participants, N=1613.**

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VARIABLE	DESCRIPTION	
MATERNAL FACTORS		
Age (n=1292)	Median (<i>IQR</i>)	40.0 (35.0; 45.9)
Education (n=1495)		
	Grade 7 and less, <i>n (%)</i>	190 (12.1)
	Grade 8 to 10, <i>n (%)</i>	664 (44.4)
	Grade 11 and above, <i>n (%)</i>	641 (42.9)
Weight loss attempt (n=1201)		
	No, <i>n (%)</i>	871 (72.5)
	Yes, <i>n (%)</i>	330 (27.5)
BMI (n=1133)	Median (<i>IQR</i>)	30.0 (25.5; 34.4)
Eating disorder score (n=1133)	Median (<i>IQR</i>)	55 (38; 63)
HOUSEHOLD FACTORS		
SES (n=1159)	Median (<i>IQR</i>)	4 (2; 5)

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Table 2: Adolescent factors of participants, stratified by sex, N=1613.

ADOLESCENT AGE	VARIABLES	N	MALES	FEMALES	P-value
			N=704 (47.3 %)	N=786 (52.7 %)	
13 Years	Weight loss attempt				
	No, n (%)	986	424 (86.5)	479 (81.2)	0,018
	Yes, n (%)	191	66 (13.5)	111 (18.8)	
	EAT, median (<i>IQR</i>)	1173	9 (6; 13)	9 (5; 13)	0,465
	BMI, median (<i>IQR</i>)	1530	17.7 (16.4; 19.5)	19.4 (17.7; 22.4)	<0.0013
17 Years	Weight loss attempt				
	No, n (%)	885	425 (90.4)	392 (67.6)	<0.001
	Yes, n (%)	258	45 (9.6)	188 (32.4)	
	EAT, median (<i>IQR</i>)	1142	9 (6; 13)	10 (6; 15)	0,025
	BMI, median (<i>IQR</i>)	1160	19.7 (18.3; 21. 5)	22.2 (19.8; 25.2)	<0.001
22 Years	Weight loss attempt				
	No, n (%)	904	457 (85.1)	389 (62.1)	<0.001
	Yes, n (%)	334	80 (14.9)	237 (37.9)	
	SES, median (<i>IQR</i>)	1196	10 (8; 11)	10 (8; 11)	0,45
	EAT, median (<i>IQR</i>)	1251	8 (5; 13)	9 (5; 15)	0,12
	BMI, median (<i>IQR</i>)	1160	20.7 (19.3; 23.3)	24.2 (20.9; 28.6)	<0.001

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¹P-values for weight loss attempt from Pearson Chi2 test, respectively;
^{2, 3, 4}P-values for EAT, BMI and SES from Wilcoxon sum-ranked test, respectively.

496 **Table 3: Results from logistic regression for factors associated with weight loss attempt at age 17 years for boys.**

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6
Y17 EAT	1.065*** (1.021; 1.112)		1.079** (1.017; 1.144)			1.051 (0.961; 1.150)
Y17 BMI		1.312*** (1.176; 1.463)	1.341*** (1.194; 1.507)			1.526*** (1.266; 1.842)
MATERNAL EAT				0.970* (0.937; 1.004)		0.955* (0.904; 1.009)
MATERNAL BMI				0.983 (0.927; 1.042)		0.897** (0.811; 0.993)
MATERNAL AGE					1.013 (0.964; 1.064)	1.054 (0.987; 1.125)
MATERNAL SES					0.968 (0.748; 1.253)	0.831 (0.579; 1.193)
EDUCATION						
Grade 7 and less (Ref.)						
Grade 8 to 10					0.667 (0.210; 2.123)	1.174 (0.221; 6.241)
Grade 11 +					0.585 (0.170; 2.010)	1.415 (0.250; 8.009)
R ²	0.0266	0.1149	0.1434	0.0134	0.0081	0.2558
Observations	469	361	360	324	273	183

519 Values are odds ratios with 95% confidence intervals in parentheses

520 *** p<0.01, ** p<0.05, * p<0.1

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525 **Supplementary Table 1: Correlation matrices for eating disorders risk and BMI at ages 13, 17 and 22 years.**

<i>EATING DISORDERS RISK</i>			<i>BMI</i>		
Year 13	Year 17	Year 22	Year 13	Year 17	Year 22
Year 13	1			1	
Year 17	0.05 (0.075)	1	0.86 (<0.001)		1
Year 22	0.07 (0.024)	0.45 (<0.001)	0.77 (<0.001)	0.84 (<0.001)	

536 All values are Pearson’s correlation coefficients (rho), p-values in parenthesis.

544 **Supplementary Table 2: Results from logistic regression for factors associated with maternal weight loss attempt.**

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VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6
MATERNAL AGE			0.978** (0.957; 1.000)	0.984 (0.962; 1.007)	0.966*** (0.943; 0.989)	0.971** (0.947; 0.995)
MATERNAL SES			1.037 (0.937; 1.148)	1.022 (0.921; 1.135)	1.010 (0.909; 1.123)	0.992 (0.889; 1.106)
EDUCATION						
Grade 7 and less (Ref.)						
Grade 8 to 10			1.208 (0.668; 2.185)	1.390 (0.733; 2.639)	1.204 (0.650; 2.230)	1.294 (0.664; 2.525)
Grade 11 +			2.377*** (1.321; 4.278)	2.862*** (1.516; 5.403)	2.581*** (1.395; 4.775)	2.925*** (1.503; 5.693)
MATERNAL EAT	0.984*** (0.979; 0.990)			0.993** (0.986; 1.000)		0.993* (0.985; 1.001)
MATERNAL BMI		1.074*** (1.053; 1.095)			1.101*** (1.073; 1.130)	1.110*** (1.080; 1.141)
R ²	0.0208	0.0386	0.0308	0.0394	0.0938	0.1094
Observations	1,117	1,201	835	772	835	772

546 Values are odds ratios with 95% confidence intervals in parentheses

547 *** p<0.01, ** p<0.05, * p<0.1

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561 **Supplementary Table 3: Results from logistic regression for factors associated with weight loss attempt at age 13 years for boys.**

	(1)	(2)	(3)	(4)	(5)	(6)	562
VARIABLES	Model 1	Model 1	Model 1	Model 1	Model 1	Model 1	563
Y13 EAT	1.027		1.018			1.012	565
	(0.993; 1.062)		(0.981; 1.057)			(0.962; 1.065)	566
Y13 BMI		1.003	0.999			0.997	567
		(0.918; 1.096)	(0.914; 1.092)			(0.884; 1.123)	568
MATERNAL EAT				0.980		0.979	569
				(0.950; 1.011)		(0.942; 1.017)	570
MATERNAL BMI				1.032		1.042	571
				(0.982; 1.084)		(0.981; 1.107)	572
MATERNAL AGE					1.025	1.018	574
					(0.987; 1.064)	(0.974; 1.064)	575
MATERNAL SES					1.153	1.267**	576
					(0.948; 1.402)	(1.006; 1.596)	577
EDUCATION							578
Grade 7 and less (Ref.)							579
Grade 8 to 10					2.257	1.123	580
					(0.625; 8.148)	(0.287; 4.400)	581
Grade 11 +					2.211	1.261	583
					(0.593; 8.249)	(0.312; 5.104)	584
R ²	0.0020	< 0.001	0.0023	0.0129	0.0242	0.0504	585
Observations	483	466	458	344	291	225	587
							588

589 Values are odds ratios with 95% confidence intervals in parentheses

590 *** p<0.01, ** p<0.05, * p<0.1

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600 **Supplementary Table 4: Results from logistic regression for factors associated with weight loss attempt at age 13 years for girls.**

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VARIABLES	(1) Model 1	(2) Model 1	(3) Model 1	(4) Model 1	(5) Model 1	(6) Model 1
Y13 EAT	1.007 (0.979; 1.036)		0.995 (0.966; 1.026)			1.012 (0.977; 1.049)
Y13 BMI		1.052** (1.008; 1.098)	1.053** (1.009; 1.100)			1.063** (1.007; 1.120)
MATERNAL EAT				0.994 (0.972; 1.017)		0.994 (0.968; 1.021)
MATERNAL BMI				0.994 (0.960; 1.029)		0.999 (0.959; 1.041)
MATERNAL AGE					0.985 (0.955; 1.016)	0.968 (0.932; 1.008)
MATERNAL SES					1.116 (0.953; 1.307)	1.125 (0.945; 1.330)
EDUCATION						
Grade 7 and less (Ref.)						
Grade 8 to 10					1.168 (0.503; 2.714)	0.935 (0.371; 2.358)
Grade 11 +					1.137 (0.485; 2.664)	1.035 (0.407; 2.630)
R ²	<0.001	0.0232	0.0097	0.0008	0.0088	0.0342
Observations	586	570	565	448	387	321

630 Values are odds ratios with 95% confidence intervals in parentheses

631 *** p<0.01, ** p<0.05, * p<0.1

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Supplementary Table 5: Results from logistic regression for factors associated with weight loss attempt at age 17 years for girls.

	(1)	(2)	(3)	(4)	(5)	(6)	
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	
Y17 EAT	1.058*** (1.036; 1.081)		1.064*** (1.038; 1.090)			1.050*** (1.018; 1.083)	
Y17 BMI		1.182*** (1.124; 1.242)	1.186*** (1.127; 1.249)			1.182*** (1.109; 1.260)	
MATERNAL EAT				0.987 (0.968; 1.006)		0.990 (0.962; 1.019)	
MATERNAL BMI				1.031** (1.001; 1.062)		0.990 (0.947; 1.034)	
MATERNAL AGE					1.003 (0.976; 1.031)	1.023 (0.987; 1.059)	
MATERNAL SES					1.159** (1.002; 1.340)	1.142 (0.946; 1.379)	
EDUCATION							
Grade 7 and less (Ref.)							
Grade 8 to 10					0.649 (0.316; 1.332)	0.919 (0.381; 2.216)	
Grade 11 +					0.880 (0.430; 1.803)	1.376 (0.565; 3.349)	
R ²	0.0410	0.0961	0.1453	0.0112	0.0166	0.1570	
Observations	578	438	437	428	367	273	

Values are odds

659 ratios with 95% confidence intervals in parentheses
660 *** p<0.01, ** p<0.05, * p<0.1
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662 **Supplementary Table 6: Results from logistic regression for factors associated with weight loss attempt at age 22 years for boys.**

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6
Y22 EAT	1.069*** (1.037; 1.102)		1.093*** (1.055; 1.132)			1.085*** (1.031; 1.142)
Y22 BMI		1.216*** (1.142; 1.296)	1.243*** (1.161; 1.331)			1.206*** (1.099; 1.323)
MATERNAL EAT				0.997 (0.985; 1.010)		0.997 (0.982; 1.012)
MATERNAL BMI				0.976 (0.931; 1.022)		0.937** (0.878; 0.998)
MATERNAL AGE					1.025 (0.990; 1.062)	1.053*** (1.008; 1.107)
MATERNAL SES					0.923 (0.770; 1.107)	0.867 (0.689; 1.091)
EDUCATION						
Grade 7 and less (Ref.)						
Grade 8 to 10					1.356 (0.540; 3.409)	4.686* (0.979; 22.43)
Grade 11 +					1.171 (0.445; 3.083)	3.711 (0.733; 18.78)
R ²	0.0398	0.0999	0.1579	0.0041	0.0102	0.1664
Observations	536	508	507	363	344	274

687 Values are odds ratios with 95% confidence intervals in parentheses

688 *** p<0.01, ** p<0.05, * p<0.1

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690 **Supplementary Table 7: Results from logistic regression for factors associated with weight loss attempt at age 22 years for girls.**

	(1)	(2)	(3)	(4)	(5)	(6)	
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	
Y22 EAT	1.110*** (1.083; 1.138)		1.126*** (1.094; 1.159)			1.118*** (1.077; 1.160)	
Y22 BMI		1.159*** (1.119; 1.199)	1.172*** (1.129; 1.217)			1.174*** (1.118; 1.231)	
MATERNAL EAT				1.002 (0.994; 1.012)		1.010 (0.998; 1.023)	
MATERNAL BMI				1.029** (1.001; 1.058)		1.010 (0.972; 1.051)	
MATERNAL AGE					1.011 (0.987; 1.035)	1.005 (0.972; 1.038)	
SES					1.104 (0.973; 1.253)	1.003 (0.849; 1.185)	
EDUCATION							
Grade 7 and less (Ref.)							
Grade 8 to 10					0.859 (0.466; 1.583)	0.951 (0.430; 2.105)	
Grade 11 +					1.037 (0.559; 1.923)	1.116 (0.496; 2.510)	
R ²	0.1091	0.1225	0.2443	0.1144	0.0084	0.227	
Observations	624	557	556	468	440	350	

719 Values are odds ratios with 95% confidence intervals in parentheses

720 *** p<0.01, ** p<0.05, * p<0.1

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727 **Table 4: Results from structural equation models for BMI (at age 13, 17 and 22 years), EAT (at age 13, 17 and 22 years) and weight loss attempt at age 22 years.**

	MALES		FEMALES	
	OR (95 % CI)	P-value	OR (95 % CI)	P-value
BMI at 17 y				
Maternal age	0.97 (0.93; 1.02)	0.236	0.98 (0.93; 1.04)	0.589
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	0.16 (0.05; 0.52)	0.002	1.56 (0.39; 6.30)	0.529
Grade 11 and above	0.22 (0.07; 0.69)	0.010	1.08 (0.27; 4.30)	0.916
Maternal EAT	1.00 (0.98; 1.01)	0.884	1.00 (0.97; 1.02)	0.733
Maternal BMI	1.11 (1.06; 1.18)	<0.001	1.13 (1.06; 1.21)	<0.001
BMI at 22 y				
Maternal age	0.97 (0.92; 1.02)	0.212	1.02 (0.94; 1.10)	0.702
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	0.28 (0.08; 1.03)	0.055	3.87 (0.64; 23.37)	0.141
Grade 11 and above	0.22 (0.06; 0.81)	0.023	1.96 (0.33; 11.69)	0.46
Maternal EAT	1.00 (0.98; 1.02)	0.913	0.97 (0.95; 1.00)	0.081
Maternal BMI	1.15 (1.08; 1.22)	<0.001	1.16 (1.06; 1.27)	0.001
BMI at 13 y				
Maternal age	0.96 (0.93; 1.00)	0.066	1.02 (0.97; 1.07)	0.403
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	1.44 (0.53; 3.91)	0.478	2.48 (0.74; 8.36)	0.142
Grade 11 and above	1.45 (0.53; 3.98)	0.474	2.70 (0.81; 9.07)	0.107
Maternal EAT	0.99 (0.98; 1.01)	0.369	1.00 (0.98; 1.02)	0.760
Maternal BMI	1.09 (1.05; 1.14)	<0.001	1.17 (1.10; 1.23)	<0.001
WEIGHT LOSS ATTEMPT at 22 y				
BMI at 17	0.98 (0.95; 1.01)	0.275	1.00 (0.98; 1.03)	0.752

BMI at 22	1.03 (1.01; 1.05)	0.006	1.03 (1.01; 1.04)	0.001
BMI at 13	1.03 (1.00; 1.06)	0.021	0.99 (0.97; 1.02)	0.551
EAT at 13	1.00 (0.99; 1.01)	0.766	1.00 (0.99; 1.00)	0.461
EAT at 17	1.00 (0.99; 1.01)	0.744	1.00 (1.00; 1.01)	0.210
EAT at 22	1.01 (1.00; 1.02)	0.005	1.02 (1.01; 1.03)	<0.001
Maternal age	1.01 (1.00; 1.01)	0.030	1.00 (0.99; 1.01)	0.868
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	1.10 (0.96; 1.27)	0.164	1.05 (0.91; 1.21)	0.544
Grade 11 and above	1.11 (0.97; 1.28)	0.137	1.05 (0.91; 1.21)	0.533
Maternal EAT	1.00 (0.99; 1.00)	0.638	1.00 (0.99; 1.00)	0.827
Maternal BMI	0.99 (0.98; 1.00)	0.028	1.00 (1.00; 1.01)	0.244
EAT at 13 y				
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	1.67 (0.20; 13.97)	0.636	1.91 (0.23; 15.98)	0.552
Grade 11 and above	3.70 (0.42; 32.33)	0.237	1.98 (0.24; 16.39)	0.528
Maternal EAT	0.98 (0.91; 1.05)	0.508	0.98 (0.92; 1.05)	0.600
Maternal BMI	1.03 (0.92; 1.15)	0.645	1.04 (0.94; 1.15)	0.425
EAT at 17 y				
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	1.40 (0.18; 10.84)	0.748	0.03 (0.00; 0.39)	0.007
Grade 11 and above	0.70 (0.09; 5.63)	0.740	0.03 (0.00; 0.36)	0.006
Maternal EAT	1.03 (0.96; 1.10)	0.382	0.92 (0.85; 0.99)	0.032
Maternal BMI	1.07 (0.96; 1.19)	0.205	1.09 (0.97; 1.23)	0.154
EAT at 22 y				
Maternal education				
Grade 7 and below	Ref		Ref	
Grade 8 to 10	10.62 (1.27; 88.96)	0.029	0.13 (0.01; 1.39)	0.091
Grade 11 and above	1.40 (0.16; 12.20)	0.758	0.29 (0.03; 3.05)	0.302

Maternal EAT	0.99 (0.96; 1.02)	0.622	0.99 (0.95; 1.03)	0.570
Maternal BMI	0.90 (0.81; 0.99)	0.038	1.06 (0.94; 1.19)	0.340

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