

Socioeconomic Differences in Weight Retention, Weight-related Attitudes and Practices in Postpartum Women

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Abstract *Objective* To determine if there is a socioeconomic status (SES) gradient in postpartum weight retention in women living in the UK, and examine SES differences in weight-related attitudes and practices in the postpartum period. *Methods* Women ($n = 2745$) who had full-term live births between July and December 1999 in four London hospitals were eligible to participate in this self-report postal questionnaire study. The questionnaire included items on socio-demographic characteristics, pre-pregnancy weight, postpartum height and weight, pregnancy weight gain and duration, and postpartum weight-related attitudes (body image and weight beliefs) and practices (weight control and weight monitoring). Education was used as the indicator of SES. *Results* Questionnaires were returned by 954 women (35%) on average eight months postpartum. Median postpartum weight retention was 2.7 kg and was significantly higher in the medium and lower SES women (3.2 kg) than higher SES women (1.8 kg) despite no difference in pregnancy weight gain. A greater proportion of higher SES women believed they would return to their pre-pregnant weight, and they engaged in more frequent weight monitoring. There were no SES differences in body dissatisfaction or the proportion of women trying to lose weight postpartum. *Conclusion* In the postpartum period, women of higher SES retained less weight than women of lower SES. There were also differences in weight-related

attitudes and frequency of weight monitoring across SES groups.

Keywords Body weight changes · Postpartum period · Socioeconomic factors

Introduction

Excess pregnancy weight gain and postpartum weight retention can be factors contributing to development of overweight, obesity, and associated conditions including heart disease and diabetes [1]. A review of studies examining weight changes between pre-pregnancy and the postpartum period, concluded that an average pregnancy results in a modest increase of 0.4–3.0 kg more than non-pregnant controls after adjusting for socio-behavioural confounders [2]. However, mean weight changes can underestimate the impact of pregnancy, because up to 20% of women may retain more than 5 kg at 6–18 months postpartum [3, 4]. Even greater pregnancy-related weight retention—at least 10 kg one year postpartum—was reported by 73% of severely obese women attending an obesity unit in Stockholm [5].

A strong positive association between pregnancy weight gain and postpartum weight retention is a consistent finding in the literature [3, 6, 7]. In 1990, the Institute of Medicine (IOM) in the US published clinical recommendations for pregnancy weight gain based on gains associated with better pregnancy outcomes for mother and child in observational studies, including reduced pregnancy complications, healthy foetal growth, and lower postpartum weight retention [8]. High pre-pregnancy BMI is also associated with greater risk of adverse reproductive health outcomes [9, 10] and risk of early overweight

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development in offspring [11]. The IOM recommendations, which are the only formal guidance regarding pregnancy weight gain, advise overweight and obese women to gain less weight than normal weight or underweight women [8].

Disparities in postpartum weight retention between socioeconomic status (SES) groups have been observed in a number of studies [7, 12]. In the 1988 National Maternal and Infant Health Survey, white and black women in the highest SES group had the lowest prevalence of excess postpartum weight retention (defined as more than 9.1 kg) on average 16 months postpartum [7]. Similarly, in a Brazilian sample, the odds of retaining ≥ 7.5 kg at 9 months postpartum was 3.3 for low compared with high income women [12]. However no association [13] or mixed associations [4] between weight retention and SES indicators have also been reported. If SES gradients in postpartum weight retention exist, this may be an important intervention opportunity to reduce socioeconomic disparities.

In many developed countries, there is an SES gradient in overweight and obesity in women, with a higher prevalence in lower SES groups [14]. Differences in weight control attitudes (e.g. perceptions of weight status; desired body mass) and practices (e.g. weight control status, frequency of weight monitoring) are some of the mechanisms hypothesised to underlie the SES gradient [15, 16]. It is plausible that similar factors contribute to SES differentials in postpartum weight retention. Although there have been studies of body satisfaction [17–20] and weight control practices [17, 18] in the postpartum phase, only one study examined SES differences and found no differences in body satisfaction or ideal BMI [17], but it did not look at weight control practices in relation to SES. The aim of the present study was to determine if there is an SES gradient in postpartum weight retention in women living in the UK, and to examine SES differences in weight-related attitudes and practices in the postpartum period.

Methods

Sample and Design

Women ($n = 2745$) who had live births between July and December 1999 in four London hospitals were eligible to participate in this postal questionnaire study. Postal addresses from the time of hospital admission were obtained from the hospitals' database. In March 2000, they were invited to complete a mailed questionnaire entitled 'How women get on after they have had a baby'; we were able to send one reminder eight weeks later for non-responders. Approval for the study was obtained from the University College London Hospitals NHS Trust Clinical Ethics Committee.

Measures

Socio-demographic Characteristics

Age, marital status, number of children, ethnicity, and pre- and post-pregnancy employment status were assessed with single items. Information was collected on four aspects of SES: highest education level (six groups¹: No qualifications; School certificate, GCSE, 'O' level; 'AS' level, 'A' level; National diploma; University degree, Higher degree; Other), household income (originally ten groups reclassified into three approximately equal groups: $<£20,000$; $£20,000$ to $£39,999$; $\geq£40,000$), Townsend neighbourhood deprivation score [21] (a UK area-based index of neighbourhood characteristics derived from postcode which has an average value of zero, with higher values indicating increasing deprivation), and material wealth (car ownership: 0, 1, >1 ; housing tenure: own home or buying home, rent home). Education level was used as the measure of SES in these analyses because the study focuses on weight-related attitudes and practices which are more likely to be shaped by knowledge rather than financial resources. It is also regarded as a more stable measure of SES [22], which may be relevant in the postpartum period when income is vulnerable to change. For the analyses, education levels were combined as follows: low (No qualifications or School Certificate, GCSE, 'O' level); medium ('AS' level, 'A' level or National Diploma); or high (University degree, higher degree).

Anthropometry

Women reported their height and weight at the time of completing the postpartum questionnaire as well as their weight just prior to pregnancy (pre-pregnancy). Pre-pregnancy and postpartum BMI were calculated. BMI was classified using the WHO criteria (underweight: <18.5 kg/m²; normal weight: 18.5 – 24.9 kg/m²; overweight: 25 – 29.9 kg/m²; obese: ≥ 30 kg/m²) [23].

Pregnancy Characteristics

Women reported pregnancy duration in weeks and the total amount of weight gained throughout the pregnancy. A premature birth was classified as a pregnancy duration <37 weeks. Pregnancy weight gain was classified as below, within, or above the IOM's pregnancy weight gain recommendations shown in Box 1, which are based on pre-pregnancy BMI. The upper recommended weight gain limit

¹ School based examinations taken at 16 years (GCSE, 'O' Level), 17 years ('AS' Level), 18 years ('A' Level)

for the ‘high’ pre-pregnancy weight status group (i.e. 11.5 kg) was also used for the obese group in analyses.

Postpartum Weight-related Attitudes and Practices

Aspects of body image including perceived BMI and ideal BMI was assessed using a BMI-calibrated figure-rating scale, consisting of a series of 12 line drawings adapted from digital photographs of young women with BMIs ranging from 12.5 to 37.4 [24]. Body dissatisfaction was determined using a modified version of a six item instrument [25] that asked respondents to rate how satisfied they were with parts of their body (e.g. hips, thighs, stomach) ($\alpha = 0.9$) on a 4-point scale from ‘very satisfied’ to ‘very dissatisfied’. The total score ranged from 6 (high satisfaction) to 24 (high dissatisfaction). The question ‘Do you think you will get back to your pre-pregnancy weight’ was asked to determine self-efficacy about returning to pre-pregnancy weight. Responses options were: ‘No, never’, ‘Yes, I have already’, ‘Yes, within 6 months’, and ‘Yes, within 1 year’, the latter two categories were grouped together for analysis. Women who were trying to lose weight used the figure-rating scale to identify their target body size. In order to examine weight control practices, respondents were asked: ‘Which statement best describes what you were doing before you got pregnant’, and ‘Which statement best describes what you are doing at the moment’. Response options for both questions were: ‘trying to lose weight’, ‘trying to keep my weight at the same level’, ‘not trying to do anything about my weight’, or ‘trying to put on weight’. Women were asked ‘Would you like to lose weight over the next 6 months’ (‘yes’ or ‘no’). Women were also asked ‘Do you have scales in the house’ (‘yes’ or ‘no’) and ‘How often do you weigh yourself’, with the response options: ‘once a day or more’, ‘less than once a day but more than once a week’, ‘less than once a week but more than once a month’, ‘less than once a month’, or ‘never’. The first two response options and the latter three were grouped together for analysis.

Statistical Methods

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 10.1.0 [26]. For continuous variables, differences between the three education groups were examined using a one-way ANOVA if normally distributed and the Kruskal-Wallis H test if non-normally distributed. Differences in continuous variables between two groups were analysed using the Independent-Samples T-Test if normally distributed and the Mann-Whitney U test if non-normally distributed. ANCOVA was used to assess group differences after adjusting the outcome variable for a continuous covariate. The Chi-square Linear-by-Linear

(trend) statistic was used to test the association between education group and other categorical variables.

Results

Response Rate

Questionnaires were returned by 954 women giving a 35% response rate. Townsend neighbourhood deprivation scores were significantly higher for non-respondents than respondents ($P < 0.001$).

Questionnaire Completion

Questionnaires were completed on average 7.6 months (S.D. = 2.1; range: 3.0–13.7) postpartum and this was not significantly different across SES groups. Cases were excluded for the following reasons: respondents were younger than 18 years of age ($n = 4$), reported delivery date did not fall between July and December 1999 ($n = 21$), or education level was not reported ($n = 33$), reducing the sample to 896 women for whom socio-demographic characteristics are presented. Because this was a study of postpartum weight retention, a further 86 women classified as having a pre-term birth (<37 weeks) were excluded because of the association with lower pregnancy weight gain.

Socio-demographic Characteristics

Socio-demographic characteristics of the sample ($n = 896$) are shown in Table 1, stratified by education group. Compared with women in the lower or medium education groups, those in the higher group were older, more likely to be married, and more likely to be white ($P < 0.001$ for all variables). Women in the lower education group had more children than women in the other groups ($P < 0.001$). Education group was highly associated with alternative measures of SES ($P < 0.001$ for Townsend neighbourhood deprivation, family income, and both car ownership and

Box 1 IOM’s pregnancy weight gain recommendations

Pre-pregnancy weight status [†]	Recommended weight gain
Low (BMI < 19.8 kg/m ²)	12.5–18 kg
Normal (BMI ≥ 19.8–26.0 kg/m ²)	11.5–16 kg
High (BMI ≥ 26.0–29.0 kg/m ²)	7.0–11.5 kg
Obese (BMI ≥ 29.0 kg/m ²)	At least 6.0 kg (no upper limit is specified)

[†] This is the only definition of weight status linked to the recommendation

housing tenure which are not shown in Table 1). More women in the higher education group were employed prior to pregnancy and more were working or taking maternity leave postpartum ($P < 0.001$).

Pre-pregnancy and Postpartum Anthropometric Characteristics

Pre-pregnancy and postpartum anthropometric characteristics are shown in Table 2, stratified by education group. Women of higher and medium SES were taller than lower SES women ($P = 0.003$). Women of medium SES were the heaviest, followed by the lower group, while higher SES women were lightest both pre-pregnancy ($P = 0.080$) and postpartum ($P = 0.002$). BMI was lowest in the higher SES group, and similar in the medium and lower SES

groups pre-pregnancy ($P < 0.001$) and postpartum ($P < 0.001$). Overall, 21.3% of the women reported weights and heights that put them in the overweight or obese category (WHO definition) pre-pregnancy, and this increased to 33.1% postpartum. The prevalence of combined overweight and obesity pre-pregnancy was greatest in lower SES women (29.0%), followed by the medium group (27.2%) and least in higher SES women (13.6%). The same pattern was seen at postpartum with the respective prevalence across SES groups increasing to 42.6%, 41.2% and 23.3%.

Postpartum weight retention was calculated by subtracting pre-pregnancy weight from postpartum weight. The median postpartum weight retention was 2.7 kg with a range from -21.3 kg to $+28.6$ kg. Higher SES women retained less weight (1.8 kg) compared with women of

Table 1 Postpartum socio-demographic characteristics stratified by education group

	n	Education group				P value
		All groups (n = 896)	Low (n = 260)	Medium (n = 243)	High (n = 393)	
Age in years ^a	895	31.0 (5.6)	29.3 (5.8)	29.6 (5.7)	33.1 (4.7)	$P < 0.001^b$
Marital status	890					
Married (%)	786	88.3	81.1	84.3	95.6	$P < 0.001^c$
Single (%)	84	9.5	15.0	13.6	3.1	
Divorced or widowed (%)	20	2.2	3.9	2.1	1.3	
Number of children	890					
1 (%)	506	56.9	44.0	62.1	62.1	$P < 0.001^c$
2 (%)	283	31.8	38.6	28.7	29.2	
≥ 3 (%)	101	11.3	17.4	9.2	8.7	
Ethnicity	892					
White (%)	626	70.2	64.6	61.4	79.3	$P < 0.001^c$
Asian (%)	50	5.6	6.2	7.9	3.8	
Black (%)	106	11.9	11.9	18.7	7.7	
Other (%)	110	12.3	17.3	12.0	9.2	
Townsend neighbourhood deprivation score ^a	890	3.6 (2.8)	4.2 (2.7)	3.7 (2.8)	3.1 (2.7)	$P < 0.001^b$
Family income	843					
$<£20,000$ (%)	308	36.5	62.0	47.4	14.7	$P < 0.001^c$
$£20,000$ – $39,999$ (%)	250	29.7	27.5	33.6	28.5	
$\geq£40,000$ (%)	285	33.8	10.5	19.0	56.8	
Employment status						
Pre-pregnancy	875					
Employed (%)	677	77.4	63.7	75.5	87.6	$P < 0.001^c$
Unemployed/ homemaker/other (%)	198	22.6	36.3	24.5	12.4	
Postpartum	890					
Employed—working (%)	297	33.4	22.8	35.3	39.2	$P < 0.001^c$
Employed—maternity leave (%)	155	17.4	8.1	13.7	25.9	
Unemployed/homemaker/other (%)	438	49.2	69.1	51.0	34.9	

^a Mean (SD)

^b One-way ANOVA

^c Chi-square test: trend statistic

medium or lower SES (3.2 kg) ($P = 0.008$). The difference between groups remained statistically significant after adjusting for time since giving birth ($P = 0.013$). There was a similar pattern of results when the three categories of income were used as the measure of SES, except the difference in weight retention between low and high SES women was even more pronounced (median kg [interquartile range]): low (<£20,000: 3.4 kg [0–9.1]); medium (£20,000–£39,999: 2.3 kg [0–6.4]); and high (>£40,000: 1.8 kg [0–4.5]), $P < 0.001$. Multiparous women retained non-significantly more weight (median = 2.7 kg; interquartile range = 0–6.4 kg) than primiparous (2.3 kg; 0–6.4 kg) women. The SES difference in weight retention was statistically significant in multiparous women (median for lower, medium, and higher SES groups respectively: 3.6 kg, 3.4 kg, 1.8 kg; $P = 0.014$) but not primiparous women (median: 2.3 kg, 3.2 kg, 2.0 kg; $P = 0.189$). Women who were classified as overweight (BMI ≥ 25) or obese (BMI ≥ 30) pre-pregnancy retained more weight (median = 3.2 kg; interquartile range = -0.9 to +7.8 kg)

than those who were underweight or normal weight pre-pregnancy (2.3 kg; 0–6.0 kg), although the difference was not statistically significant.

Pregnancy Characteristics

Women’s pregnancy characteristics (for full-term births) are shown in Table 3 stratified by education group. A quarter of women had a caesarean section and average infant birth weight was 3.4 kg, however there was no significant difference in either of these characteristics across SES groups. Average pregnancy weight gain was 12.9 kg and SES differences were not statistically significant overall nor within sub-groups of primiparous or multiparous women. Overall, 37.7% of women gained below, 32.7% gained within, and 29.6% gained above the IOM recommendations for pregnancy weight gain but there was no statistically significant difference across SES groups.

Table 2 Pre-pregnancy and postpartum anthropometric characteristics stratified by education group

	n	Education group				P value
		All groups (n = 714)	Low (n = 182)	Medium (n = 198)	High (n = 334)	
Height (m) ^a	686	1.65 (0.07)	1.64 (0.07)	1.66 (0.07)	1.66 (0.06)	$P = 0.003^b$
Weight (kgs) ^c						
Pre-pregnancy	714	60.4 (54.0–67.2)	60.4 (54.0–69.9)	63.6 (54.0–69.9)	60.2 (54.0–65.4)	$P = 0.080^d$
Postpartum	714	63.6 (57.2–71.7)	64.0 (57.2–75.5)	65.8 (57.2–76.3)	62.0 (56.3–68.6)	$P = 0.002^d$
Postpartum weight retention (kgs) ^c	714	2.7 (0–6.4)	3.2 (0–6.4)	3.2 (0–6.4)	1.8 (0–5.0)	$P = 0.008^d$
BMI (kg/m ²) ^c						
Pre-pregnancy	686	22.0 (20.3–24.5)	22.6 (20.5–25.7)	22.7 (20.3–25.3)	21.6 (20.1–23.4)	$P < 0.001^d$
Postpartum	686	23.1 (21.0–26.2)	24.2 (21.6–28.1)	24.1 (21.6–27.3)	22.6 (20.7–24.5)	$P < 0.001^d$
Weight status (WHO definition)	686					$P < 0.001^e$
Underweight (%)						
Pre-pregnancy	49	7.1	7.4	5.4	8.1	
Postpartum	30	4.4	4.5	3.2	5.0	
Normal weight (%)						
Pre-pregnancy	491	71.6	63.6	67.4	78.3	
Postpartum	429	62.5	52.9	55.6	71.7	
Overweight (%)						
Pre-pregnancy	107	15.6	17.1	21.9	11.1	
Postpartum	156	22.7	25.0	28.4	18.3	
Obese (%)						
Pre-pregnancy	39	5.7	11.9	5.3	2.5	
Postpartum	71	10.4	17.6	12.8	5.0	

^a Mean (SD)

^b One-way ANOVA

^c Median (interquartile range)

^d Kruskal-Wallis H test

^e Chi-square test: trend statistic, pre-pregnancy and postpartum

Pregnancy weight gain was not significantly different between women with a low or normal pre-pregnancy BMI (<26 kg/m², IOM definition), and women with a BMI classified as high or obese (≥26 kg/m²) (12.9 kg vs. 12.7 kg), but the latter group were more likely to be classified as gaining above the IOM recommendations (24.9% vs. 55.3% respectively), and fewer gained within (34.0% vs. 25.9%) or below (41.1% vs. 18.8%) the recommendations ($P < 0.001$). Women gaining below the recommendations retained the least weight (median: 1.8 kg; interquartile range: 0–5 kg), followed by those gaining within the recommendations (2.0 kg; 0–5.9 kg), with women gaining above the recommendations retaining the most (4.5 kg; 0.9–9.1 kg) ($P < 0.001$).

Postpartum Weight-related Attitudes and Practices

Women's postpartum weight-related attitudes including body image and beliefs, and practices including weight control and weight monitoring are presented in Table 4, stratified by education group. Mean BMI for perceived size and perceived ideal size was 23.4 kg/m² and 19.6 kg/m², respectively. For both body image ratings, women of higher SES selected a thinner figure compared with women of lower or medium SES ($P = 0.009$ and $P = 0.002$ respectively).

The proportion of women who *reported* having returned to their pre-pregnant weight was 32.2%; the rate was similar in the higher and lower SES groups (35.7% and 33.5%, respectively). Among women who had not returned to their pre-pregnant weight (67.8%), 79.0% believed they would return to their pre-pregnancy weight within 6 or 12 months, with more women of higher SES (87.2%) holding

this belief than women in the medium (73.0%) or lower SES groups (71.3%) ($P < 0.001$). Prior experience may have influenced women's beliefs about losing weight in the postpartum period and therefore primiparous and multiparous groups were examined separately. In the primiparous group, 93.2% of high SES women thought they would return to their pre-pregnancy weight within 6–12 months, compared with 78.0% in the medium and 72.1% in the lower SES groups ($P < 0.001$). In the multiparous group, 78.9%, 65.3% and 70.8% of higher, medium and lower SES women held this belief ($P = 0.262$).

Postpartum, more women were trying to lose weight compared with pre-pregnancy (49.9% vs. 23.3%), and fewer were trying to keep their weight at the same level (15.5% vs. 30.1%) or do nothing about it (31.0–43.3%). Pre-pregnancy and postpartum, the prevalence of 'trying to lose weight' was greatest in the lower SES group and least in the higher SES group, but this trend was only statistically significant pre-pregnancy ($P = 0.031$ and $P = 0.346$, respectively). The majority (74.8%) of women in all SES groups responded that they would like to lose weight in the next six months but there was no statistically significant trend across SES groups. Among women who were trying to lose weight, the mean ideal BMI was 20.8 kg/m², with women of higher SES selecting a thinner figure than the one chosen by women of medium and lower SES ($P = 0.015$). The target for future size was thinner than women's pre-pregnancy BMI in all SES groups, and the difference was greater in lower (3.1 kg) and medium SES women (2.7 kg) compared with higher SES women (2.3 kg) ($P = 0.038$). The proportion of women who had scales at home was 59.2%, and this was highest in the medium SES group (63.2%) and lowest in the lower SES group (50.0%) ($P = 0.024$). Limiting the analysis to women

Table 3 Pregnancy characteristics stratified by education group

	n	Education group				P value
		All groups (n = 714)	Low (n = 182)	Medium (n = 198)	High (n = 334)	
Pregnancy weight gain (kgs) ^{a,b}	572	12.9 (5.9)	12.2 (6.6)	13.1 (6.0)	13.1 (5.3)	$P = 0.316^c$
Baby birth weight in (kgs) ^a	699	3.4 (0.5)	3.4 (0.5)	3.5 (0.5)	3.4 (0.5)	$P = 0.832^c$
IOM classification of pregnancy weight gain ^b	550					
Below (%)	207	37.7	40.5	33.3	38.6	$P = 0.715^d$
Within (%)	180	32.7	29.0	34.0	33.8	
Above (%)	163	29.6	30.5	32.7	27.6	
Birth type	710					
Caesarean (%)	177	24.9	22.1	26.2	25.7	$P = 0.408^d$
Non-caesarean (%)	533	75.1	77.9	73.8	74.3	

^a Mean (SD)

^b Excludes 5 women reporting a pregnancy weight gain >35 kg

^c One-way ANOVA

^d Chi-square test: trend statistic

Table 4 Postpartum weight-related attitudes and practices stratified by education group

	<i>n</i>	Education group				<i>P</i> value
		All groups (<i>n</i> = 714)	Low (<i>n</i> = 182)	Medium (<i>n</i> = 198)	High (<i>n</i> = 334)	
Body image						
Perceived size (kg/m ²) ^a	706	23.4 (4.8)	24.0 (5.5)	23.8 (4.5)	22.8 (4.4)	<i>P</i> = 0.009 ^b
Perceived ideal size (kg/m ²) ^a	706	19.6 (2.7)	19.9 (3.0)	20.0 (2.8)	19.3 (2.4)	<i>P</i> = 0.002 ^b
Body dissatisfaction score ^c	662	16.8 (0.1)	16.6 (0.2)	16.8 (0.2)	17.0 (0.2)	<i>P</i> = 0.400 ^d
Weight beliefs						
Realistic target for future size (kg/m ²) ^a	590	20.8 (3.3)	21.3 (3.8)	21.1 (3.3)	20.4 (3.0)	<i>P</i> = 0.015 ^b
Reported to have returned to pre-pregnant weight (%)	222 ^e	32.2	33.5	25.0	35.7	<i>P</i> = 0.370 ^f
I think I will return to pre-pregnant weight ^g	467					<i>P</i> < 0.001 ^f
No (%)	98	21.0	28.7	27.0	12.8	
Yes, within 6 or 12 months (%)	369	79.0	71.3	73.0	87.2	
Weight control practices						
Pre-pregnancy I was trying to:	704					
Lose (%)	164	23.3	28.3	24.2	20.0	<i>P</i> = 0.195 ^f
Stay same (%)	212	30.1	30.0	26.3	32.4	
Do nothing (%)	305	43.3	36.1	46.4	45.5	
Gain (%)	23	3.3	5.6	3.1	2.1	
Postpartum I am trying to:	704					
Lose (%)	351	49.9	52.0	51.3	47.9	<i>P</i> = 0.337 ^f
Stay same (%)	109	15.5	17.9	15.4	14.2	
Do nothing (%)	218	31.0	24.0	29.7	35.5	
Gain (%)	26	3.7	6.1	3.6	2.4	
Weight monitoring						
Have scales at home (%)	404 ^h	59.2	50.0	63.2	61.8	<i>P</i> = 0.024 ^f
Weighing frequency (only women with home scales)	402					
Once a week or more	132	32.8	31.8	21.3	40.5	<i>P</i> = 0.033 ^f
Less than once a week or never	270	67.2	68.2	78.7	59.5	

^a Mean (SD)^b One-way ANOVA^c Mean (standard error); adjusted for postpartum BMI^d ANCOVA^e From 689 women^f Chi-square test: Trend statistic^g Excludes 222 women reporting to have returned to pre-pregnant weight^h From 682 women

who had scales at home, the proportion weighing themselves at least once a week was 32.8%, but this behaviour was more common in the higher SES group (40.5%) and least common in the medium SES group (21.3%) (*P* = 0.033).

Discussion

SES differences in weight retention, weight-related beliefs and monitoring practices were found in this sample of postpartum women from London having full-term births.

Although there were no differences in pregnancy weight gain, higher SES women retained the least amount of weight postpartum and more of them believed they would return to their pre-pregnancy weight within the next year. Higher SES women also weighed themselves more frequently and had lower ideal and target body sizes, although there was no difference in body dissatisfaction or prevalence of trying to lose weight postpartum across SES groups.

The median amount of weight retained by women having full-term births in this study was 2.7 kg on average

8 months postpartum. The finding that higher SES women retained the least amount of weight is consistent with previous findings (7, 12). Our results showed no statistically significant SES differences in full-term pregnancy weight gain which is a strong predictor of weight retention [3], and therefore the SES differences in weight retention suggest that effects are emerging in the postpartum period. The key SES difference in weight retention was in the multiparous group, which may mean that factors associated with higher educational level, including knowledge and financial resources, may provide the conditions to minimise weight retention when faced with the demands of caring for multiple offspring in the postpartum phase.

Socio-biological mechanisms may also contribute to the higher level of postpartum weight retention found in lower SES women. In a US study of pregnant women those with a fasting insulin concentration in the highest quartile had at least a two-fold odds of excess pregnancy weight gain and excess pregnancy weight retention (both defined as >90th centile in that sample) compared with women who had lower insulin levels [27]. That study did not present or adjust for an association between education and insulin levels, but population studies have reported that women with lower levels of education have greater fasting insulin concentrations [28] and higher odds of metabolic syndrome [28, 29] compared with more educated women.

The use of self-reported pre-pregnancy and postpartum weight to calculate weight retention is unlikely to explain the SES differences we found in weight retention, since any SES bias in weight reporting is likely to be consistent for weight reports at both time points. The postpartum SES differences we found in weight loss self-efficacy and frequency of weight monitoring may be related to SES differentials in postpartum weight retention, although we are unable to confirm if the association was causal.

Women's perceived and ideal sizes were within the normal-weight range (WHO definition). However, the target for future size was thinner than women's pre-pregnancy BMI in all SES groups and the difference was greater in the lower than the higher SES group, indicating an SES differential in realism about future weight. Average body dissatisfaction score (16.8), adjusted for postpartum BMI, was in the 'dissatisfied' range (12–18) and was not significantly different across SES groups. Similarly, no SES differences in body satisfaction were reported in a study of 90 postpartum women from the US, but in contrast to our findings there was no SES gradient in ideal BMI [17]. In the present study approximately three quarters of women in all SES groups wanted to lose weight in the next six months which also reflects the norm for postpartum body dissatisfaction.

In the group of women who had not described themselves as having returned to pre-pregnant weight, there was

an SES gradient in the belief that they would return to it within 6 or 12 months (71.3% of lower SES to 87.2% of higher SES women). Compared with women of medium and lower SES, a greater proportion of higher SES women in both the primiparous and multiparous groups held this belief, suggesting that prior experience does not explain the difference across SES groups. SES differences in weight loss self-efficacy could be a consequence of the differential weight loss needed to achieve pre-pregnancy weight. Alternatively, higher SES women may feel they have greater personal and environmental resources to achieve weight loss. A study of the association between psychosocial characteristics and change in exercise and food intake in the first 12 months post-partum [30] lends support to the importance of self-efficacy in achieving weight/behavioural goals in the post-partum period. In that study, behaviour-specific self-efficacy scores (exercise self-efficacy and food intake self-efficacy) were associated with increased exercise frequency and decreased food intake respectively, at 12 months post-partum. Weight control self-efficacy was also identified as a predictor of decreased food intake at 12 months post-partum, although differences across SES groups were not examined.

In the present study, the proportion of women trying to lose weight increased from approximately a quarter pre-pregnancy to half in the postpartum phase. Similarly in another study of British women, 51.4% reported having actively tried to lose weight in the 2.5 year period after giving birth [18]. The absence of an SES differential in trying to lose weight postpartum in the present study is not surprising considering the majority of women in all SES groups claimed not to have returned to their pre-pregnant weight. Pre-pregnancy there was a trend for a higher frequency of trying to lose weight in the lower SES group; probably because the prevalence of overweight and obesity was highest in this group.

The trend for more frequent weight monitoring in higher SES women was consistent with another study using a population representative sample [15]. Among overweight and obese individuals in weight control trials, more frequent self-weighing (at least once per week) was associated with greater weight losses [31]. Similarly, self-weighing at least once per week was a characteristic shared by 75% of successful dieters enrolled with the National Weight Control Registry in the US [32].

Limiting postpartum weight retention was one of the considerations when developing the IOM recommendations [8], and gaining above the recommendations in this study was associated with higher weight retention. The overall prevalence of gaining above the recommendations in the present study was 30%, but was much greater in women with a high/obese weight status (BMI > 26, IOM definition) than those with a low/normal weight status

(BMI < 26). But this was because a lower maximum weight gain is recommended for women with a high weight status and not because of any difference in weight gain between the two groups. Overall, 33% of women gained within the recommendations, similar to the rates reported in other studies [33, 34].

Recruitment of a large sample of women from a range of SES backgrounds is a strength of this study. However, the low overall response rate, and lower response rates in addresses from more deprived areas limits the generalisability of the results, and further studies of SES differences in post-partum weight retention are warranted to confirm our findings. Recruitment for surveys during pregnancy and the post-partum period is often challenging, even in studies having initial face-to-face contact with eligible participants [17, 35]; in one study, only 50% of women who had agreed to complete questionnaires given to them directly by study investigators, returned them [17]. In another study, after a reminder was sent to initial non-responders, only 57% of women who indicated to the researcher during their post-natal hospital stay that they would like to take part in a post-partum postal survey returned it [35]. An additional problem with recruiting women in the postpartum period is their relatively high probability of moving house—up to 25% of women move residence by 12 months postpartum (*Personal Communication: Taylor, 2006* [36]) which may mean that mailed questionnaires do not reach the intended recipients. Response rates in the present study may have been improved if we had been able to provide a telephone reminder and this would have also helped to determine the proportion of women who had moved, but ethical considerations often limit the efforts to make contact.

Prior to pregnancy an SES gradient in overweight and obesity prevalence was observed and this persisted at postpartum, an association that has been well described in the literature [14]. The prevalence of overweight and obesity in this study sample (average age 31 years) was relatively low at 21% pre-pregnancy and 33% postpartum, compared with 36% of 16–34 year old women in a nationally representative sample in the Health Survey for England 1999 [37]. This is likely to be due to a greater proportion of higher SES respondents, a sample that was limited to women from London, and the use of self-reported heights and weights.

In this study of postpartum women from London having full-term births, those in the higher SES group retained less weight than their lower and medium SES counterparts despite no differences in pregnancy weight gain across groups. These findings support the need for programs to reduce weight-retention in the postpartum period, particularly in lower SES groups. Although there were no SES

differences in body dissatisfaction or the proportion of women trying to lose weight postpartum, a greater proportion of higher SES women believed they would return to their pre-pregnant weight and they engaged in more frequent weight monitoring. Together these findings indicate there may be a subtle interplay of psycho-behavioural factors operating to curb weight retention in higher SES women.

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