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N.B.: When citing this work, cite the original article.

Original Publication:

Ing-Marie Claesson, Gunilla Sydsjö, Jan Brynhildsen, Maria Blomberg, Annika Jeppsson, Adam Sydsjö and Ann Josefsson, Weight after childbirth: A 2-year follow-up of obese women in a weight-gain restriction program, 2011, Acta Obstetrica et Gynecologica Scandinavica, (90), 1, 103-110.

<http://dx.doi.org/10.1111/j.1600-0412.2010.01016.x>

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Postprint available at: Linköping University Electronic Press

<http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-56583>

Weight after childbirth: A 2-year follow-up of obese women in a weight-gain restriction program

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Abstract

Objective: To investigate the effects of a weight gain restriction program on weight development or weight maintenance two years after childbirth.

Design: A case-control intervention study

Setting: Antenatal care clinics in the south east of Sweden

Sample: 155 obese pregnant women who participated in a weight gain restriction program with weekly support during pregnancy and every six months during the two first years after childbirth. The control group consisted of 193 obese pregnant women.

Methods: Follow-up weight measurements were done at 12 and 24 months after childbirth.

Main Outcome Measures: Weight change in kg at 12 and 24 months postpartum.

Results: A greater percentage of women in the intervention group showed a weight loss 24 months after delivery than did women in the control group at that same time ($p = 0.034$). Women in the intervention group who gained less than 7 kg during pregnancy had a significantly lower weight than the controls at the 24 months follow-up ($p = 0.018$). The mean value of weight change in the intervention group was -2.2 kg compared to + 0.4 kg in the control group from early pregnancy to the follow-up 12 months after childbirth ($p = 0.046$).

Conclusions: An intervention program with weekly motivational support visits during pregnancy and every 6 months after childbirth seems to have an impact on weight gain up to 24 months after childbirth for those women in the intervention group who succeeded in restricting their gestational weight gain to less than 7 kg.

Keywords: pregnancy, obesity, postpartum, weight gain, intervention

Introduction

Excessive gestational weight gain might imply a risk for continuous postnatal weight gain or weight retention. For some women that might lead to a higher pre-pregnancy weight in subsequent pregnancies (1-4). The American Institute of Medicine (IOM) stated in 1990 recommendations for weight gain depending on pre-pregnancy BMI, for women with a pre-pregnancy BMI >29, the recommended weight gain is at least 6.8 kilos during pregnancy (5). These guidelines were reexamined in 2009 and the present recommendations now suggest a gestational weight gain for obese women (BMI ≥ 30 kg/m²) between 5.0 – 9.1 kg (6).

Weight retention after pregnancy and possible interacting factors such as smoking status, breastfeeding, eating- and exercise behavior, have been investigated in several studies. High weight gain during pregnancy seems to be an important factor for weight retention (7-12). These studies report weight gain retention between 0.5 and 3 kg, within the first year after childbirth. Also, in a longer perspective, excessive gestational weight gain and failure to lose weight postpartum are significant predictors for weight gain or weight retention several years later (13, 14). Schmitt et al. showed that lifestyle-related factors rather than biological reasons explain the increase in body weight one year after childbirth (15). Intervention studies with the aim of helping women lose weight after childbirth report diverging results (16, 17). A review including six randomized controlled studies, with a follow-up within one year after childbirth, have shown an impact of diet and exercise or a combination of these on maternal body composition (16). On the other hand, in a controlled trial, Kinnunen et al. could not find any significant effect of counseling on weight 10 months after childbirth (17). The design of each of these studies differs from the others, which makes comparisons difficult. Previous intervention studies to prevent excessive gestational weight gain also report diverging results (18-25). So far only one of these studies has reported results from a follow-up period longer than six months after childbirth (20).

We have previously shown that an intervention program for obese women designed to restrict weight gain to less than 7 kg during pregnancy had a positive effect and managed to reduce gestational weight gain (23). The aim of the present study was to investigate the effect of this weight gain restriction program on weight development during the following two years after childbirth. We also separately evaluated the weight development for the women who managed to gain < 7 kg during pregnancy. Hence, the primary outcome was weight and weight change from early in pregnancy to 24 months postpartum.

Material and Methods

Between November 2003 and December 2005 obese (BMI ≥ 30 kg/m² in early pregnancy) pregnant women were recruited to an intervention study (n=155) at the antenatal care clinics (ANC) in Linköping, Sweden. Obese pregnant women at ANC: s in two nearby cities (n=193) were recruited to serve as controls and followed the routine ANC program. All women were included in the study before gestational week 15. The results of the intervention study are thoroughly described and presented elsewhere (23). Briefly the intervention program for pregnant women was based on individual weekly 30 minutes sessions with a specially trained midwife (author IMC). The women made on average 22.1 visits during the pregnancy. The motivational interview/talk was used as a tool with the aim of motivating the obese pregnant woman to change her behavior and to obtain information applicable and useful for her needs (26). The target weight gain of the study was a gain of less than 7 kg and this target was only discussed at the first session. The midwife worked throughout the whole program with assessing the pregnant woman's knowledge of obesity in general and her knowledge of its role as a risk factor for her pregnancy and delivery outcome as well as for the health and wellbeing of her child. If the woman lacked sufficient knowledge, she was offered information and given accurate facts. The woman was also informed about the potential consequences of different behaviors associated with energy intake; written information was supplied if needed. The sessions included weight control and a counseling program characterized by its collaborative structure. The woman's own judgment of her motivation and the possibility of changing a behavior, the advantages and disadvantages of changing a behavior, and the choice of strategies for adopting and maintaining a new behavior were all topics of the sessions. All women who attended the program were also invited to an aqua aerobic class (once or twice a week) designed for obese pregnant women.

The obese pregnant women in the control group attended the standardized Swedish antenatal care program which for healthy pregnant women recommends seven to nine visits to a midwife, and, if needed, extra appointments with an obstetrician and/or with the midwife. There were no differences between the women in the intervention- and control group regarding age, parity, marital status, smoking, BMI and occupation, but the women in the intervention group reported a higher level of education (p=0.044). The women in the intervention group had a lower weight gain during pregnancy (8.7 kg) (p<0.001) and weighed less (-2.2 kg) at the postnatal check-up (p<0.001) compared with the women in the control group, who gained 11.3 kg and weighed 0.8 kg more at the postnatal check-up. The mean value of the gestational length in both groups were 39.3 weeks (23).

The follow-up visits for weight assessment were scheduled at 6, 12, 18 and 24 months after childbirth. This study reports results from the one and two year's follow-up. At each 30 minute long visit, with the same midwife as during pregnancy, the woman's views about handling her weight in her role as mother and in the new family constellation was discussed. The discussions could concern change of routines that the woman was pleased with, but could also concern routines that functioned well during pregnancy but not after the delivery. If the woman so desired, a supportive motivational talk was provided. The weight was measured at the same weighing scale as during the pregnancy and at postnatal check-up for the women in the intervention group.

The women in the control group were invited to the ANC for weight measurement only. The original plan for all women in the control group was to objectively measure the weight at the same scale as was used during the pregnancy. However, it was not possible to implement this plan since some of the women in the control preferred to report their weight by telephone.

Statistics

All analyses were performed using the SPSS program, version 16.0 (SPSS Inc., Chicago, IL). Statistical significance was defined as (two-sided) $p \leq 0.05$. Before analyzing the weight changes the assumption of these variables being normally distributed were validated using the Kolmogorov-Smirnov test. Since this assumption was confirmed ordinary Student's t-test was used as method of analysis for detecting weight change differences between index and control women at 12 and 24 months after childbirth. In general, group differences were estimated by using the chi-square test on categorical variables and the Student's t test on continuous, normally distributed variables.

This study was approved by the Human Research Ethics Committee, Faculty of Health Sciences, Linköping University.

Results

A description of the study population from enrolment to the two years follow-up is presented in figure 1. The rate of participation in the intervention group was 88.1 % and 81.6 %, one and two years after childbirth. The corresponding figures for the control group were 60.9 % and 37.6 %. After 12 and 24 month analyses were made to update the socio-demographic data among the women still remaining in the study sample. There was a difference in parity, only at the 24 months follow-up with more multiparas in the intervention group ($p=0.011$), (Table 1).

Table 2 shows the weight and mean weight change among the women in the intervention- and control group at the two assessments. The mean weight was 3.0 kg and 4.5 kg lower in the intervention group than in the control group, one and two years after childbirth respectively, but the differences did not reach statistical significance.

Sub analyses of the group that reached the target weight gain during pregnancy, i.e. weight gain less than 7 kg, showed a difference of weight change between the intervention- and control groups at 24 months after childbirth ($p=0.018$). The women in the intervention group had a lower mean weight (87.3 kg) than the women in the control group (100.8 kg).

The mean weight change from early pregnancy to the follow-up occasion was analyzed and at 12 months after childbirth a difference between the intervention- and control group was found ($p=0.046$), (Table 2). The women in the intervention group had a greater mean weight change (-2.2 kg), i.e. weighed less than the women in the control group (0.4 kg). These differences had disappeared 24 months after childbirth. A total of 23 women in the intervention group and 13 women in the control group showed a BMI <30, at 24 months after childbirth (data not shown).

The weight development, i.e. the weight at the assessment 12 and 24 months after childbirth compared with the weight at the first antenatal care visit and expressed in 5 kg classes, is shown in figure 2. There was a significant difference between the intervention- and control group 24 months after childbirth ($p=0.034$). There were more women in the intervention group who had lost weight, compared with the control group. A drop-out analysis was performed. Women in the intervention group who refrained from participation in the follow-up had a higher weight at the first visit at the ANC than the women who participated in the follow-up ($p =0.015$ and $p =0.011$ at 12 and 24 months respectively). In the control group, multiparas refrained from participation at the 12 month follow-up to a significantly greater extent ($p =0.033$) but not at the 24 months follow-up.

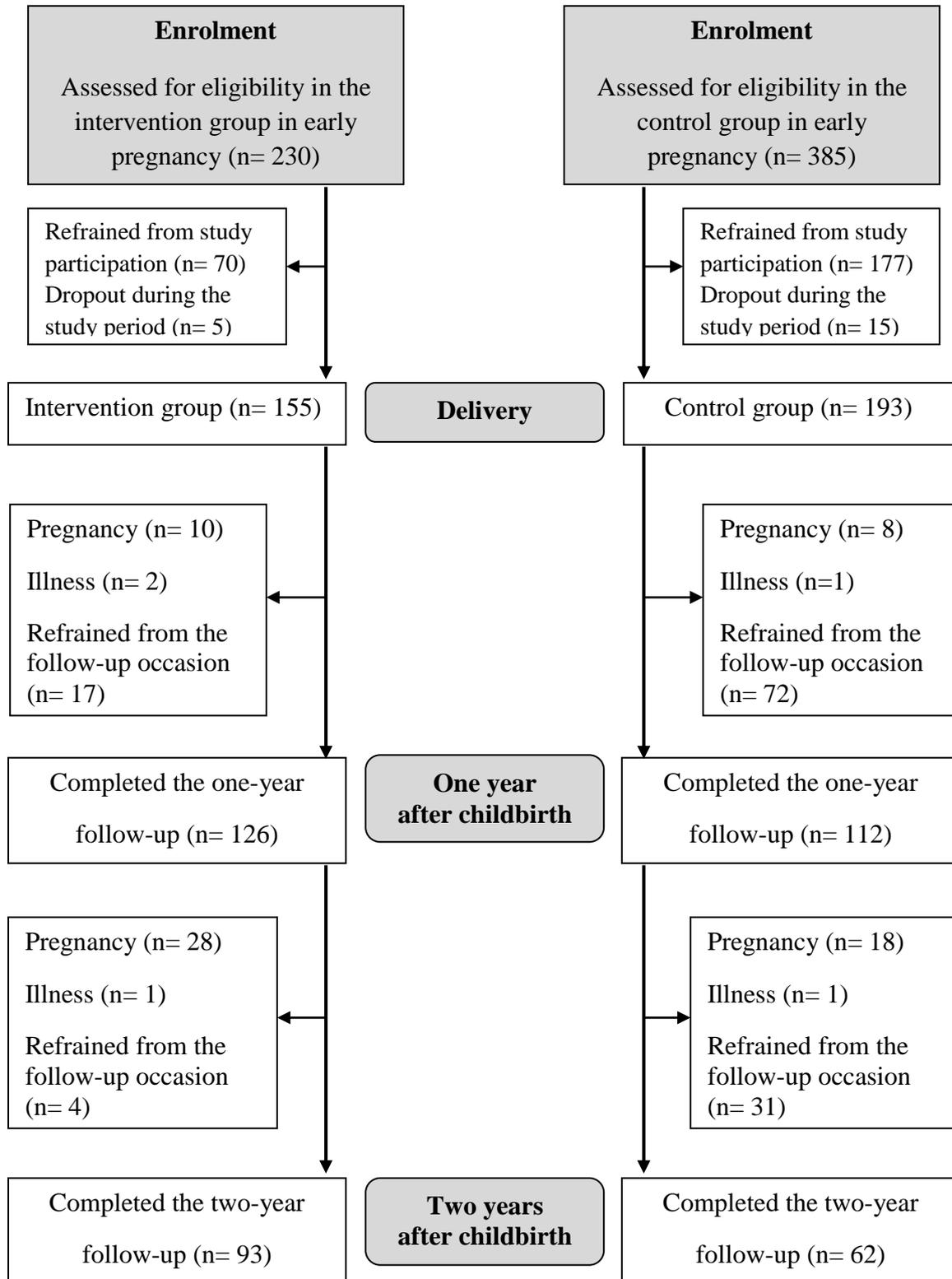


Figure 1. Description of the study population from enrolment to the two-year follow-up.

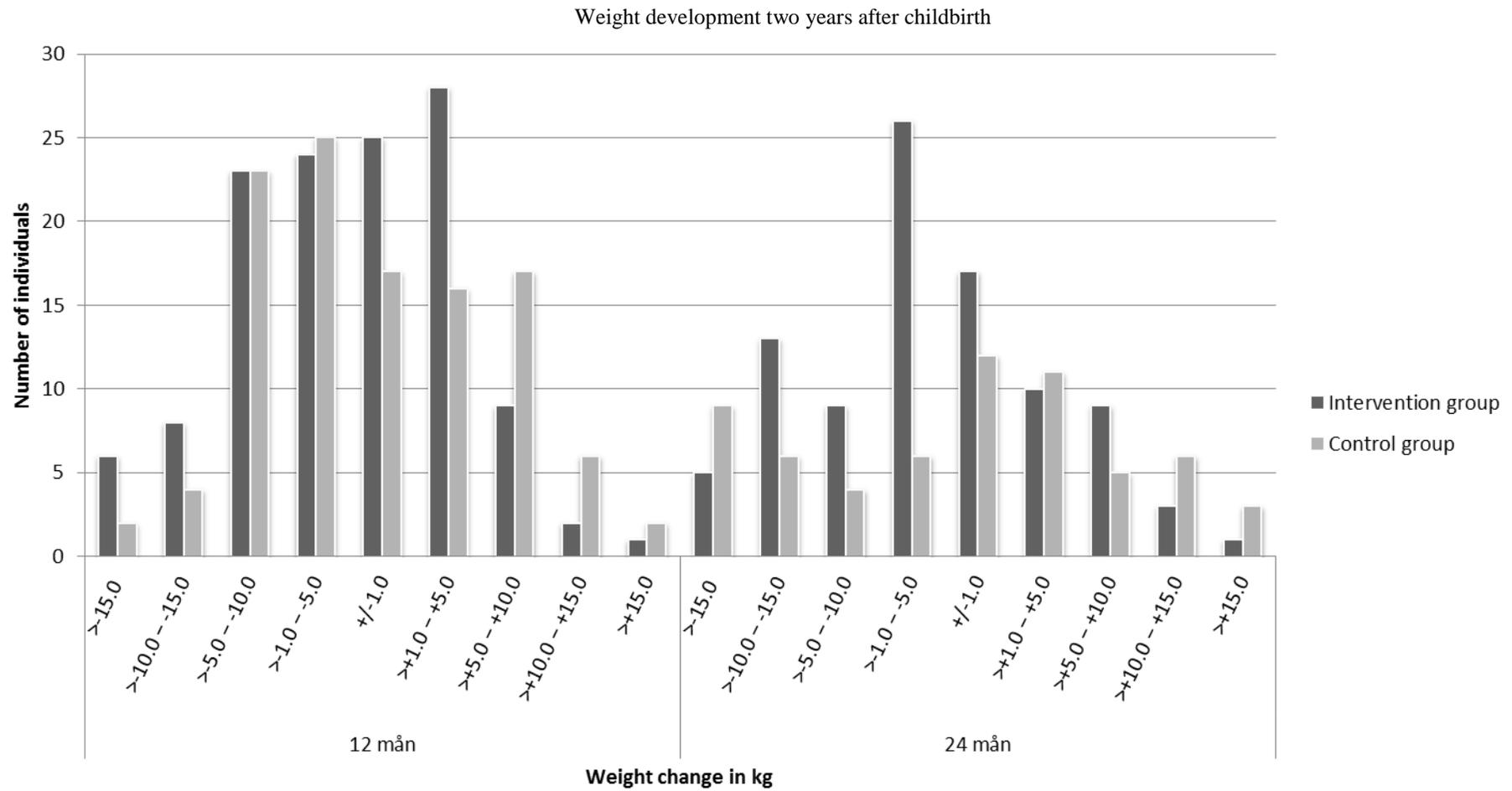


Figure 2. Weight change at the follow up occasions 12 months ($p=0.144$) and 24 months ($p=0.034$) after childbirth in the intervention- and control group compared with the weight at the first antenatal care clinic visit.

Discussion

This study reports the results of a two year follow-up of pregnant women taking part in a weight gain intervention study. There were no differences in mean weight between the intervention- and the control group. Among women who reached the target, i.e., gestational weight gain less than 7 kg during pregnancy, there was a significant difference in mean weight between the intervention group and the control group at follow-up assessment 24 months after childbirth. There was also a difference in mean weight change from early pregnancy to the follow-up assessment at 12 months after childbirth but not at the 24 months follow up. The women in the intervention group showed a greater mean weight change compared with the control group. In terms of weight change, i.e. the weight at the assessment compared with the weight at the first antenatal care visit and expressed in 5 kg classes, there was a difference at the assessment at 24 months after childbirth. More women in the intervention group had lost weight compared with the women in the control group.

In the intervention study we found that women in the intervention group had a lower gestational weight gain and weighed less at the check-up 10-12 weeks postpartum than in early pregnancy, compared with the women in the control group (23). Two years later these differences became smaller or disappeared. In a Finnish controlled trial aiming at reducing postpartum weight retention, 48 first-time mothers in an intervention group got individual counseling on diet and physical activity, two to ten months postpartum at five clinic visits at a public child care clinic (17). The counseling consisted of one primary counseling session and four booster sessions. These women were compared with 37 first-time mothers in a control group who received routine care. There was no significant difference between the two groups in weight retention ten months postpartum. The authors speculated if their intervention instead should have begun in early pregnancy to prevent excessive gestational weight gain, which is a risk for high postpartum weight retention, and continue during the postpartum period (17).

Olson et al. monitored 560 normal and overweight women in an intervention group who received an education program by e-mail during pregnancy. The gestational weight gain was monitored by health care providers and then compared with a historical control group from early pregnancy until one year after childbirth (20). They found no difference in weight gain or weight retention. This is partly in accordance with our results, but differs when we compare the subgroups. Among the women who belonged to the intervention group, the subgroup of women with gestational weight gain less than 7 kg, were found to have a lower weight. Thus the group of women in the present study who reached the initial target of a weight gain during pregnancy of maximum 7 kg seemed to have a better

prognosis. We take this result as an indication of the importance of restricting weight gain during pregnancy in accordance with recommendations for the different BMI-classes. This might be done by providing information and motivation in order to increase the woman's knowledge and personal responsibility for her own health and well-being. However, as the sample in this subgroup is small the results should be interpreted carefully.

In a large Danish study, Baker and colleagues found that obese women with BMI 30.0-34.9 reported mean values of weight retention of -1,2 kg and -2.9 kg at six and 18 months after delivery whereas the corresponding figures for morbid obese women (BMI \geq 35.0) were -3.7 kg and -5.3 kg (27). In our study the mean weight change from early pregnancy to one year after childbirth differed significantly between the intervention group (-2.2 kg) - and the control groups (+0.4 kg), but this difference had disappeared two years after childbirth.

There are strengths as well as weaknesses in this study. It must be kept in mind that there were a considerable number of drop-outs especially in the control group. Consequently, the results must be interpreted with caution. The reasons for the minimal long-time effects of the intervention program during pregnancy are unclear. One possible explanation might be that the pregnancy and/or postnatal life involve major changes in lifestyle and behavior such as increased intake of food, greater access to food, change of meal habits and decreased physical activity (28, 29). These factors may affect the postnatal weight gain, and it is possible that this is true also for our study population. Another possible explanation could be that only women with weight loss or low weight gain participated in the follow up and as a consequence we may lack information from women with high postnatal weight gain. If this is true for the control group it could have affected the results. Consequently, we could not exclude that the high drop-out may have biased our results.

This intervention study is, to our knowledge, the first study which has followed the participating women from pregnancy, through the postpartum period and until two years after childbirth. Furthermore, the women in the intervention group were weighed on the same weighing scale at all measurements. The percentage of participation in this group was also satisfactory at both follow-up occasions 12 and 24 months after childbirth (88 % respectively 82 %), whereas the participation at the same assessments was much lower in the control group (61 % respectively 38 %) which is an important limitation. Moreover, in contrast to the intervention group, a substantial number of the follow-up weights of the controls were self-reported which also may be a source of bias. Self-reported information seldom is equally exact as an objective one. Some studies have investigated the

agreement between self-reported and measured weight information and shown a trend towards greater underestimation with increasing weight (30-32). In the study of Brunner 50 % of the obese women underestimated their weight by at least five pounds (2.3 kg) and 37 % of the obese women underestimated it by 10 pounds or more (≥ 4.5 kg) (31). One can therefore speculate whether the true mean weight difference would have been more pronounced within the control group if all weights had been objectively measured. From our results we can only confirm that it is difficult to maintain compliance with a longitudinal study design for these women who are in a phase of life which is very demanding. In a study of Østbye et al. where more than 40 % of the participants dropped out, the participating women reported difficulty attending the intervention program because of problems with securing childcare and coordinating the schedules of the family (33). Nevertheless the first years after childbirth are an important period, seen from the perspective of preventing the risk of obesity. It remains a challenge to motivate and engage women in this transitional period of life.

Another limitation of the study design is the lack of randomization. However, in a clinical setting it is well known that an intervention with a new treatment routine might influence the staff to change their behavior and treatment regimens even to those women who are supposed to be controls and receive standard treatment. Therefore, we chose to use other cities and their ANCs as controls. The antenatal care programs in Sweden are standardized and almost identical concerning the treatment and supervision offered during pregnancy.

It is evident that structured efforts in preventing weight retention or weight gain postpartum have a modest impact. Since compliance often seems to be the obstacle to overcome there is a need to develop methods that facilitate and motivate women to continue with the weight gain restriction program. Nevertheless, our intervention program with weekly motivational support visits during pregnancy and every 6 months after childbirth had an effect on weight gain up to 24 months after childbirth for the women in the intervention group who succeeded in restricting their gestational weight gain to less than 7 kg.

Acknowledgements

This study was supported by grants from The Health Research Council of the Southeast of Sweden and ALF, County Council of Östergötland.

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Figure and Table legends

Figure 1. Description of the study population from enrolment to the two-year follow-up.

Figure 2. Weight change at the follow up occasions 12 months and 24 months after childbirth in the intervention- and control group compared with the weight at the first antenatal care clinic visit.

Table 1. Socio-demographic data at the time of the first antenatal care clinic visit for women participating at the follow-up assessments 12 and 24 months after childbirth.

Table 2. Weight and weight change at 12 months and 24 months among the studied women in the intervention- and control group.

Table 1. Socio-demographic data at the time of the first antenatal care clinic visit for women participating at the follow-up assessments 12 and 24 months after childbirth.

	Follow-up assessment 12 months after childbirth				<i>p</i>	Follow-up assessment 24 months after childbirth				<i>p</i>
	Intervention group		Control group			Intervention group		Control group		
	n	%	n	%		N	%	n	%	
Age mean, (SD)*	29.8 (4.35)		30.5 (4.95)		0.297	29.7 (4.57)		31.2 (4.65)		0.091
Parity†					0.058					0.011
Primiparas	52	41.3	60	53.6		29	31.2	32	51.6	
Multiparas	74	58.7	52	46.4		64	68.8	30	48.4	
Marital status†					0.291					0.313
Married/cohabiting	120	95.2	102	91.9		89	95.7	56	91.8	
Other family situation	6	4.8	9	8.1		4	4.3	5	8.2	
Smoking†					0.381					0.505
No	117	92.9	107	95.5		86	92.5	59	95.2	
Yes	9	7.1	5	4.5		7	7.5	3	4.8	
BMI†					0.890					0.801
30.0-34.9	87	69.1	75	67.0		66	71.0	41	66.1	
35.0-39.9	26	20.6	26	23.2		16	17.2	13	21.0	
≥40.0	13	10.3	11	9.8		11	11.8	8	12.9	
Socioeconomic group†					0.187					0.237
Unskilled workers	26	20.6	26	23.2		17	18.3	16	25.8	
Skilled workers	37	29.4	40	35.7		28	30.1	16	25.8	

Table 1; continuation										
	Follow-up assessment 12 months after childbirth					Follow-up assessment 24 months after childbirth				
	Intervention group		Control group		<i>p</i>	Intervention group		Control group		<i>p</i>
	n	%	n	%		n	%	n	%	
Lower white collars	6	4.8	6	5.4		4	4.3	4	6.5	
Middle/high white collar workers and self-employed	29	23.0	13	11.6		21	22.6	11	17.7	
Students	18	14.3	13	11.6		16	17.2	5	8.1	
Unknown	10	7.9	14	12.5		7	7.5	10	16.1	
Occupation†					0.263					0.074
Gainfully employed	84	66.7	80	73.4		58	62.4	45	76.3	
Not employed	42	33.3	29	26.6		35	37.6	14	23.7	

All values are given as frequencies unless otherwise stated.

For some women in the control group information is missing for some variables.

* Student's *t* test

† χ^2 test

Table 2. Weight and weight change at 12 months and 24 months among the studied women in the intervention- and control group.

	12 months after childbirth							24 months after childbirth						
	Intervention group			Control group			<i>p</i> **	Intervention group			Control group			<i>p</i> **
	n	mean*	SD	n	mean*	SD		n	mean*	SD	n	mean*	SD	
Weight at the first antenatal care clinic visit	143	95.1	12.04	184	96.3	15.45	0.468	114	95.2	12.45	165	96.8	12.45	0.353
Weight at 12/24 months after childbirth	126	92.1	13.94	112	95.1	15.60	0.115	93	91.3	14.04	62	95.8	16.68	0.081
Weight change early pregnancy to 12/24 month after childbirth†	126	-2.2	7.02	112	0.4	6.84	0.046	93	-2,4	7.58	62	-2.2	12.26	0.877
<u>Weight gain <7 kg during pregnancy</u>	n	mean*	SD	n	mean*	SD	<i>p</i>**	n	mean*	SD	n	mean*	SD	<i>p</i>**
Weight at the first antenatal care clinic visit	47	93.6	10.85	30	98.7	16.49	0.105	35	92.9	11.48	28	100.1	16.21	0.055
Weight at 12/24 months after childbirth	41	88.9	12.49	16	96.3	17.80	0.145	29	87.3	12.07	11	100.8	21.58	0.018
Weight change early pregnancy to 12/24 month after childbirth†	41	-3.4	5.27	16	-2.8	8.09	0.741	29	-3.4	5.51	11	-2.7	11.02	0.785

* mean expressed in kg

** Student's t-test

† That is 'weight at the follow-up occasion' minus 'weight at the first antenatal care clinic visit'