

# Behavioural correlates of successful weight reduction over 3 y. Results from the Lean Habits Study

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**OBJECTIVE:** To examine behavioural characteristics of subjects with successful long-term weight reduction.

**DESIGN:** Prospective cohort study with 3 y follow-up.

**SETTING:** Multicentre study of participants of a commercial weight-reduction programme (BCM-Programme).

**SUBJECTS:** Until February 2000, 6857 voluntary study participants were included. Analyses are based on 1247 subjects with complete 3 y data.

**INTERVENTIONS:** Open-group dietary and behavioural counselling with initial meal substitutions.

**RESULTS:** Subjects show a number of significant behavioural improvements, for example, choice of low-fat food, flexible control of eating behaviour and coping with stress. Subjects who maintain these changes by the end of the first year have a higher probability of successful weight reduction after 3 y.

**CONCLUSIONS:** Successful weight maintenance is associated with more pronounced improvements of health behaviours after 1 y. The likelihood of success increases with the number of behavioural patterns which are involved in the process of change.

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## Introduction

Long-term results of obesity treatment are generally disappointing. <sup>1</sup> Little is known about the behavioural characteristics of those few who manage to maintain their reduced weights for a longer period of time. The Lean Habits Study is a prospective cohort study on the association between behaviour and successful long-term weight reduction.

## Methods

Subjects were recruited from 400 primarily German centres of the BCM Diet programme, a commercial weight-loss programme. Counselling of the patients takes place in an open group format led primarily by physicians. Usually, participants visit the group meetings every 2 weeks. The programme is open ended with an average duration of participation of 4–5 months. It aims at inducing a lasting change of diet and eating behaviour. In addition, two meals

per day are replaced with a formula diet at the start of the programme.

Body weight has been measured. Behavioural characteristics were assessed using a self-administered questionnaire developed for this study. From the questionnaire, scores for eight behavioural characteristics were computed: *Rigid control* and *flexible control* of eating behaviour; <sup>2</sup> rigid control is characterised by a dichotomous 'all or nothing' approach to weight and eating, where periods of strict dieting alternate with periods without any weight control efforts. Rigid control includes attempts to totally avoid sweets or other favourite foods. Flexible control on the other hand is characterised by a graduated 'more or less' approach to eating and weight control, which is understood as a permanent task. *Meal rhythm:* These items assess regular meal rhythm and the avoidance of snacking and nibbling. *Meal situations:* This dimension assesses within-meal situations, for example, sitting down, taking time and rest for eating and/or avoidance of any other activity while eating. *Food choice:* These questions assess the avoidance of fatty foods or sweets and preference of vegetables and fruit. *Restriction of quantity of food:* These items assess whether the amount of food eaten is restricted. *Physical activity:* The extent of exercise as well as physical activity in everyday life

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is assessed. *Coping with stress*: These items include subjective feeling of stress, conscious relaxation and management of emotionally induced eating.

Baseline assessment took place at the start of the programme, follow-up measurements (FU) after approximately 10 weeks, after 1, 2 and 3 y. Subjects were invited by mail and telephone to FU if they no longer participated in the programme.

Until February 2000, a total of 6857 subjects was included in the study. Until May 2003, 1593 subjects (23.2%) attended the 3 y FU. Because 10 week or 1 y FU data were missing for some of these 1593 subjects, the present analyses are based on 1247 subjects with complete data.

A weight loss of 5% or more from baseline to 3 y FU was defined as successful weight reduction. For the purpose of analyses, the sample was divided into two subgroups with or without successful 3 y weight reduction.

## Results

The percentage of women in the sample ( $n=1247$ ) was 89.3%. The average age at baseline was  $47.4 \pm 12.0$  y (mean  $\pm$  s.d.), the average BMI ( $\text{kg}/\text{m}^2$ ) was  $31.0 \pm 5.1$ . The duration of programme participation in the present sample ranged between 0 and 151 weeks with an average of 44 weeks which was considerable higher than the usual mean participation of 16–20 weeks. The mean weight loss after 10 weeks was  $8.2 \pm 4.3$  kg, after 1 y  $9.0 \pm 8.6$  kg, and after 3 y  $4.9 \pm 8.4$  kg. At 3 y FU, 710 subjects (10.4% of all 6857 subjects who originally entered the study until February 2000) maintained a weight loss of 5% or more from baseline.

Averages for all eight behavioural scores increased from baseline to 10 weeks follow-up with only few significant differences between the long-term success subgroups. Significant differences ( $P < 0.05$ ) were found for flexible control and restriction of quantity of food. At 1 y FU, most of the average scores were lower than at 10 week FU, and we found significant differences between the two success-subgroups ( $P < 0.05$ ) for all behavioural dimensions except for rigid control and physical activity.

Therefore, we defined 'maintenance of behavioural improvement' if the score for a behavioural characteristic was maintained or further improved from 10 week FU to 1 y FU. With the exception of rigid control and restriction of amount of food, the maintenance of behavioural improvement for each of the eight scores was associated with a significantly higher probability of successful weight reduction after 3 y (Table 1). The percentage of successful weight reduction increased with the number of behavioural scores for which improvement was maintained and was highest in subjects who maintained five to eight behavioural improvements (Table 2).

## Discussion

Results show that successful long-term weight reduction is a complex process of behavioural change. Successful partici-

**Table 1** Odds ratios for successful weight reduction after 3 y dependent on the maintenance of behavioural improvements after 1 y

Behavioural dimension	Odds ratio for successful weight reduction after 3 y (maintenance of behavioural improvement vs no maintenance)	Significance
Flexible control of eating behaviour	1.30	*
Rigid control of eating behaviour	1.18	ns
Meal rhythm	1.71	**
Food choice	1.81	**
Meal situations	1.36	*
Restriction of amount	1.17	ns
Physical activity	1.35	*
Coping with stress	1.31	*

ns: not significant; \* $P < 0.05$ . \*\* $P < 0.001$ .

**Table 2** Percentage of subjects with successful 3 y weight reduction dependent on the number of maintained behavioural improvements after 1 y

Number of maintained behavioural improvements	n	Percentage of subjects with successful weight reduction after 3 y (%)
0	1	0.0
1	19	21.1
2	58	24.1
3	115	33.9
4	234	44.0
5	323	52.3
6	299	51.5
7	168	60.7
8	30	53.3
Total	1247	48.2

pants can reach a higher level of weight-related health behaviours by the end of the first year, and this predicts the probability of successful weight reduction after 3 y. The likelihood of success increases with the number of behavioural areas, which are involved in the process of change. Thus, to achieve a lasting stabilisation of weight, it is usually not sufficient to change one or another single aspect of personal behaviour. It seems to be much more promising if one changes the whole personal life style. The finding that less successful subjects give up behavioural improvements and relapse into old behavioural patterns within the first year indicates that the therapeutic support of weight reduction should be continued for at least 1 y.

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